On Meta-Preferences and Incomplete Preference Maps

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ABSTRACT

The paper suggests that a consumer's specific preferences for goods are derived from underlying meta-preferences. In this context, the paper demonstrates that preferences for goods must always be incomplete. Hence, the problem of mapping out preferences should be considered an integral part of the consumer's basic optimization problem. In turn, this means that learning and innovation must play a role in the consumption process and that observed choices do not always reveal a consumer's underlying preferences. Some choices are made simply to try out new things and, whenever the consumer does not like the results, a choice will not be repeated. Accordingly, one cannot always rely on revealed preferences to predict future behavior. (JEL D11)

INTRODUCTION

Human desires and aspirations are not simple enough to be nailed down in terms of specific market goods. The goods are not an end but rather a means to an end, since "underlying preferences are defined over fundamental aspects of life, such as health, prestige, sensual pleasure, benevolence, or envy, that do not always bear a stable relation to market goods and services"[Becker, 1976, p. 5]. In other words, specific preferences for goods are based on underlying meta-preferences. Still, for expediency and pedagogical reasons, it is sometimes convenient to pretend that goods do have intrinsic utility and that preferences for goods are both predetermined and complete. Diamond [1984, p. 47] put it this way:

> "Basic research is sometimes best done with assumptions that are known to be wrong: untrue assumptions may be chosen to isolate the workings of a particular institution or merely out of tractability.... Since there are many things to be learned about the economy, the analogy of looking under the light for a key lost elsewhere is a bad one. There is no single key. On the other hand, it is very tempting to confuse assumptions chosen for basic research with true statements about the world."

The truth of the last sentence is confirmed by the fact that the completeness axiom of consumer choice theory, originally chosen for expository clarity, has ended up as an inviolable hard-core tenet[1] of mainstream economic theory [Weintraub, 1993, pp. 109-10]. This is true, in spite of the fact that people have long since known that preferences do change over time and that "there is considerable evidence that people do not always know what they want." [Rosser, 1993, p. 358].

The point is, one must be careful in choosing assumptions and must not loose sight of why they were chosen in the first place. In choice theory, simplifying assumptions is necessary because an individual's decisions generally have too many intangible attributes. Those who reject pure theory, built on simplifying assumptions, as Panglossian and unrealistic miss the fact that it is not really

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meant to be anything else. No one argues that perfect information and zero transaction costs are realistic assumptions. Pure theory may well be based on unrealistic assumptions and still be a valuable tool in exposing logical fallacies and in organizing thoughts. Obviously, pure theory often fails to explain empirical facts and it may not always yield the relevant answers from a policymaker's point of view. Yet, without the use of logic and without a way of systematizing observations of reality, one can hardly make sense of the real world. But even so, the wrong set of simplifying assumptions can still lead someone astray.

The completeness axiom is handy when one wishes to sidestep the issue of preference formation but it is most inappropriate and misleading to think of it as universally descriptive. Reliance on the veracity of the completeness axiom has directed one's attention away from how the supposedly revealed preferences came to be in the first place. In other words, it has repressed scientific inquiry into why consumers want whatever they want. The problem is so serious that many researchers in the fields of consumer psychology and marketing actually believe that the economic literature over the last few decades has contributed nothing to the understanding of consumer behavior.

To bring modern consumer theory back on track, one must explicitly recognize that tastes and preferences are incomplete and that learning, experience, and innovation will affect objective. This paper contends that a rejection of the completeness axiom of choice theory, especially in a Beckerian household-production framework, presents the reader with a ready-made setting for the analysis of rational choice that is at once more sophisticated (i.e., less tautological) and more realistic and relevant than the framework of traditional choice theory. Moreover, this framework immediately resolves certain controversies that have long puzzled choice theorists.

The rest of the paper is organized as follows. The next section demonstrates that the mapping of a complete rank-order preference structure, even for a small number of goods, requires too many calculations for it to be feasible. No real consumer can possibly have a rigorously complete preference map in terms of specific goods. Given this, the third section then demonstrates that in a meta-preference framework, the set of all conceivable commodities produced by a household is much larger than the set of commodities that can ever actually be considered. This immediately suggests that the consumer is always operating under radical uncertainty, that the process of learning about available options is an integral part of the consumer's optimization problem, and that Schumpeterian creative (as opposed to adaptive) economic responses must play a crucial role. In other words, consumers do not simply choose from a known menu of fully understood alternatives; they are continually forced to rewrite the menu, to create new and previously unknown possibilities. Finally, the fourth and last section the paper summarizes the implications of this for choice theory.

ON THE TRADITIONAL SPECIFICATION OF PREFERENCE MAPS

Following Jonsson [1995, Appendix], the traditional axiomatic formulation of consumer choice is reviewed based on preexisting preferences. Formally, one uses $X = \bigcup_I x_i \subset \mathbb{R}^n$ to denote the set of all conceivable vectors of consumption bundles, $x_i \in \mathbb{R}^n$, where each such bundle can be thought of as vector $x_i = (x_{i,1}, x_{i,2}, \ldots, x_{i,n})$ of elements $x_{i,j}$ that represent the quantities of the various goods r ($r = 1, 2, \ldots, n < \infty$) in vector x_i. For any ordered pair of consumption bundles, $(x_i, x_j) \in \mathbb{R}^n \times \mathbb{R}^n$, it is always supposed to be clear whether the consumer prefers x_i to x_j, does not like x_i as well as x_j, or is indifferent between the two.

In this sense, one can envision a preference structure on the set of conceivable consumption vectors X. This preference structure specifies the consumer's preferences for each ordered pair of conceivable alternatives, $(x_i, x_j) \in \mathbb{R}^n \times \mathbb{R}^n$. In turn, this structure consists of sets of binary preference relationships that are defined over the set of all ordered pairs in the Cartesian product $X \times X \subset \mathbb{R}^n \times \mathbb{R}^n$.

One uses $\succ$ both to denote the set of applicable strict preference relations, $\{\succ\}\subset X \times X$, and as an operator to indicate that x_i is strictly preferred to x_j (i.e., $x_i \succ x_j$). Based on this notation, the statements $x_i \succ x_j$ and $(x_i, x_j)\in\{\succ\}$ are equivalent. For consistency, assume that the set $\{\succ\}$ is irreflexive (in the sense that $(x_i, x_i)\notin\{\succ\}, \forall x_i \in X$), asymmetric (i.e., $(x_i, x_j)\in \{\succ\} \Rightarrow (x_j, x_i)\notin\{\succ\}$, $\forall x_i, x_j \in X$), and transitive (i.e., $(x_i, x_j), (x_j, x_k)\in\{\succ\} \Rightarrow (x_i, x_k)\in\{\succ\}$, $\forall x_i, x_j, x_k \in X$).

Similarly, $\{\prec\}$ denotes the set of applicable strictly less-preferred-than relationships, so $x_i \prec x_j$ means that x_i is strictly less favored than x_j or, equivalently, that $(x_i, x_j)\in\{\prec\}$. For consistency, assume that the set $\{\prec\}$ is also the converse of the set $\{\succ\}$. In other words, one believes that $x_i \prec x_j \Leftrightarrow x_i \succ x_j$, $\forall x_i, x_j \in X$ or, equivalently, that $(x_i, x_j)\in\{\succ\} \Leftrightarrow (x_j, x_i)\in\{\prec\}$, $\forall x_i, x_j \in X$.

Finally, $\{\sim\}$ denotes the set of applicable indifference relations, while $x_i \sim x_j$ denotes that the consumer values x_i and x_j equally. For consistency, assume that the set $\{\sim\}$ is reflexive (i.e., $(x_i, x_i)\in\{\sim\}$, $\forall x_i \in X$), as well as symmetric (i.e., $(x_i, x_i)\in\{\sim\} \Rightarrow (x_j, x_i)\in\{\sim\}$, $\forall x_i, x_j \in X$) and transitive (i.e., $(x_i, x_j), (x_j, x_k)\in\{\sim\} \Rightarrow (x_i, x_k)\in\{\sim\}$, $\forall x_i, x_j, x_k \in X$).

The total preference structure of the consumer is presumed to be defined by these three sets of different binary preference relations, $\{\succ, \prec, \sim\}$. If the set of consumption vectors is finite and if each of the sets of binary preference relationships defined above is complete, then the union of these sets will give a complete set of all ordered pairs of consumption bundles, that is, $\{\succ\} \cup \{\prec\} \cup \{\sim\} = X \times X$. Under these circumstances, the consumer's preference map is said to be complete.

A complete preference map on the set X can then also be characterized in terms of a unique set of relationships $\{\succeq\} = \{\succ\} \cup \{\sim\}$. To see this, notice that if the consumer prefers x_i to x_j, then $(x_i, x_j)\in\{\succ\} \Leftrightarrow (x_i, x_j)\in\{\succeq\}$ and $(x_j, x_i)\notin\{\succeq\}$. Similarly, if the consumer is indifferent between x_i and x_j, then $(x_i, x_j)\in\{\sim\} \Leftrightarrow (x_i, x_j)\in\{\succeq\}$ and $(x_j, x_i)\in\{\succeq\}$. If the consumer prefers x_j to x_i, then $(x_j, x_i)\in\{\succ\} \Leftrightarrow (x_j, x_i)\in\{\succeq\}$ and $(x_i, x_j)\notin\{\succeq\}$.

This means that if the consumer's preference map is complete, then a complete, transitive, rank-order structure of preference can be created based on the $\succeq$ relation alone. In turn, through mapping, the very existence of this rank-order structure will yield an ordinal utility function. Based on this function, a rational consumer will choose an alternative only if no other alternative is preferred to it or, equivalently, will choose an alternative only if there is no other alternative that generates a higher level of utility.

But this tautological approach ignores the more fundamental question of "how a person arranges his decisions in such a coherent order to begin with" [Rawls, 1971, p. 558]. As a result, in this context, the very concept of rationality becomes meaningless (i.e., it has no cognitive content) since this approach does not really concede the possibility of irrational behavior. If one believes that all choices are rationally based on preexisting preferences and, hence, that the choices always reveal the consumer's underlying preferences, then all choices are by definition based on utility maximization. Thus, nothing but inconsistencies that contradict previously revealed preferences [Jonsson, 1992] can ever be labeled irrational.

That complete preference maps are taken for granted by most economists is a recent phenomenon. Earlier writers were not so certain. Schumpeter, for one, always believed that a person "knows very little about our utility curves, and is forced to make assumptions about their shape" [Schumpeter, 1909, p. 219].[2] Similarly, Menger and the other Austrian subjectivists of his day believed "that men frequently misjudge the order of their wants" [Lachman, 1994, p. 214].

Consider how many binary preference relations it takes to generate a complete preference map for any given consumer. One must compare all conceivable vectors of consumption bundles, $x_i = (x_{i,1}, x_{i,2}, \ldots, x_{i,n})$. If any specific good or element $x_{i,j}$ in the vector x_i is available in up to a maximum of q_j discrete units (so $x_{i,j} = 0, 1, 2, \ldots, q_j$), then the total number of independent binary preference relations, Φ, needed to construct a complete preference map is:

$$\Phi = \frac{1}{2}[(\prod_{j=1}^{n}(q_j + 1))(\prod_{j=1}^{n}(q_j + 1)-1)] .$$

Table 1 demonstrates how quickly this becomes an unmanageably large number. Assume that $q_j = q$ for all goods I. Table 1 then shows the calculated the value of Φ for different values of q and n.

TABLE 1
The Size of Φ for Different Values of q and n

	$n = 2$	$n = 4$	$n = 10$	$n = 100$
$q = 1$	6	120	527,776	8.03469×10^{59}
$q = 3$	120	32,640	5.49755×10^{11}	1.2911×10^{120}
$q = 5$	630	839,160	1.82808×10^{15}	2.1341×10^{155}

Assume that a consumer only takes a single second to come up with each new preference relationship. Even so, 10,000 years (3.15576×10^{11} seconds) would not suffice to map all the preference relationships necessary for a complete preference map for 10 different goods in quantities ranging from zero to three discrete units.

Of course, in practice, one does not have to spend that much time comparing hypothetical consumption alternatives. Using some specific feasible vector of goods as a reference and then comparing all other vectors to that one only requires a total of $\Pi_I\ (q + 1) - 1$ independent binary preference relationships. Moreover, one needs only consider viable alternatives. The point is, in reality, one does get by with local maps of feasible choices. And, it is far easier to come up with limited local maps than a complete map.

Still, an explicit recognition of the mapping problem must change the approach to the consumer's problem. One is now forced to consider preference formation as an integral part of the consumer's overall optimization problem. Moreover, to the extent that the mapping problem turns out to be significant at all, the bulk of microeconomic choice theory must now be seen as focusing on a limited special case.

But, more importantly, to the extent that goods are used as inputs in Beckerian commodity production, preferences for goods are based on a given consumption technology and, thus, not etched in stone any more than a firm's preference for the use of specific factors of production.

ON CHOICE IN EQUIVOCAL SITUATIONS

According to Becker's theory of the allocation of time, market goods are used as inputs in the production of utility generating commodities.[3] Moreover, any given vector of market goods and time can be used in a variety of different ways to produce different Beckerian commodities. So a household's production function, specifying the relationship between goods and commodities, must be a transformation function of the form f: $\mathbb{R}^n \rightarrow \mathbb{R}^m$, where $m > n$. In fact, a finite n may well correspond to an infinite m.

To complicate things further, production time lags and future commitments may mean that the production of commodities across time is not contemporaneous with the use of goods. In addition, as consumers gain experience and skill over time, their household production technologies will change in unpredictable ways, since by definition, one cannot know in advance what one will only learn later. This suggests that the consumer's problem is far less tractable than generally considered. Moreover, it is easily demonstrated that, thus formulated, the consumer's intertemporal utility maximization problem will not have a single unique solution in terms of an optimal vector of goods [Jonsson, 1992, 1995].

This, along with a recognition of the fact that complete preference maps are inconceivable, has obvious implications for choice theory. A consumer must learn not only about different goods but, more importantly, about how these goods can best be used as inputs in the production of Beckerian commodities. If a given set of market goods and time can be used in an endless variety of different ways, a finite number of market goods will yield an infinite number of conceivable Beckerian commodities. Clearly, this means that no consumer can ever do more than just scratch the surface of available options. And this provides a new perspective on the consumer's problem. While choice theorists have long distinguished situations of risk, based on well-defined probabilities, from situations of ambiguity, one must also reckon with the more serious problem of radical uncertainty (or equivocality).

Ambiguity denotes that "the probabilities of potential outcomes are neither specified in advance nor readily assessed on the basis of available evidence" [Fox and Tversky, 1995, p. 585]. However, this does not describe the kind of radical uncertainty implied by this interpretation of the Beckerian framework. It suggests that consumers are generally too ignorant to assess what all the alternative outcomes are in the first place. Following the managerial literature, the author suggests using the term equivocality [Daft and Lengel, 1986, pp. 556-7] for radical uncertainty of this kind. In other words, in an equivocal situation, one is too ignorant to define all relevant alternatives.

Gilboa and Schmeidler [1995a, p. 606] argue that for decision making in equivocal situations "the very language of expected utility models is inappropriate." Instead, they suggest use of the language of "case-based decision theory." In a nutshell, they see a case as defined by a triple (p, a, r), where p is some problem, a is an agent's action in response to the problem, and r is the result of that action. Utility then depends on results that are generated by actions and agents rely on their memory of results from past actions to guide current actions.

Formally, case-based decision theory can be presented by letting P denote the set of all problems (or state of the world situations) that a consumer might ever face, while A is the set of all conceivable actions that a consumer might take when faced with a problem. To simplify the presentation it is convenient to pretend that any act $a \in A$ can be applied to any problem $p \in P$, (although it would be more realistic to assume that the set of possible actions is limited by the problem at hand, so that for any problem p the set of available actions is a subset of all actions $A_p \in A$. Any pair (p, a) of problems and actions is then presumed to be uniquely associated with some specific result r. In other words, the set of all results R is defined over the set of all pairs (p, a) in the Cartesian product $P \times A$. Similarly, the set of all conceivable cases is $C \equiv P \times A \times R$. To simplify the analysis, it is further convenient to assume that results correspond to utility, so that each r is measured in utils and that the set of conceivable results is also a set of real numbers $R = \mathbb{R}$ [Gilboa and Schmeidler, 1995a, pp. 612-3].

Memory of past cases is then defined as a subset of all conceivable cases $M \subseteq C$, so the history of problems faced by the consumer can be thought of as the projection from M to P, defined as $H = H(M) = \{p \in P \mid \exists a \in A, r \in R, \wedge (p, a, r) \in M\}$. In the memory set $M \subseteq C$ for all past problems faced by the consumer $p \in H(M)$ and for all corresponding actions $a \in A$ there exists some unique result $r_M(p, a)$ corresponding to the triple $(p, a, r) \in M$. But only one of the potential actions, a, was actually chosen in response to any specific past problem p and the agent will assign the value $r_0 = 0$ to the results from all actions that were not chosen. In any case, an agent with memory M can now be presumed to have a clearly defined preference structure in term of past actions $\{\succeq_{pM}\} = \{\succ_{pM}\} \bigcup \{\sim_{pM}\} \subset A \times A$, based on the results from those actions.

Moreover, it is assumed that the consumer can make comparisons between two act profiles x_i and x_j in response to a new problem q in terms of some similarity function describing how closely this new problem matches other familiar problems p. In other words, the idea is that for any new problem q, there exists a function relating this new problem to the history of problems already encountered, $s_{q,H} : H \rightarrow \mathbb{R}$. In this context, the consumer's preferences for the two act profiles x_i and x_j are specified in terms of $x_i \succeq_{pM} x_j \Leftrightarrow \Sigma_{p \in H}\, s_{q,H}(p)\, x_i(p) \succeq_{pM} \Sigma_{p \in H}\, s_{q,H}(p)\, x_j(p)$ for all x_i and x_j.

Without delving further into the details of the case-based approach, it is intuitively clear that the approach allows learning and innovation to play a crucial role in the consumption process. Each new consumption decision contributes to experience and this, in and of itself, will affect future choices. In particular, in the face of equivocality and ignorance concerning actual outcomes, one cannot just rely on past experiences but must also seek guidance from the choices made by other similar but more experienced consumers. This point was also made by Schumpeter [1909, p. 219], who believed that in the absence of experience, utility is predicted rather than known *a priori* and people will expect to have "utility curves shapes similar to those of other members of the community."

This need not be irrational, since the cost of constant reevaluation of the consumer's problem may outweigh potential gains in utility. As later noted by Schumpeter [1934, p. 40]: "The salient fact is obviously that these rules of behavior have stood the test of experience and that individuals are of the opinion that they cannot do better than go on acting according to them." This also helps to make sense of observed differences in consumption patterns across different cultures and societies. It helps explain why country music is more popular in the South than in the Northeast, why Californians eat more avocado than New Yorkers, and why the French drink more red wine than the Germans. Rather than simply looking at network externalities in consumption, one should look at emulated behavior that is successful enough to be reinforced by experience.

CONCLUSION

Textbook narrations of choice theory generally sidestep how preferences are formed and simply start out with an axiomatic formulation of logical choice based on preexisting preferences. In contrast, this paper has focused specifically on the preference-mapping problem. In the process, the paper has given cognitive content to the otherwise meaningless concept of irrationality in economics. Without a yardstick for evaluating the rationality of preference formation in terms of meta-preferences, all discussion on choice and rationality in economics is pleonastic. In fact, modern choice theory has stripped the very concept of rationality of cognitive content to the point where one can scarcely concede the possibility of irrational behavior. Even suicide can circularly be explained in terms of utility maximization [Hammermesh and Soss, 1974]. Nothing can truly be labeled as irrational other than the violation of revealed preference.

As for "the oft-repeated statement by orthodox economists that tastes and preferences are not the explananda of economics" [Hodgson, 1994, p.154], a Misesian admonition is in order [Mises, 1949, p. 4]:

"The first task of every scientific inquiry is the exhaustive description and definition of all conditions and assumptions under which its various statements claim validity. It is a mistake to set up physics as a model and pattern for economic research. But those committed to this fallacy should have learned one thing at least: that no physicist ever believed that the clarification of some of the assumptions and conditions of physical theorems is outside the scope of physical research."

Rational consumers are likely to make decisions that are still globally suboptimal in the sense that if better information had been freely available, then higher levels of utility could have been attained. This also provides a context for thinking about the importance of innovation and learning for consumption. To the extent that consumers can use the experiences of others to guide their own, the consumer entrepreneur who innovates in consumption, just like the business entrepreneur, not only benefits himself, "but he has also triumphed for others, blazed the trail and created a model for them which they can copy. They can and will follow him, first individuals and then whole crowds"[Schumpeter, 1934, p. 133].

Finally, one must be careful in applying the concept of revealed preference. One cannot read the mind of the consumer and, therefore, cannot always be certain whether a revealed choice was based on an investment in trying something new or whether it was truly based on well-mapped preferences. This means that one cannot use the consistency of revealed choice to judge the rationality of a consumer, nor always rely on it to draw inferences concerning preexisting preferences. A rational consumer may well try some alternative, find it unsatisfactory, and then reject it when a similar situation arises later. Moreover, since preferences for market goods are conditioned on a given Beckerian consumption technology, the preferences will evolve and change over time.

FOOTNOTES

[1] As explained by Lakatos [1978], a scientific research program is made up of a hard core of fundamental tenets that are treated as irrefutable, a positive heuristic designating the appropriate methods and proper problems for examination, a negative heuristic specifying what is improper, and a protective belt of supplementary assumptions and defensive conjectures that protect the discipline from outside threats posed by aberrant events, unexplained observations, and unfair critics.

[2] As demonstrated by Jonsson [1994], Schumpeter [1949, footnote 28, pp. 380-1] consistently argued that one ought to explore the foundation of preference formation explicitly and formally: "Economists have expressed unbound respect for the consumer's choice-it is not time to investigate what the bases of this respect are and how far the traditional and, in part, advertisement-shaped tastes of people are subject to the qualification that they might prefer other things than those which they want at present as soon as they have acquired familiarity with these other things?"

[3] Thus, while a consumer may purchase market goods like a television set, television cable service, a refrigerator, a six-pack, and some lay-z-boy chairs, utility is not derived simply from the intrinsic characteristic of any these goods, but rather from activites wherein the goods are used. For example, utility may come from an evening spent with friends drinking cold beer and watching a ball game on television. It is in this sense that Becker [1976, p. 5] believes that desires are not defined in terms of specific goods but rather in terms of their use in activites that help satisfy fundamental drives.

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