A Conceptual Model of Desire-Based Choice

“You can’t always get what you want
But if you try sometimes you just might find
You just might find
You get what you need”¹

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Abstract
A bounded rationality model incorporating desires and evaluations based on them is proposed. Choice options are characterized by finitely many degrees of fulfillment of a finite number of desires. The set of options is subject to logical restrictions, resource constraints, and social norms. The evaluation process leading to a choice from the set of feasible options is considered. We offer different evaluation modes, lexicographic rankings of the importance of desires as well as weighted aggregations. In the evaluating procedures we model different goals of the individual, maximization of satisfaction or minimization of frustration, and we also combine satisfaction and frustration in one evaluation including the dependence on the individual’s status quo of living.

Key words: desires, bounded rationality, evaluation of options, choice, quality of life

JEL: D01, D03, I31

1. Introduction

The aims of this paper are conceptual. It proposes a formal model of how an individual deals with the fact that she cannot always get what she wants since she can only choose an option from the feasible set. We propose some modes of individual evaluation structures based on a set of the individual’s desires. Evaluations lead to a choice of some option from the feasible set. This choice then defines actions an individual would have to take in order to fulfill the chosen combination of fulfillment of desires.

Our concept is based as far as possible on variables that have an empirical basis. It will be possible to ask subjects to name or select the variables and to observe subjects’ evaluation process.

¹ The Rolling Stones, 1968
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Eventually the aim must be to find out how real world individuals go about their decision-making process against the background of desires. The model proposed here has a descriptive choice making component and also a partially normative one. It is laying out some standards of minimum rationality that may or may not be fulfilled. This should be open to empirical testing.

In section 2 we will present the framework and define the desire grid of options. Section 3 deals with different restrictions of the feasible set of options. In section 4 we develop several evaluation procedures, and section 5 concludes.

2. The Model

Consider an individual with a certain finite number of desires. Desires of the individual are denoted by $D_1, ..., D_n$. We assume that each desire $D_i$, $i=1, ..., n$, can be fulfilled to a certain extent. The individual relies on a “coarse structure” to assess and classify the degree of fulfillment of the desire. Degrees of fulfillment of desire $D_i$ are denoted by $f_i$. For the sake of simplicity we assume that there are a finite number $p$ of degrees the individual perceives, and that this set is the same for all desires. The set of degrees is denoted by $F$.

As a specific illustration one can imagine that each desire $D_i$ may be fulfilled not at all $f_i=0$, or to a low degree $f_i=1$ or to a medium degree $f_i=m$ or to a high degree $f_i=h$ or completely $f_i=c$. This exemplary coarse structure $F_i=\{0, 1, m, h, c\}$ stands in for any other empirically relevant finite structure of $p$ degrees between zero fulfillment and complete fulfillment of a desire. This coarse structure of five or in general $p$ degrees can be applied to each desire $D_i$, $i=1, ..., n$, in principle. But it may well be the case that for some specific desire not all degrees make sense. For instance, in case of the desire to own a Rolls Royce, either you own one or you don’t, reducing the set to $\{0, c\}$. We will take care of this in the discussion of reasons for non-feasibility.

In order to present the choice possibilities of the individual we define the Cartesian product $G=\{(f_1, ..., f_n) \mid f_i \in F\}$. $G$ contains all combinations of degrees of fulfillment of the $n$ desires and is called a grid. Elements in $G$ are called options. We interpret options as states of affairs representing some circumstances of an individual’s life. In the example of owning a Rolls Royce the desire is not defined by the object but by the state of affairs of owning it. Example 1 shows a two-dimensional grid with five degrees of each desire.

Example 1

Desire Grid

In general there are $n$ desires with a finite number of $p$ degrees of fulfillment. In the example we consider two desires $D_1$ and $D_2$ with the degrees $0, 1, m, h, c$.

Two desires and five degrees lead to a two-dimensional 5x5 Cartesian product or grid:
We say that an option is feasible if and only if there is a set of actions the individual can perform in order to achieve this option. Assuming a world of certainty concerning consequences of action we need not calculate expected degrees of fulfillment. This is ruled out formally since it would not make sense in a model with merely ordinal rankings. In substance it is also not in line with the mental representations individuals use in the process of mental modeling complex action situations. An individual judges a certain combination \( g \in G \) to be feasible then the individual owns at least one plan of actions that would result in the realization of \( g \).

3. Non-Feasibility

The grid \( G \) is the starting point of the analysis. There is a so called ideal option \( \bar{c} \in G \) with \( \bar{c} = (c, \ldots, c) \) where all desires are completely fulfilled. If this option is feasible, i.e. there is a plan of actions such that \( \bar{c} \) is the outcome, we shall assume that the individual will be happy to choose this plan and the resulting complete realization of all her desires. This individual gets what she wants in all dimensions.

However, an individual may not always get what she wants. Therefore, in our context we have to deal with circumstances where \( \bar{c} \) is not feasible. In addition, the same may hold true for other vectors in \( G \), too. Holler (2013a, 2013b) refers as “editing” to the process the individual has to apply in order to account for all combinations of desires that may be feasible or may be good options. How individuals in fact form their desire grids and edit them is an empirical question. We study the editing process in principle starting with the search for incompatibilities of desires.

3.1 Logical Restrictions and Incompatibilities “on the Grid”

To start with the most trivial example, there may be desires that can be completely fulfilled or not at all. This is a case in which all degrees of fulfillment between 0 and \( c \) do not make sense. Therefore, all vectors in \( G \) with intermediate degrees of fulfillment of such a desire are not feasible.

There may also be limitations by nature that restrict certain desires to some extent. E.g. the desire of a person to fly like a bird cannot be fulfilled for natural reasons.

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3 See on this view also Güth 2014.
In addition, considering subsets of desires it may follow logically that the fulfilment of them is bound to restrictions. Let us consider the case of two desires \( D_i \neq D_j \). We can define for this pair of desires that the fulfillment of desire \( D_i \) to a certain (non-zero) degree is strictly incompatible with the fulfillment of \( D_j \) to a certain (non-zero) degree and vice versa: \( f_i \neq 0 \iff f_j = 0 \). This is equivalent to \( f_j \neq 0 \iff f_i = 0 \). E.g. the desires to be a dwarf and the desire to be a giant are strictly incompatible due to logical reasons. If you are a giant you are not a dwarf and vice versa.

Yet there exist weaker versions of pairwise incompatibility. Let us consider the desire to be a person of public interest and the desire to lead a calm and reclusive life. One can think of situations where a person having completely or to some high degree realized the desire to be of public interest will for obvious reasons not be able to realize a calm and reclusive life to any positive degree (or to some medium or higher degree). The thought behind this weakening can be generalized to a notion of general incompatibility. For any vector of desires we can define vectors of degrees of fulfillment of these desires that are incompatible. These incompatibilities depend on the definition of the degrees of fulfillment of a desire and therefore on empirical issues. The degrees have to be defined by the individual depending on her perception. Logical considerations in an application of the model can only be made afterwards, taking degrees a given.

Note that the preceding considerations concerned structural relations in the result space. Independently of what is possible in the action space it is not meaningful at all to try to achieve the results since they are incompatible as results. Obviously there are also issues of feasibility in the action space.

### 3.2 Limited Resources

In order to undertake the actions necessary to realize vectors of fulfillment of desires the individual needs certain amounts of resources. We assume that these amounts are limited, implying that not all combinations of fulfillment of desires are feasible even if they are compatible. This second step of editing further restricts the set of feasible combinations in \( G \). To construct this type of restriction on \( G \) empirically the budgets of relevant resources have to be known and the amounts necessary to realize certain vectors in \( G \). For the exercise at hand it is important to bear in mind that compatibility in result space is different from feasibility according to action space restrictions. Normative restrictions may concern both the acceptability of certain desires themselves and the acceptability of feasible actions leading to compatible combinations.

### 3.3 Social Norms

In a third step of the editing process the individual has to decide which laws and informal social norms of her social environment she will respect when realizing her desires. These norms may exclude some desires, but also specific actions to be used to realize certain...
desires. Norm compliance restricts the feasible set further on. Norms may concern actions as well as desires themselves. To start with the latter, it may be stigmatized in a society to have certain desires and the individuals having them will feel guilty. For instance, certain sexual desires may be present but not be deemed desirable by the actor herself. It does not seem self-contradictory to have a desire to keep within the bounds what is deemed desirable according to norms or standards. Likewise as far as actions are concerned some can be feasible and desired but again due to norms be deemed undesirable. An individual may not want or cannot always follow the norms she generally finds important. Consider an individual having the desire to own a Rolls Royce and the desire to obey the norm “do not steal”. In this case the fulfillment of the first desire may be possible in circumstances where the second desire is not fulfilled. Norms that are seen by the individual as not fully binding are modeled as desires, and feasibility under norm fulfillment is edited similar to other incompatibilities.

Example 2

For the case of two desires and five degrees of fulfillment each we can represent $G^*$ in the grid of example 1 by denoting feasible options by crosses.

\[
\begin{array}{cccc}
\text{Fulfillment Degrees of } D_1 & & & \\
0 & l & m & h & c \\
\end{array}
\]

\[
\begin{array}{cccc}
\text{Fulfillment Degrees of } D_2 & & & \\
c & x & x & \\
h & x & x & \\
m & x & x & x \\
l & x & x & x & x \\
0 & x & x & \\
\end{array}
\]

So far we have applied different types of restrictions to the set $G$. We denote the resulting subset of feasible fulfillment vectors by $G^*$. We interpret $G^*$ as the result of the editing process. We will call elements on $G^*$ feasible options. The next step deals with evaluations of elements in $G^*$. If the feasible set contains more than one element further evaluations must take place.

4. Evaluation and Choice

The evaluation of options presupposes that the individual has some idea how her wellbeing is derived from the fulfillment of her desires and how to trade off the different aspects combined in an option. The focus may be positive on the quality of life, the satisfaction or the happiness the individual will experience if she chooses some option. On the other hand

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being unable altogether to fulfill a desire may be of greater importance and then avoidance of frustration or keeping dissatisfaction small may be in the foreground.

We may introduce a status quo \( d \) in \( G^* \) and assume that the individual evaluates all choices compared to \( d \). \( d \) is the state the individual expects to emerge in continuity with the present one unless she realizes an altering option.

The option the individual chooses will depend on the type of evaluation and on the results of this evaluation. We offer evaluations that lead to an ordering of options and assume rationality of choice, i.e. the individual chooses an undominated element with respect to her evaluation ordering.

### 4.1 Lexicographic Orderings

In the evaluation step the individual may compare desires themselves or vectors of degrees of fulfillment. Let us start with the assumption that the individual ranks desires with respect to their strength. There are stronger desires and weaker desires. Instead of strength one can also think of importance or urgency of desires (cf. Scanlon 1975) or needs like in Maslow’s pyramid (c.f. e.g. Maslow 1943) dependent on the context of the decision problem. All these examples lead to the assumption that the individual is able to construct a linear ordering of her desires “\( > \)” such that w.l.o.g. \( D_1 > D_2 > \ldots > D_n \). We could conceivably assume that this ordering does not depend on her actual circumstances of life. But we could also assume that it is contextually influenced. In the latter case the status quo of the individual would be a typical influence on the ordering and it would be assumed that the ordering is only valid for one decision, namely a prospective change of the status quo.

We model strength of desires in the following way: if one desire is stronger than another one, the individual will look for options such that the stronger desire is fulfilled as well as possible. Among these options the individual looks for the maximal degree of fulfillment of the weaker desire. Applying this idea to the set of all desires a lexicographic ranking \( R_{\text{lex}} \) of options emerges. If \( (f_1,\ldots,f_n) \neq (g_1,\ldots,g_n) \) are vectors in \( G \) we say that \( (f_1,\ldots,f_n) R_{\text{lex}} (g_1,\ldots,g_n) \) applies if an only if the following holds: let \( s \) be the smallest index such that \( f_s \neq g_s \). Then \( f_{s+1} > g_{s+1} \). (Remark: \( s \) exists since \( (f_1,\ldots,f_n) \neq (g_1,\ldots,g_n) \)). Here we implicitly assume that given a fixed desire a higher degree of fulfillment of that desire is always preferred to a lower degree.

\( R_{\text{lex}} \) is an ordering on \( G \) and therefore also on \( G^* \). Facing \( G^* \) the individual chooses the unique maximal option in \( G^* \) under \( R_{\text{lex}} \). This option is the one that maximizes the satisfaction of the individual given that the restrictions, the strength ordering and the lexicographic aggregation rule hold. In the plausible case that the individual orders her desires related to need, she might find that she does not always get what she wants, but what she needs (most) (cf. the subtitle of the Rolling Stones’ quotation).

Let us turn to the negative focus and the attempt to avoid frustration or dissatisfaction. We can assume that the individual constructs a linear ordering of the desires with respect to their importance to avoid dissatisfaction. If the importance ordering to avoid frustration is
different from the ordering with respect to strength, we rearrange the desires again such that $D_1, \ldots, D_n$ reflects the importance ordering with respect to avoidance of frustration. We assume that the degrees of frustration are inversely ordered to the degrees of fulfillment. Then we define $R_{lex}^{frust}$ similarly to above for distinct vectors: $(f_1, \ldots, f_n) R_{lex}^{frust} (g_1, \ldots, g_n)$ if and only if the following holds: let $s$ be the smallest index such that $f_s \neq g_s$. Then $f_{s+1} > g_{s+1}$. This means the degrees of fulfillment are identical for all most important indices up to $s$ in $f$ and $g$, but the degree of fulfillment in $f$ is higher in desire $s+1$, i.e. the frustration is lower in $f$. The individual then minimizes aggregated frustration by choosing a maximal element in $G^*$ with respect to $R_{lex}^{frust}$. In the special case where considering the importance of dissatisfaction leads to the same order of the desires compared to considering their strengths $R_{lex}^{frust}$ and $R_{lex}$ are identical.

The shortcoming of lexicographic orderings is that they presuppose importance rankings that are independent on the actual options to be compared. To put it in economic terms, they do not allow for trade-offs in which compensation takes place between dimensions. Since decision making in the shadow of scarcity does of necessity involve trade-offs unless there is a single undominated alternative imposing a lexicographic ordering of dimensions conceals some essential problems. It is an empirical question whether and when the assumption of situation invariant lexicographic orderings is reasonable. That it is universally applicable is certainly not likely. We should be prepared to offer a more general aggregation rule that deals with satisfaction and frustration simultaneously and also incorporates status quo dependence.

4.2 Weighted Aggregation

It is an empirical question how detailed and specific individuals may weigh different degrees of fulfillment of desires and how they may manage to cardinally compare degrees of different desires. In reality there will be only a few attractive candidates for choices in $G^*$ and the whole evaluation procedure may boil down to a small enterprise. Since individuals somehow explicitly or implicitly form such trade-offs, we assume that they can in principle be constructed by the individual. We offer a general model that does not presuppose specific assumptions on the definition of weights for each degree of fulfillment for any desire, however, we will use an additive structure of the weighing process, i.e. the evaluation is presented by a separable function. We assume that the individual can construct $n \times p$ positive numbers on the desire grid. For each $k \in \{1, \ldots, n\}$ and desire $D_k$ and for each of the $p$ degrees of fulfillment $f_k \in F$ the positive number $w_k(f_k)$ transforms the fulfillment of $D_k$ to the degree $f_k$ to a real number. We call $w_k$ a weight function of desire $k$, and we want $w_k$ to be monotonic in $f_k$, i.e. higher degrees of fulfillment receive higher weights.

For any option $g = (g_1, \ldots, g_n)$ in $G$ the result of the evaluation is defined by $W(g) = \Sigma_{i=1,\ldots,n} w_i(g_i)$. The individual’s choice from $G^*$ with respect to $W$ is then an option that maximizes $W$ in $G^*$. 

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We do not assume any regularities of the vector $w=(w_1,\ldots,w_n)$. However, by restricting possibilities for $w$, for instance, the lexicographic ordering can also be presented by some weight function with appropriate differences in sizes between $w_1,\ldots,w_n$.

A model for the negative view of frustration by not achieving the fulfillment of desires to some extent can be presented e.g. by positive frustration weights $v_k(f_k)$ for each $k\in\{1,\ldots,n\}$ and desire $D_k$ and for each degree of fulfillment $f_k$ of desire $k$. The weights $v_k(f_k)$ are decreasing in $f_k$. The evaluation function $V$ in terms of frustration is defined by $V(g) = \sum_{i=1,\ldots,n} v_i(g_i)$. The individual chooses an option from $G^*$ that minimizes $V$. It is, of course, easy to model choice under frustration in a maximizing concept. One could e.g. use negative weights, the higher the frustration the smaller the weight.

Evaluations and the choices with respect to $W$ and $V$ may not be equivalent. $W$ is concentrated on hypothetical gains in satisfaction, whereas $V$ is concentrated on hypothetical frustration which can be seen as derived from a loss compared to complete fulfillment of desires. From experimental choice theory it is known that losses are perceived differently than gains. Thus also the evaluation of happiness or quality of life will depend on what is empirically considered, hypothetical gains compared to some fictitious situation of zero fulfillment of all desires or frustration compared to complete fulfillment of all desires.

Another variation of the concept stems from the perspective of comparing all hypothetical gains and losses in satisfaction to the situation the individual lives in. In this case we consider a weight function that depends on the status quo $d=(d_1,\ldots,d_n)$ which is an option in $G^*$. The evaluation then may be modelled in different forms. We suggest assigning positive weights to gains and negative ones to losses compared to the status quo $d$. $d$ would receive zero evaluations in all desires. However, we could also equivalently use an overall positive weighing with positive weights for $d$, too. In any case we assume that for any $g = (g_1,\ldots,g_n)$ in $G$ the weight difference considering desire $k$ $w_k(g_k) - w_k(d_k)$ is non-negative if $g_k > d_k$ and non-positive if $g_k < d_k$. Weight differences are monotonic in steps of changes of degrees. $W$ is defined like above by $W(g) = \sum_{i=1,\ldots,n} w_i(g_i)$. Then $W$ is maximized to select a choice option.

This last most general aggregation rule also includes cases of lexicographic orderings where the importance ranking depends on the status quo. This might be an appropriate model when degrees of fulfillment are interpreted as aspiration levels. There exists empirical evidence that the importance ranking may depend on achieved levels (Selten et al. 2012).

We use the grid from example 2 in order to apply different evaluations. In case of lexicographic rankings, if $D_1$ is the most important desire in Example 3 option (c,l) will be chosen. If $D_2$ is the most important desire option (l,h) will be chosen. If we apply monotonic degree weights the choices will be between the options (l,h),(m,m), and (c,l) dependent on the concrete weights. These are the strongly Pareto-efficient options in terms of degrees of fulfillment.
Example 3

Fulfillment Degrees of D₂

\[
\begin{array}{cccc}
  c & & & \\
  h & x & x & \\
  m & x & x & x \\
  l & x & x & x & x \\
  0 & & & x \\
  0 & l & m & h & c \\
\end{array}
\]

Fulfillment Degrees of D₁

Now we introduce a status quo \(d=(l,m)\) (cf. Example 4).

Example 4

Fulfillment Degrees of D₂

\[
\begin{array}{cccc}
  c & & & \\
  h & x & x & \\
  m & x & d & x \\
  l & x & x & x & x \\
  0 & & & x \\
  0 & l & m & h & c \\
\end{array}
\]

Fulfillment Degrees of D₁

Let us e.g. define that a loss of one step in degrees compared to \(d\) has a negative impact in the aggregation which is twice as high as the positive impact of a gain of one step. Then the maximal options are \((l, h), (m,m), \) and \((c, l)\). These options have identical aggregate weights. Here it is important to note that \((l,h)\) and \((m,m)\) are weak Pareto-improvements in terms of degrees compared to the status quo, whereas \((c, l)\) is no Pareto-improvement compared to \(d\). It is also easy to find examples in cases of low weights for frustration such that the maximal option is not a Pareto-improvement. In our example in case of lower weights for frustration the choice would be \((c,l)\).

5. Conclusion

We offer a framework to model individual choices of an individual. This framework is based on a concept of desires. In contrast to standard economic choice theory the choice model in this paper does not use the relation between utility functions and choices. We also do not talk about preferences on outcomes. In addition we do not assume all rationality requirements formulated in economic decision theory to be fulfilled. Our concept is embedded in theories of bounded rationality, instead. The first element of our concept belonging to this field is the assumption of bounded perception of differences in degrees of fulfillment of desires. We work with a coarse structure of finitely many degrees of fulfillment. Then there is no necessity to consider the spaces of the contents of desires more
closely. Different types of desires can be handled in the same model without problems since the aspects we are focusing on are degrees of fulfillment. These are one-dimensional and can be assumed to be of the same kind for all desires.

The second aspect of bounded rationality is that we allow for different kinds of restrictions of the set of options, including bounds the individual imposes on her by following certain social norms. The third aspect governed by bounded rationality is that we model very coarse evaluations of the feasible options. There are aggregation functions and choices induced by lexicographic rankings known from descriptive decision theories to be very prominent in real decision making (c.f. for instance Payne et al. 1993). Here one important rationality condition enters the model. We assume that the individual chooses a maximal element with respect to the constructed ordering of options. We refine these procedures by assuming weights on degrees of fulfillment. Here again a rationality assumption is used. We assume that weights are monotonic in increasing degrees of fulfillment. This assumption reflects the monotonicity in satisfaction derived from higher degrees of fulfillment of desires and seems very natural in view of the purpose of the choice e.g. to maximize satisfaction.

The concept is variable enough to model the attempt of the individual to aim for satisfaction or to avoid dissatisfaction or frustration. It is also possible to include satisfaction and frustration simultaneously. Here we may use weight functions that are dependent on a status quo or some option the individual aspires to. We present ways to model different types of weight for gains in fulfillment of desires and of losses.

The theoretical presentation of the model suggests a sequence of steps, first the individual selects desires and degrees of fulfillment, then she checks feasibility, afterwards she evaluates feasible options and finally chooses. In the model these steps are formulated separately and sequentially for structural reasons in order to distinguish different categories of the choice process. It is an empirical question whether and how individuals integrate elements of these steps. Let us assume that an individual wants to proceed fast and does not want to invest too much or unnecessary cognitive effort (cf. e.g. Gigerenzer et al. 1999). In this case one can well conceive of the following proceeding. Confronted with a choice problem the most important desire comes to an individual’s mind. She checks to what maximal degree this desire can be fulfilled and considers only options with this property. After this first selection she decides on her second most important desire and searches for the best feasible degree of this second desire among the options under consideration. This process might continue as long as there is more than one option left such that the individual may include some further desire in order to discriminate. Such a procedure saves cognitive effort since in case of lexicographic evaluations it is not necessary to check the feasibility of all options. In addition it may also be the case that not all potentially relevant desires have to be included if the set of options under consideration already shrank to just one element. Such a process is one conceivable empirical realization of some desire-based choice with status quo and context dependent importance rankings of the desires. Because of the sequential revelation of the importance ordering of desires in a generalized version of this
approach the next important desire may even depend on the set of options that are still under consideration.

Since, to a large extent, our model uses variables that can be inferred from subjects and their behavior in experiments it is a challenge to find out how far the concept is suited to describe decision making by subjects in experiments.

6. References


