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Endogenous Preferences: A Structural Approach

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This paper speaks to one of the key assumptions in the rational model as assumed by neo-classical economists. This assumption is that preferences are exogenous, that they are determined by forces outside the system, and that they are unchanging through time. In contrast, I will propose a model of endogenous preferences, one that captures the dynamics of preference formation as people interact with one another. This model preserves the mathematical simplicity and analyzability of modern economic theories and permits the derivation of an equilibrium of preferences in a complex dynamic system.

A Brief History of Exogenous Preferences

In their ground-establishing article, "De Gustibus Non Est Disputandum," Stigler and Becker make two claims about preferences: (1) individuals' basic tastes do not change over time, and (2) individuals do not differ from one to another in their tastes. To emphasize this point, they compare tastes to the Rocky Mountains: "Both [tastes and the mountains] are there, will be there next year, too, and are the same to all men" (76).

They recognize that this stand would be controversial, suggesting that a "generation of economists" will not be able to defend against the anticipated deluge

I would like to thank Steve Roehrig, Gerald Salancik, Seth Sanders, Herbert Simon and Lowell Taylor for their thoughtful comments on earlier versions of this work. I would also like to thank my lucky stars that I am at Carnegie Mellon University, where such collegial help is commonplace.

*Krackhardt, David
1998 "Endogenous Preferences: A Structural Approach," in Jennifer Halpern and Robert N. Stern (eds.) Debating Rationality: Non-rational Aspects of Organizational Decision Making, Cornell University Press, pp. 239-247.

of questions and counterexamples. But they assure the reader that it is not their intent to explain all rich social phenomena via utility theory. Rather, they defend their approach as one that "offers guidance in tackling these problems—and that no other approach of remotely comparable generality and power is available" (77).

To demonstrate this power, Stigler and Becker (formalized and extended by Becker and Murphy 1988) provide an example of how "addictive" behaviors, which on the surface seem to be clear indications of changes in tastes over time, can be explained by appealing to the concept of "consumption capital." Consumption capital represents the degree to which experience with a good or service reduces the cost of that good or service. As a consumer gains experience with a good (such as heroin), it is easier to acquire and use (one knows better where to get it and better how to administer it, etc.). Thus, the cost of using it goes down as use goes up, resulting in higher marginal "profit" (gains in utility minus costs). As the marginal utility diminishes with ever-higher usage, equilibrium is reached when the diminishing marginal utility gains match the reduction in cost obtained by increases usage (i.e., increased consumption capital).

In the Becker and Murphy heroin example, they show three equilibrium points: no usage (a stable equilibrium), moderate usage (a saddle point, likely to result in movement to one of the other two equilibria), and addiction (a stable equilibrium). They note that these equilibria and predictions are consistent with what people who work with such addictions have found in the field.

The benefits of such a model, they argue, are that one does not have to resort to ad hoc explanations like "needs" or "different tastes," which are the purview of a whole bag of social scientists (Stigler and Becker [1977, 76]. They wonder aloud whether such a bag includes phrenologists right alongside the psychologists and sociobiologists): "We believe that the phenomenon Marshall is trying to explain, namely that the exposure to [some good] increases the subsequent demand for [the good] (for some persons!), can be explained with some gain in insight by assuming constant tastes, whereas to assume a change in tastes has been an unilluminating 'explanation'" (78).

There are many structural sociologists who would agree on this point about tastes constituting an unilluminating explanation. Mayhew (1980) passionately argued that social scientists of all stripes, including sociologists, too often resort to differential tastes, needs, or desires as explanations of behavior: "The individualists [social scientists who appeal to such explanations] do not seem to have grasped the elementary principle that one does not explain a set of data by simply repeating it. To say that 'people do things because they want to' is not an explanation (nor even an interpretation) of what people do: it is a restatement of the (individualist's) data. It is not different from saying that people do things because they do things" (355).

Encouraged by Becker and his colleagues, other economists have followed suit and begun to explain many social phenomena that used to be the domain of sociologists. For example, Manski (1993a) has developed a model that explains why underclass youth underestimate the return on education (thereby appearing to "value" education less) (see also Manski 1993b; 1995). Montgomery (1994) draws on the consumption capital idea to show why husbands of lower-class families would appear to "value" their families less.

Even sociologists have begun to incorporate utility-maximizing explanations as core to their models of human behavior (e.g., Coleman 1990; Burt 1982). Pertinent to the point of this paper, two political scientists (Cohen and Axelrod 1984) have suggested that people often learn that their underlying beliefs about the probabilities of outcomes are wrong. Faced with such "surprises" (defined as the difference between what they expected and what they observed), they not only modify their estimates of the probabilities, but their experience "is also used to modify the very utility function that is being maximized" (39).

Becker and his colleagues are to be commended for developing a consistent and powerful theory that does not resort to trivial logical tautologies. As shown in just these few examples, their efforts have succeeded in guiding many subsequent studies of macro social behavior. But that social phenomena *can* be explained by some theory does not imply that the theory is correct.

The Structuralist's Perspective

I now turn to an alternative, one that does not resort to setting up a tautology based on tastes, but does attempt to explain variance in tastes endogenously. It rests on the axiom that people influence each other in their beliefs, values, tastes, and virtually every other cognitive or affective process in which they engage. This axiom certainly is well-founded in the literature on social psychology and sociology, and I would argue is at least as robust as the utility-maximizing assumption about rational behavior. It is not my purpose here to argue this axiom, but only to state it as a starting point, from which I derive the following formal model about preferences.

To state that people influence each other is too general. I am speaking of influence that occurs as a byproduct of direct interaction.[1] Thus, not everyone influences everyone else. In fact, no one influences everyone else. While some of

[1] I will ignore the indirect kind of influence that may occur at a global level, for example, the effect that my congressperson might have on me even though I have never talked to her. Nor am I referring to indirect ripple effects that rumors might have on individuals: No doubt these social influences can affect one's preferences, but they are outside the scope of the model I am developing here.

my colleagues at Carnegie Mellon University influence me a great deal, others do not. Nonetheless, what I value, what I like, and what I aspire to, are all in part influenced by particular others in my social history.

The exact form of this influence is difficult to specify and is the appropriate object of empirical research, but I will start with simplifying assumptions about the form to make the models tractable. I will develop a dynamic model that suggests an equilibrium state for preferences within a given influence structure. The model suggests how to assess the extent to which preferences, and other variables of interest to social scientists, are affected by the social influence process I am proposing.

Equilibrium within an Influence Structure

Consider the case where one's preference at time t (designated as $U_t(i)$ for person i, or U_t for all persons) for a good, service, outcome, or whatever, is influenced by the preferences of a set of actors in the system (including self).[2] Let us further assume that the extent to which any other actor j influences person i is given by some weight, w_{ij}. To this point, I have not stipulated exactly how this influence might take place, except to say that it is a joint function of the opinions of all actors in the system, weighted by W. So, for an individual,

$$U_t(i) = \sum w_{ij} U_{t-1}(j). \tag{1}$$

For the entire set of individuals, these equations can be represented in matrix notation as:

$$U_t = \mathbf{W} U_{t-1}$$

The question is, what is the nature of W? That is, how are utilities affected through associations with others?

The truth is, W could take on many forms, each of which would depend on a social theory of preference influence. I will restrict myself in this paper to a theory premised on the following two assumptions:

> Assumption 1: Principle of Interaction. The degree of influence person j has on person i's preferences is proportional to the amount of time i and j spend interacting with each other.

That is, the more time i and j spend interacting, the more they will influence each other in their changes in preferences over time. I also assume here that a

[2] I will, for the moment, constrain U_t to be positive real. An extreme value of 0 would represent indifference to the good, while increasing positive values would represent increasingly positive value placed on the good.

person can influence herself ($= w_{ii}$). This parameter represents a person's obstinacy, or what psychologists might call the individual's personality. To the extent that these diagonal elements are large relative to the off-diagonal values in W, we are assuming that preferences are exogenous and relatively stable over time, untempered by the preferences of others. In the extreme case, if $w_{ii} = 1$ for all i and $w_{ij} = 0$ for all $i \neq j$, then we are reduced to the model that Becker claims: preferences are exogenous and stable over time. To the extent that the w_{ii}'s are small, individuals are assumed to be quickly influenced by their social neighbors.

This is a very reasonable assumption, one that has much support in the social psychological science literature (e.g., Festinger 1954; Friedkin and Johnsen 1990; Marsden 1981). It has appeal in that it shows how people are both dependent on and independent of each other.

But it also assumes symmetry, that is, it assumes that when two people interact, they influence each other to the same extent. We can increase the sophistication of this model by recognizing that some people *respond* differently to the same amount of interaction with others. It would be tempting here to suggest that such responses are personality-based ("bad chemistry," for example), but to do so would be to fall into the same trap that Mayhew warned us against, that of explaining the outcome by describing the outcome. Instead, I will use a structural assumption about how people respond differently to the amount of time they spend with each other.

> Assumption 2: Principle of Reflected Exclusivity. The degree of influence person j has on person i's preferences is *inversely* proportional to the amount of time person j spends with all others (including self).

This assumption requires somewhat more explanation. For illustration, let us assume that Stephen interacts for the same amount of time with two people, Sheila and Josephine. According to Assumption 1, Sheila and Josephine each should contribute equally to Stephen's re-formulation of his preferences. But, suppose further that Sheila is a gregarious individual, and that she interacts with everyone. Suppose that Josephine, on the other hand, confides solely in Stephen. He sees Josephine's interactions as focused on him, singling him out as someone worth investing in. Thus, while both women objectively spend just as much time with Stephen, he weighs more heavily the investment that Josephine makes in him. Therefore, Josephine has more influence on Stephen's views of the world than does Sheila.

There are two separate rationales for this assumption, one emphasizing the target of influence, and one emphasizing the source. For the first, there is an appreciation of the time devoted by the actor. Stephen recognizes that Sheila's time investment in him is not particularly aimed at him, but that Josephine's is

indeed special to him. That is, the actor recognizes the relative investment on the part of the other (Josephine), and in exchange for this devotion is willing to be influenced by the other's view more readily. The second rationale is that the other who has not squandered her time on a plethora of targets can formulate a more relevant, focused and effective presentation to the target. Thus, it is likely to be more effective in its delivery, and more influential in its outcome.

With these two assumptions in place, we can complete the model. If we assume that the degree of interaction between all actors in the system is given by X, then we can incorporate both of the above assumptions above in determining W:

$$w_{ij} = \frac{x_{ij}}{\sum_{k=1}^{N} x_{kj}} \tag{2}$$

The question remains, what is the distribution of U_t as t approaches infinity in equation (1)? That is, do the utilities converge to an equilibrium? The answer is yes, under most reasonable conditions for W.[3] In this simple model, then, we are able to draw the following conclusion: *The structure of* W *determines the distribution of preferences U at equilibrium, and this distribution is independent of the initial values* U_0. This is true even if people are very stubborn individualists (i.e., w_{ii} are all large), as long as there is at least a modicum of interaction among parties (i.e., not all $w_{ij} = 0$).

Thus, we have established a model wherein we make specific predictions about the distribution of preferences based solely on the influence network among the system of actors. And the solution to this distribution is independent of the initial conditions of the set of preferences held by the actors; whatever their initial preferences, they will move toward a stable equilibrium of preferences relative to others in the system with whom they have strong contacts. Preferences are truly endogenous, without having to resort to either tasteless tautologies or rational behavior on the part of the actors.

Discussion

In a footnote, Stigler and Becker rhetorically ask the question why Jews were Jews, Christians were Christians, and Moslems were Moslems. This model answers that question: Jews are Jews because they are influenced by others who are

[3] It is easy to see in equation (2) that W is column stochastic, with each column summing to 1, and each element is nonnegative. Thus, the matrix is Markov. This is sufficient to show that U_t in equation (1) reaches an equilibrium as t —> ∞, with the steady state being proportional to the first eigenvector of W.

Jews; and the same is true for Christians and Moslems. Furthermore, this model predicts that Jews will convert to non-Judaism to the extent that their assimilation into a larger non-Jewish community reduces their contacts with other Jews (the same is true for Moslems and Christians). Thus, the structure of contacts (and the resulting influence that goes with such contacts) will change the distribution of even the most personal and strongly held preferences.

Becker's quote that began this paper, dedicating his work to the four prominent Chicago economists from whom he "learned" the "economic approach," raises a parallel question: Why are Chicago economists Chicago economists? Why do they seem to believe in this model with such enthusiasm? The answer to this question underscores several possible ways to approach the problem I address in this paper.

First, of course, the model suggested in this paper is that Gary Becker and other Chicago economists are the product of the social forces around them at the University of Chicago. Their daily interactions, mutual reinforcements of ideas and values, and simple time invested in discussing these models moved their group to believe in what became known as the "Chicago School." Those most active in these discussions became the most fervent believers and proselytizers. But this explanation is only one of several that could be offered for the same phenomena.

For example, it could be proposed that these four luminaries provided *information* to Becker, and that Becker, being of sound intelligence, could discern the wisdom in this information and in the logic behind the model. This information argument, however, is not sufficient. Such models are readily available in print, discussed at length in prominent journals such as *American Economic Review*, and read by almost every economist trained in this country, whether or not they have any Chicago association. They all have access to the same information that Gary Becker had. Yet, they do not all buy into the Chicago model. The argument that they may not be as discerning as Gary Becker is not sufficient, either. No one could accuse Herb Simon of lacking in intellectual horsepower; yet few would describe him as a Chicago School economist (even though his Ph.D. is from the University of Chicago).

However, even if we do interpret "influence" as merely the absorption of information, the model in this paper still holds; it only changes the interpretation. That is, if we assume that information flows throughout a system in a manner dominated by the interaction patterns described in X, and we assume that this new information permits the user to alter estimates of costs and benefits of the good, we can still apply the assumptions of interaction and reflected exclusivity. In this case, interaction would increase the amount of information relevant to a good, and reflected exclusivity would affect the source's ability to present a strong and convincing case about the good. The results of the model,

then, would be the same. "Revealed preferences" would be a function of the structure in X, not independent evaluations.

Another possible explanation for the concentration of Chicago economists at the University of Chicago is selection. That is, only those economists who subscribe to the Chicago School philosophy are likely to seek admission to the club known as the University of Chicago; and even those "mistakes" who did not self-select themselves out were weeded out through the Ph.D. exam process or through the tenure-granting process.

There are two responses to this argument. First, the argument is valid. Certainly such selection processes hold, and the more dominant the Chicago School is in the University, the stronger the selection process will be. In sociology, the argument is termed "homophily," that is, those who believe, value, and act alike will seek others out (McPherson and Smith-Lovin 1987). Birds of a feather will flock together.

The second response is that such selection cannot be the whole story. If we take Becker at his word, that he "learned" about the Chicago School from these four luminaries, then presumably Becker did not hold such beliefs ahead of time. The causal direction implied in his statement was the other way around: First, he encountered his teachers, then he learned about the "economic approach." If selection were the whole story, no one would change their mind, no one would learn.

A reasonable alternative to the present model, however, is that both processes occur simultaneously. That is, people influence each other through their interactions, and at the same time people seek out others of like-mindedness to interact with. That is, they are the product of their structural environment and they also cause changes in the structure (cf., Burt 1992, chapter 7).

The advantage of the current model proposed in this paper is that the equilibrium for the distribution of utilities is derivable analytically with simple linear algebra. By including the additional assumption that the structure of interaction systematically changes to increase homophily, one is faced with a far more complex model that probably cannot be solved analytically.

Nonetheless, such a complex model has intuitive appeal. The most formidable approach to such non-linear feedback systems, however, is to set aside the simplicity and elegance of mathematics and resort to computational modeling. Some scholars have already pursued such models, and with some success. For example, Kathleen Carley's (1990) computational model on group formation and stability draws on both sets of assumptions and demonstrates under what conditions homophilic groups will persist and under what conditions they will fall apart. For those of us who wish to push this model further, the course paved by Carley and others from the computational school is most likely to lead to fruitful insights into the complexity inherent in such social processes.

Conclusion

I began by discussing the modern economists' models of rational utility theory. Modern economists appear to hold two meta-assumptions about their models. First, they assume that people are utility-maximizing. This assumption has been the object of many years of derision by behavioral decision theorists, who have demonstrated empirically that this assumption is false. But some have argued that the question has been rather moot, since it has also been shown that many results in economic theory do not rely on utility-maximizing players (Becker 1962; Gode and Sunder 1993). Perhaps more important, behavioral decision theorists have failed to replace the neoclassical model with an alternative, equally powerful model from which equilibria in social economic systems might be derived.

I prefer to concentrate on the other major assumption in economic theory, that people act atomistically. At a minimum, relaxing this assumption has profound implications on any empirical results, since such an assumption lies behind virtually all econometric techniques. Violations of this assumption can have devastating effects on statistical tests (e.g., Krackhardt 1988; Doreian 1980). But more importantly, my point is not simply to say that economists are wrong in this assumption. Nihilism is not productive, in my view. My point is that structuralists have an alternative assumption that can be formalized and can produce its own set of predictions, ones that may be empirically tested and may shed light on social/economic processes. From within this kind of formal structure, perhaps economists and structuralists could communicate on common ground, and build a new overriding model of human behavior.

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