
A Blau space primer: prolegomenon to an ecology of affiliation

Miller McPherson

This paper describes an ecological model of the behavior of social entities in a property space defined by sociodemographic dimensions. The model departs from the standard population ecology model in that it measures dimensions of the niche space, and assembles populations into a community. In this model, the time and energy of human individuals are the resource consumed by the social entities. While the model was originally developed for voluntary organizations, the paper argues that this model can be applied to a very wide variety of social phenomena, including firms, groups, associations, events, cultural artifacts, markets, social circles, collectivities, occupations, social movements, roles, identities, attitudes, beliefs, lifestyles, institutions, meanings, human cognitive structure, disease and other socially transmissible quantities. The paper concludes with some speculations based loosely on the model.

1. Introduction

In the early 1980s I developed an ecological model of affiliation, which argued that social organizations compete with each other in a niche space defined by sociodemographic variables (McPherson, 1983). While the paper was written in the same strain of thought as Hannan and Freeman (1977), it departed significantly from that line of work in that it proposed to measure the dimensions in the niche space, and directly model changes in populations of organizations in those dimensions. The first part of this paper is a discussion that should have preceded the 1983 paper, in that it describes the characteristics of the niche space, which I subsequently named Blau space.¹ A lot of unnecessary sparring with reviewers and editors might have been avoided. The second part of the paper is more expansive, in that it argues for an extension of the model to a wide variety of social entities, and makes speculations about some otherwise disparate areas.

¹I chose to name it Blau space in honor of Peter Blau's fundamental contribution to our understanding of system-level consequences of the organization of the sociodemographic variables (Blau, 1977). I think that we make a serious error in not naming our concepts for the intellectual progenitors—mathematics and economics benefit greatly from this strategy.

2. What is Blau space?

Blau space is the k -dimensional system generated by regarding the sociodemographic variables as dimensions, rather than as variables. Each locus in Blau space is a point described by k coordinates. The relationships among points are defined by distances in the coordinate system. Blau space is spatial because the distances between positions are the primary focus, rather than the relationship among variables.

3. What is the purpose of Blau space?

Blau space allows us to think about the distribution and dynamics of social entities in a coherent and simple way. It organizes our conception of social networks at the global level, rather than at the individual level. Blau space combines this simple image of global level processes of social networks with an evolutionary model of the growth, decline and change in social entities from organizations to identities. The properties of the space allow us to argue that the dynamic behavior of virtually anything that is transmitted through social communication can be analyzed with relatively simple techniques.

4. Where did Blau space come from?

As the recent excellent work by Cavalli-Sforza (1995) and his colleagues shows, early humans existed in small hunting and gathering groups of closely related individuals. These small groups moved their encampment regularly, when the food sources easily obtainable within walking distance were exhausted. The contingencies for the acquisition of material wealth were entirely different from those of today, in that early humans must have viewed material goods as an encumbrance instead of an advantage, due to the necessity of moving them regularly by muscle power. The distribution of material wealth in these societies was very flat, as was the amount of power held by individuals. This organization of wealth and power is represented in the first panel of Figure 1, which arrays social positions held by individuals in a two-dimensional scatterplot. The figure visually illustrates the most important feature of these societies: there are only minimal distinctions among the positions in these small systems. The principle of mechanical solidarity (Durkheim, 1950) binds these small communities together; all persons have the same collective experiences, the same language, the same daily routine, the same point of view, the same relatives, and so forth. It is difficult to overestimate the extent to which this near complete level of *gemeinschaft* contributes to the collective nature of the group. As Sahlin (1972) so clearly puts it, the organization of these societies acts to drastically flatten the material and social differences among individuals.

5. How does Blau space change over time?

When the world is made up of primarily these small scale societies, virtually all cultural

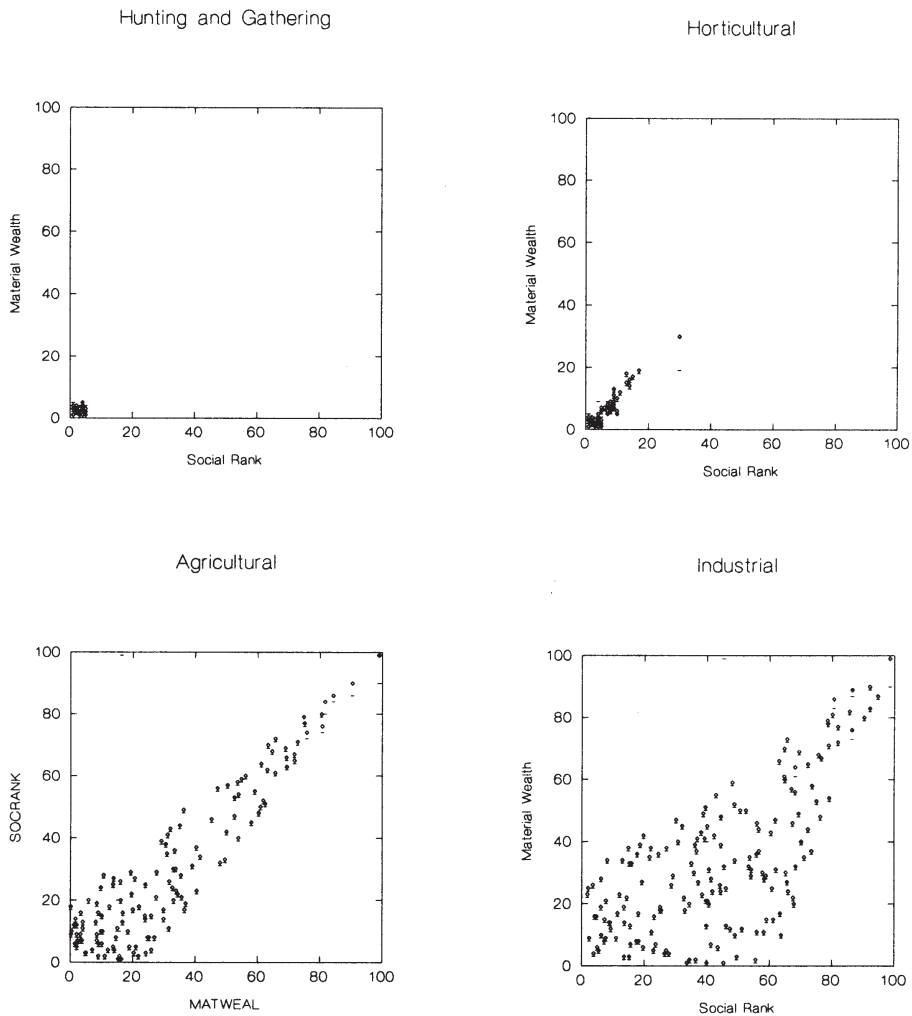


Figure 1 The origins of Blau space: the relationship between social rank and material wealth in four kinds of society.

and material differences across societies can be explained by geographic distance. When the technology of communication and transportation is limited to the speed of human locomotion, the spread of innovations is localized spatially. The similarity of two randomly chosen groups on a land mass on earth can be almost completely captured in the geographic distance between them. Near neighbors will tend to share language, technology, kinship, food sources, and so on, while groups at great geographic distance will be dissimilar in these respects. Essentially, the distribution of human cultural characteristics depends almost completely on geographic distance; social forms, language, and other socially defined characteristics will be spatially localized.

For societies that make the transition from hunting and gathering to horticulture (the second panel of Figure 1), the reduced necessity for moving camp every few weeks allows the development of some inequality in material wealth and power. Typically, these societies, perhaps an order of magnitude larger than hunting and gathering groups, have a single figure (the 'big man') who is looked to for arbitration among competing interests in the group. This person may acquire significantly more material resources than many others in the group, as suggested by the second panel of Figure 1.² Since these societies are bound in geography to their arable land, the accumulation of material resources becomes an advantage rather than a burden, while the increased size of the system permits social differentiation and the beginnings of the division of labor.

The distribution of material and political resources is stretched by the movement of the big man into a region of social space not previously occupied. This change introduces a significant new factor into the organization of society, in that the social distance between positions has expanded through the movement of the leader in social space away from the mass of the rest of the group. In addition, the beginnings of authority relations based on the control of material resources engenders the differentiation of social relationships from one another. The connections among people based on *Gemeinschaft* in the hunting and gathering groups are at once unique to each individual, and unitary in their inseparability from the individual. As society grows larger and requires indirect means of social control and coordination, social relationships begin to take on a character that abstracts from structural relationships among members of the group, rather than from attributes and experiences of unique members. Intermediate social positions begin to develop, which derive from the necessity of the mediated coordination of activities. The effect of differentiation of social positions has a parallel differentiation in the types of connections among individuals in society. The relationship based upon the whole person gives way to the unpacking of increasingly limited and specialized connections.

This process is accelerated in the agricultural systems (the third panel of Figure 1) that developed as a result of the harnessing of animal power to the tasks of cultivation and transport. For these much larger systems, such as the Roman Empire, the imperatives of coordinating activities over vast areas of time and space results in a great expansion of differences among individuals. The division of labor, and the accompanying social differentiation which coevolves with new multiplicities of ways of making a living lead to a proliferation of social dimensions that make a difference in human interaction. Not only are the dimensions of material accumulation and power becoming less correlated (as represented by the increasing occupancy of positions off the principal diagonal), but the activation of entirely new dimensions such as education, occupational prestige, and other distinctions come into play.

²N. Mark (personal communication) points out that sometimes the leader of such groups gains status by divestiture of material goods, rather than benefitting from accumulation.

6. What are the Blau dimensions, and what entities occupy Blau space?

In industrial societies (panel 4 of Figure 1), the extractive technologies and the associated vast increases in the amount of energy available have produced a social space of high dimensionality. Not only have the positions spread through a larger volume of the space, but the space itself is differentiated into many more dimensions not represented in the figure. The number of observable characteristics that can affect the outcomes of social interaction are virtually unlimited. As Bourdieu (1987) observes, the distinctions that we make among our associates are continually generated and regenerated by social process.

The net result of these processes is the creation of a very high dimensional social arena, in which much of the action occurs locally. The institutional structure of society enforces and reinforces the sorting processes that allocate persons to positions in the stratification system. People move from group to group on daily, weekly, monthly, yearly and life-cycle schedules. The trajectories through which people move are orchestrated by the institutional structures of family, work, religion, medicine, government and so forth. Change of position in years of age takes place in a regular rhythm over the life course, while position in years of education usually stabilizes in early adulthood.

The dimensions in which change takes place the most slowly are the socio-demographic dimensions such as physical location, age, gender, years of education, occupation and income, although there are an extremely large number of dimensions which have come to make a difference in social interaction, as the social psychologists point out (Ridgeway, 1991).

This multi-dimensional Blau space at once organizes the social interactions among individuals, and structures the opportunities for the formation of social entities that are associated with individuals in that space. Since the Blau dimensions change relatively slowly in comparison to the entities which are transported relatively quickly from individual to individual, we choose to map the entities in the framework of the dimensions. These entities include the concrete and the nascent: firms, groups, associations, events, cultural artifacts, markets, social circles, collectivities, occupations, social movements, roles, identities, attitudes, beliefs, lifestyles, institutions, meanings, human cognitive structure, disease and other socially transmissible quantities.

There are a number of advantages to this scheme. Particularly important is the fact that virtually every social survey ever taken to the field contains information on at least some of the dimensional variables, and some of the entities. Practically the entire corpus of survey data gathered in the last six decades can be brought to bear on some aspect of the processes that are highlighted by the theory. Any entity that is spread through social transmission might be governed by the processes in the model.

7. How does Blau space relate to mainstream sociology?

The tools of regression analysis are the closest thing to canon in the field of sociology.

While every sociologist has tacit knowledge of the core concepts of the field such as power, stratification, structure and status, the details of those concepts vary tremendously from sociologist to sociologist. Ask an experimental social psychologist what power is, and you will get an answer that is well-nigh uninterpretable to a social movements researcher. And these differences are not just skin deep. One of the reasons for the woeful lack of cumulative knowledge in the field is our failure to agree on the most basic of definitions of even our core concepts. As Smith-Lovin (1999) notes, this fact, put together with the growth of the field in the twentieth century, leads sociology in the direction of the tower of Babel, rather than the science of society envisioned by our progenitors. We are forever arguing about the rules instead of playing the game.

The exception to this lack of agreement is elementary statistical analysis—especially the methods initiated by Blalock and his colleagues in the 1960s (e.g. Blalock, 1961a,b). This line of work developed the regression paradigm that dominates quantitative sociology today. Whether they agree on the utility of the concept or not, sociologists almost unanimously agree on what a dependent variable is. This nexus of agreement is no accident, given the script of graduate education in the field. Virtually all sociology graduate programs require some introduction to regression analysis. The great irony of Blalock's successful infection of sociology with these techniques that come primarily from economics is that the subsequent pandemic of regression methods has left us susceptible to the atomizing theories of their birthplace. One goal of the Blau space approach is to attack the fundamentals of the conventional regression script, in order to reintroduce some primitive assumptions from society, rather than the economy.

Figure 2 presents the essence of the standard regression approach. In this figure, 100 cases from the General Social Survey reveal the relationship between father's and child's occupational prestige. The storyline here, dating back to the definitive Blau and Duncan work of the 1960s (e.g. Blau and Duncan, 1968), is that the child's occupational prestige is generated from that of the father—that there is a causal relationship between the two variables. The dependent variable is regressed on the independent variable (and appropriate control variables) to trace the links of causation through an ever increasing web of variables. The implicit assumption here is that the world can ultimately be captured in an elaborated econometric model of society.

This model has achieved great success in providing a template for survey researchers to publish in the major journals. It has been arguably less successful in contributing to sociological theory, since the tendency is for the literature to devolve into debates about models, rather than theories. My proposed solution to this problem is to shift our viewpoint from the essentialist regression framework, to a relational view, as suggested in the next section.

8. How is Blau space relational, as opposed to essential?

The points in Blau space are social positions described by the values of the Blau dimensional variables. Each position may be occupied by multiple people. The values of

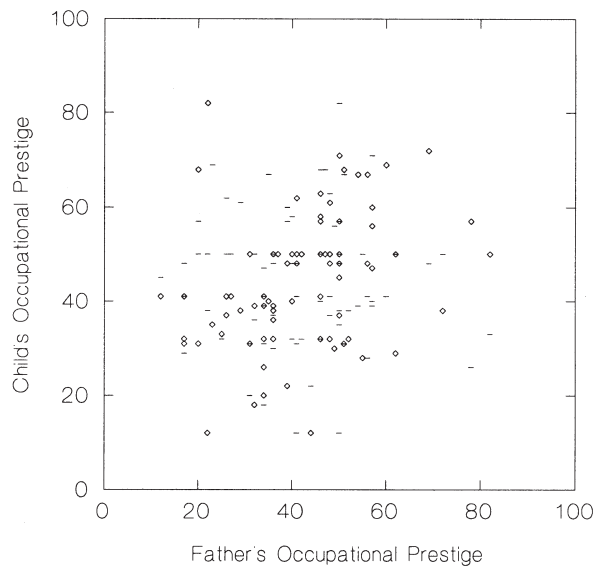


Figure 2 The relationship between father's and child's occupational prestige (source: General Social Survey, 1988).

the Blau dimensions are not attributes of individuals, but are quantities that locate social positions in relationship to one another. This shift in emphasis, while subtle, is essential to an understanding of our model. Each locus in Blau space is defined by its position relative to all the other positions. Two positions are characterized by their distance from one another in this multi-dimensional space, rather than their distances from the mean, as in the regression approach. The Blau variables create a map of social space within which social process is carried out.

The most problematic aspect of the regression approach to these variables is that it is fundamentally atomizing. These models are rooted in an essentialist view of reality. Characteristics of individuals are treated by the conventional approach as though they originate in the individuals, and do not derive from social process. The regression models refer to hypothetical populations of individual units that are identical to one another in every respect other than those of the measured variables. The only piece of information about each unit that is relevant to the model is the distance of each observation from the mean. The models boil the world down to covariances among all the variables, losing all of the information about the relations among the units.³

To get some idea of the amount of relational information lost by the regression approach in even this simple example, note that regression uses $N - 1$ independent

³The epitome of regression models, LISREL (Joreskog, 1970) is a particularly pure realization of this fact, in that the input to LISREL is usually a covariance matrix. Of course, extensions to these models can use higher moments of the data. All these moments are nonetheless characteristics of aggregated distributions, rather than representing relational aspects of the data.

pieces of information from the data (having essentially used one case to estimate the mean). But there are at least $N(N-1)/2$ relationships in even these limited data. In our concrete example, the regression analysis uses ninety-nine relationships of each case to its mean, while there are actually 4950 relationships (and twice that many if we allow asymmetry) in the data. This is a ratio of 99/4950 or about 2% of the available information. And the problem only grows worse with increasing sample size. At $N = 1000$, the ratio declines to 0.002. With very large datasets, the proportion of information contained in the regression model approaches zero. The very feature of regression analysis that gives it so much leverage over other techniques such as tabular analysis means that it ignores more of the information in the data, the more data there are.

Of course, the problems with regression run much deeper than that. The meat grinder of regression puts all the information about social context into the maw of the independent variable, and crunches out values of the dependent variable with the teeth of the estimated parameters, shredding any sense of social structure left in the data. While the data generated by survey techniques are not in any sense ideally suited to understanding the nuances of social context, regression industriously discards the vast majority of whatever information is available.⁴

So, the central task at hand is to begin the project of capitalizing on the relational properties that are actually available in survey data, since we have a vast amount of this information available. To this end, we want to think differently about the meaning of scattergrams like Figure 2. Figure 3a gives another scattergram with different variables, the ages and education levels of ten cases⁵ from the, 1985 General Social Survey, along with the ages and educations of the friends that they report as having been partners in discussion of important matters. The pairs in the figure are connected by straight lines. Figure 3b contains the same data, but the lines connect random pairs of points. As can be easily seen from the figure, friends are much more closely arrayed in Blau space than random assortment would produce.

This fact is an illustration of one of the most replicated findings in social science: social ties tend to be between similar individuals. In the scattergram, proximity maps similarity—the shorter the distance, the more alike two individuals are. This well known tendency is called the homophily principle (McPherson *et al.*, 2001). The homophily principle guarantees that people who have similar backgrounds will be more likely to communicate. They are much more likely have common experiences, common friends, and common relationships to other social entities. People from the same area of social space will be similar in understandings, assumptions, and viewpoints. And the homophily principle guarantees that these commonalities are

⁴Some useful counter-methods that acknowledge context include Singer *et al.* (1998) for large N and Ragin (1987) for small N .

⁵Actually, the last ten cases of the, 1985 GSS dataset in which the respondent reported that the first named network alter is a 'friend' (respondent ID numbers 1520–1533).

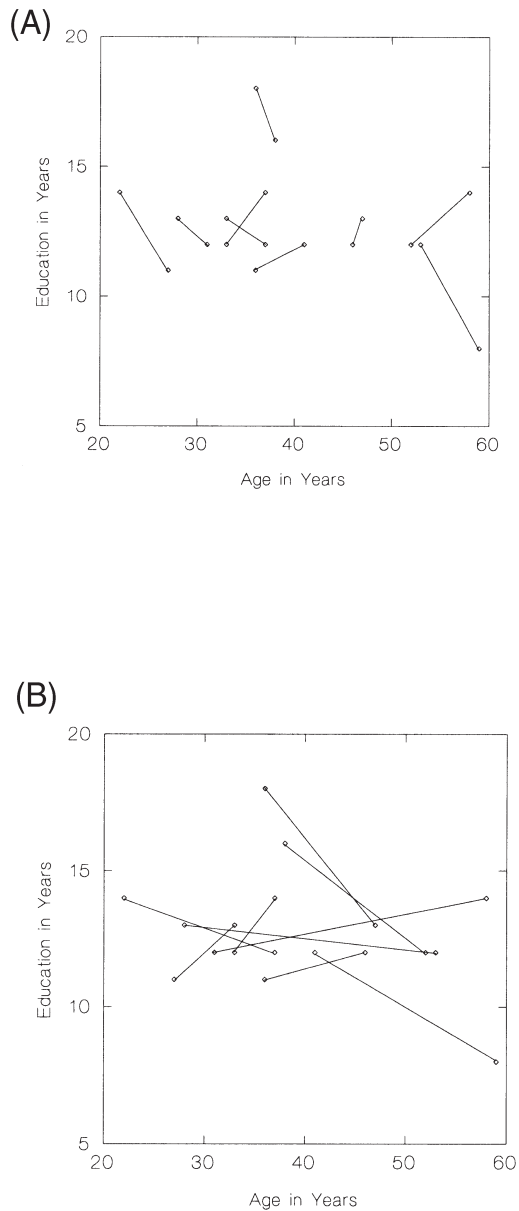


Figure 3 Contacts between friends versus randomly chosen others (source: General Social Survey, 1985). (A) Connections between friends; (B) random connections.

organized along the observable dimensions of social life that have been the mainstay of social survey analysis for decades: the sociodemographic characteristics such as age, sex, race, occupation, education and income. Society generates a landscape of commonality of opinion, interest, attitudes, beliefs and so forth that is localized in the basic

sociodemographic dimensions. One of the reasons that survey analysis has been so persistently successful in detecting interesting social facts is that so much of the cognitive action in society is shaped by this localization principle. Many of the cherished findings of survey analysis can now be understood as a simple reflection of the localization of transportable cognitive entities into niches in social space.

Figure 4 gives a simple example of this principle: social space is represented in two dimensions, age and occupational prestige. The figure is based on results from the, 1988 GSS. The figure reveals that support for gun control is clearly localized in social space: there are peaks of support for gun control among those with prestigious occupations, and valleys among younger persons with low occupational prestige.

The traditional survey-analytic view of this picture would be that there is some inherent property of occupational prestige which is producing the general increase in support for gun control among high status individuals, and the local variations in the curve are just minor deviations from the pattern. Or, the slightly more sophisticated analyst would point to the correlation between occupational prestige and, say, education, arguing that the prestige–gun control relationship is actually due to higher education among the prestigious occupations. And education, the analyst might argue,

Age, Occupational Prestige, and Gun Control

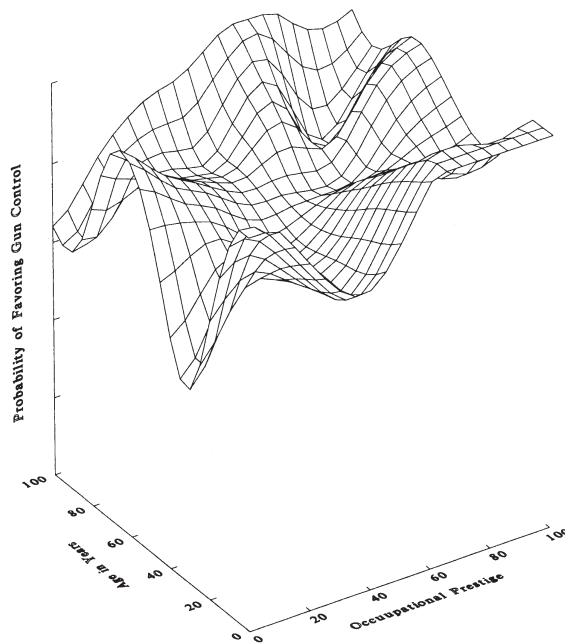


Figure 4 Two-dimensional social space (source: General Social Survey, 1988).

is the prime cause of support for gun control, since highly educated people are more likely to be able to take the long view about such things.

Or, another survey analyst might argue that those who occupy high prestige occupations are more inclined to let the duly constituted authorities handle threats to life and property, and thus do not feel the need to protect themselves with weapons. And low status people are accustomed to having to settle scores on their own. Each explanation is accompanied by a potential set of statistical procedures to 'test' the theory. If statistically controlling for education reduces the relationship between prestige and support for gun control, then the 'long view' theory is supported by the data.

The literature of survey analysis is filled with just-so stories along these lines. Since survey analysis is not very good at tracing connections among people—indeed, survey analysis rips the individual from the social context that gives rise to virtually all social characteristics—the kinds of theories about the origins of behavior that survey analysts can investigate are limited to these atomized caricatures of motives, feelings, beliefs, values and the like.

The best explanation for the configuration of the data in the figure, and in the world at large, is simply that individuals who are like one another communicate their likes and dislikes, their values and beliefs, their attitudes and opinions to one another. As a result of this process, these opinions often become localized in social space.⁶ The meaning of gun control is local in social space. To older, high prestige (probably urban) individuals, gun control means 'taking the guns away from those irresponsible people'. To low status 40 year old males, gun control means 'taking my guns away'. Gun control as an entity does not have the same position in the cognitive maps of individuals in different locations in social space; that is, it does not hold the same meaning. Since meaning is localized in social space, associated attitudes, opinions and the like are also localized. And the true account for many of the correlations and relationships so assiduously studied by the survey researcher is simply that people grow similar with contact, and dissimilar with lack of contact.

The bottom line for this mode of explanation is a very radical one, from the point of view of traditional survey analysis: most relationships between variables in survey analysis are due to the fact that similar people talk to one another. All the elaborate 'causal models' of attitudes and opinions and such need to rule out this baseline explanation before they can convincingly argue that there is anything going on in their data beyond social transmission among similar others.

9. How do social entities behave in Blau space?

If our new understanding of the reasons for observed relationships among survey variables were the only result of framing these issues in the context of Blau space, we

⁶The extent of their localization is a dependent variable in the model. See McPherson and Rotolo (1995) for an example which explains the dispersion of niches in Blau space.

would be able to quickly assimilate this point of view into conventional sociological thought. But, the Blau space conception allows us to model the relationships among the entities as well. And, those relationships allow us to understand some aspects of changes in the entities, as we will see.

The first principle that we need to emphasize is that human individuals possess finite time and other resources. No person can belong to every club and group, hold every job, possess every cultural trait, cling to every attitude, know every fact, be infected with every disease, or exhibit every socially acquired characteristic. Because of this fact, the presence of some of these entities in a person's repertoire will inhibit the acquisition of other entities. In the simplest case, when a person holds a social position (e.g. a job) that demands the expenditure of time, that time cannot be dedicated to another entity (e.g. another job). Entities which consume large amounts of time, then, will tend to suppress other entities to a greater extent than those which demand relatively little time for maintenance, such as a mild affinity for bluegrass music. But note that maintaining even the mildest attitude, opinion, or taste requires occasional elicitation, or else the entity will fade with time.

This limit to our capacity to acquire and maintain these social entities appears at the aggregate level as competition among the entities for our time and other resources. For instance, Mark (1998) has shown convincingly that even mild tastes for types of music compete with each other for our attention. The maintenance of a taste often involves activities connected with learning about the entity, discussing it with friends, buying, storing and displaying associated artifacts, attending events and performances, and so forth. These constraints at the individual level operate as competitive exclusion at the system level. The strong presence of an entity decreases the probability of other competing entities.

Since entities will tend to be transmitted locally in Blau space because of the homophily principle, characteristic niches will form, in which an entity will out-compete its neighbors by excluding them locally. These niches will, of course, interpenetrate each other, since homophily is not perfectly strong. The extent of interpenetration is a variable which is in principle explicable by the mechanisms of the model. Of course, we will discover that some entities are facilitative, rather than competitive, particularly when we make comparisons across types of entities. Certain attitudes, for instance, are facilitated by certain social positions; for instance, it is a truism that conservative political attitudes come easily to the economic elite, while liberal tendencies are often found more among poorer intelligentsia. Most of these cross-entity facilitation effects are likely to be historically particular, in the sense that there is not likely to be a functional reason for the connection between attitude and position. Stock car racing devotees wear baseball caps, while derbies are the head apparel of choice for fox hunters.

The system of social entities in Blau space is thus a dynamic equilibrium of competition and interpenetration (cf. McPherson and Ranger-Moore, 1991). Perturbations in the system work their way through the niches, as they adjust and adapt to

each other over time. These perturbations come through two distinct sources: demographic changes in the population of individuals on the one hand, and the birth and death of entities on the other. Short term changes in the density of entities in the neighborhood can promote the spread or contraction of the niche of existing entities. Fluctuations in the extent of packing in the niche space thus affects the viability of entities.

For example, one reason for the two-decade decline in the density of voluntary participation in the USA is the secular trend upward in female labor force participation. As the time of women has increasingly been occupied by job-related activity, the time available for voluntary activity has declined. And, since attitudes tolerant of female labor force activity are easier to maintain when many women are working, there is a corresponding shift in gender-role attitudes, as we will see in a later section.

In sum, the model generates an explanation for short term movements in the social entities, including spread, contraction (McPherson and Rotolo, 1996), shifts in the entire distribution (McPherson and Ranger-Moore, 1991), changes in skewness and higher moments (McPherson and Rotolo, 2000), the density of the entities (Mark, 1998), the connections between memberships and the social networks underlying them (McPherson *et al.*, 1992; Popielarz and McPherson, 1995), and other short-term characteristics, as well as the amount of overlap in Blau space the entity occupies (McPherson and Smith-Lovin, 1988), the half-life of connections to the entities (McPherson *et al.*, 1992), effects on local networks (McPherson and Rotolo, 2000), and many other time-varying quantities.

10. How does Blau space relate to the traditional concerns of social network analysis?

The homophily principle (cf. McPherson *et al.*, 2001) is one of the few rules known to organize social networks at the global level.⁷ The principle holds very generally across time, space, and for most types of social network ties. Much of social network analysis has either focused on the Markov neighborhood (Pattison and Robins, 2002), which defines the local set of ties between a given node and those nodes within a few links of the focal node, or has focused on the set of ties inside some clearly delineated system, such as a firm, a monastery, or some other social group. The homophily principle can be viewed as the aggregation of ties formed in such groups across an individual's life course, in the sense that social ties rarely originate outside some group context.

⁷Other fairly well established global principles include the tendency for ties to be reciprocal (where not excluded by definition), the inverse relationship between system size and the density of ties, and the small world principle.

11. How is the behavior of nascent entities like attitudes in Blau space Darwinian?

One of the defining characteristics of a Darwinian process is that competition occurs between populations of the entities. The fundamental images of variation, selection and retention are articulated by competitive exclusion between the populations. A series of papers has suggested that we can usefully describe the competitive interactions among voluntary associations, religious organizations, occupations and musical forms. I want to suggest how the process works for one of the hardest cases—attitudes, as measured in social surveys.

Attitudes, of course, are a most difficult case for an argument about entities in Blau space, since they are usually thought of as residing intracranially. I want to argue two very simple things about attitudes: (i) that they spread through Blau space locally; and (ii) that they sometimes act like populations in competition with one another.

The line of logic that we follow to understand the spread of attitudes in Blau space is that growth in the proportion of adherents to an attitude will depend on the prevalence of that attitude in neighboring positions (the propagation hypothesis). If neighboring positions have many believers, the focal position's growth rate in believers will be elevated. Conversely, focal positions with neighboring positions with low rates of adherence to the attitude will not experience growth in the attitude. And, most importantly, distant positions will not have any effect on the focal position.

To understand the competitive effects of attitudes on one another, we construct a parallel argument: the presence of high rates of adherence to an attitude in a focal position will suppress the growth rate of other attitudes in that focal position (the competition hypothesis). This scheme follows the time-honored definition of competitive exclusion, in which the presence of one population in a habitat suppresses the growth of a competing population.

Preliminary results (McPherson and Schaefer, 2003) of the estimation of this model show robust negative effects of competing attitudes and positive effects of propagation. There appears to be clear support for the competition and propagation effects. These results suggest that there are grounds for regarding attitudes as entities which interact with each other at the community level. In the next section, I will turn to some more speculative notions of attitudes and other entities.

12. Some conjectures on Blau space

1. The attitude–behavior relationship is spurious, due to network transmission of both through Blau space.

Both attitudes and behavior are acquired by communication and through modelling of socially proximate others. When both attitude and behavior share the same niche, the probability of co-occurrence is heightened, leading to the inference that they are causally linked.

2. Blau space explains non-attitudes, non-memberships, non-affiliations: individuals occupying positions not in the niche of an attitude will not be exposed to the attitude at a sufficient rate to maintain it.
3. Blau space explains the fact that a single individual may often hold conflicting attitudes: individuals in the overlap of two 'logically inconsistent' attitudes are likely to possess both attitudes.

Since the rationale (i.e. rationalization) for an attitude is itself likely to be localized in Blau space, the conjunction of attitudes that do not satisfy the rules of logical consistency will occur easily where the niches of such attitudes happen to overlap.

4. The largest structural hole of all is created in Blau space.

Because great Blau distance is associated with very low probability of contact, most of the structural holes in society are arrayed in the off-diagonal elements of an adjacency matrix of individuals ordered by Blau proximity.

5. The relationship between types of entities in Blau space explains the 'content' of entities through their transport of units from one arena to another.

Attendees at tractor pulls wear baseball caps, while attendees at croquet tournaments do not. Processes of contagion occur across populations of entities that inhabit the same regions of Blau space.

6. Blau space explains why some sociodemographic variables seem to have 'effects' on social entities.

When a niche is concentrated at an extreme end of a dimension, there will be a correlation between the presence of the entity and the value of the Blau dimension, simply because of their co-occurrence. High status individuals in the USA generally do not roll their pack of cigarettes up into the sleeve of their T-shirt.

7. Organizations have shape in Blau space.

Ever since Pfeffer's series of papers on the social demography of organizations, it has been generally recognized that the social composition of organizations has a fundamental to a variety of organizational outcomes. A lingering question in this literature is to what extent aspects of social composition are general across and within organizational populations. Some preliminary results from an analysis of populations of voluntary organizations (McPherson and Rotolo, 1996) shows that the second moment of the distribution of social characteristics (skewness in age and education) can be predicted by the competitive processes of the model. This leads us to speculate that better data on organizational composition would allow us to link organizational demography to the community ecology of organizational populations. In other words, we should be able to predict the shape of organizational entities in Blau space from our model.

13. The cost of Blau space

No primer in any subject would be worthy of the name without some cautionary admonitions. We give up a great deal by viewing the world through the lens of Blau space. Most proximately, since homophily is not complete, we lose a vast amount of local detail in the social network. While the homophily principle is very general, it leaves the majority of the social arrangements for a particular individual open to substantial variation. For instance, while we can reasonably predict that a 40-year-old white male Ph.D. from California is not likely to marry (i) someone he has never met face to face, thus ruling out over 99% of the world's population, or (ii) someone of drastically different age, race, religion, education, etc., thus ruling out another large chunk of the remainder. Since the people we encounter face to face are selected by the homophily principle, we see that we can explain the vast majority of marital pairs with the simple device of Blau space. The usual sociologist's reaction to this is to feel somehow unsatisfied with this explanation because it accords too well with our common sense.

We give up the stories. The uniqueness of each individual's path through time and Blau space is sacrificed for the generality of reducing that path to a vector of coordinates which characterize position in time, geography, and social structure. The discourse, the negotiated reality, the micro exchanges are all relegated to the spline generator of the homophily principle in Blau space.

Most importantly, we give up the claim to agency. The mechanism that drives movement in Blau space is not very amenable to political, social, or emotional manipulation. The distribution of action across the vast social distances of Blau space reduces the forces of individual human agency to a mere whisper beyond the immediate social environment. Taking in the social world through Blau space mutes even the ponderous tones of organization and institution. For those committed to maintaining the traditional social science view (or those in need of a vibrant story line for MBA students), Blau space will be an uncomfortable venue for dialogue. It remains to be seen whether the benefits will overcome the discomfort.

Address for correspondence

Miller McPherson, Department of Sociology, University of Arizona, Tucson, AZ 85716, USA. Email: mcphersn@u.arizona.edu.

References

- Blalock, H. M. Jr (1961a), 'Correlation and causality: the multivariate case,' *Social Forces*, **39**, 246–251.
- Blalock, H. M. Jr (1961b), 'Theory, measurement, and replication in the social sciences,' *American Journal of Sociology*, **66**, 342–347.
- Blau, P. M. (1977), *Inequality and Heterogeneity*. Free Press: Glencoe, IL.

- Cavalli-Sforza, L. L. (Luigi Luca) (1995), *The Great Human Diasporas: A History of Diversity and Evolution*. Addison-Wesley: Reading, MA.
- Blau, P. M. and O. D. Duncan (1968), *The American Occupational Structure*. Free Press: Glencoe, IL.
- Bourdieu, R. (1987), *Distinction: A Social Critique of the Judgement of Taste*. Harvard University Press: Cambridge, MA.
- Durkheim, E. (1950), *The Rules of the Sociological Method*. Free Press: Glencoe, IL.
- Joreskog, K. (1970), 'A general method for the analysis of covariance structures,' *Biometrika*, **57**, 239–251.
- Hannan, M. T. and J. Freeman (1977), 'The population ecology of organizations,' *American Journal of Sociology*, **82**, 929–964.
- Mark, N. (1998), 'Birds of a feather sing together,' *Social Forces*, **77**, 453–485.
- McPherson, J. M. (1983), 'An ecology of affiliation,' *American Sociological Review*, **48**, 519–532.
- McPherson, J. M. and L. Smith-Lovin (1986), 'Sex segregation in voluntary associations,' *American Sociological Review*, **51**, 61–79.
- McPherson, J. M. and L. Smith-Lovin (1987), 'Homophily in voluntary organizations: status distance and the composition of face-to-face groups,' *American Sociological Review*, **52**, 370–379.
- McPherson, J. M. and L. Smith-Lovin (1988), 'The comparative ecology of voluntary associations: an ecological analysis of the voluntary organizations in five nations,' in G. Carroll (ed.), *Ecological Models of Organizations*. Ballinger: Cambridge, MA.
- McPherson, J. M. and J. Ranger-Moore (1991), 'Evolution on a dancing landscape: organizations and networks in dynamic Blau space,' *Social Forces*, **70**, 19–42.
- McPherson, J. M. and T. Rotolo (1996), 'Testing a dynamic model of social composition: diversity and change in voluntary groups,' *American Sociological Review*, **61**, 179–202.
- McPherson, J. M. and D. Schaefer (2003), 'Competition and propagation of attitudes in Blau space,' in progress, Department of Sociology, University of Arizona.
- McPherson, J. M., P. Popielarz and S. Drobnic (1992), 'Social networks and organizational dynamics,' *American Sociological Review*, **57**, 153–170.
- McPherson, J. M., L. Smith-Lovin and J. Cook (2001), 'Birds of a feather: homophily in social networks,' *Annual Review of Sociology*, **27**, 415–444.
- Motter, A. E., A. P. S. de Moura, Y.-C. Lai and P. Dasgupta (2002), 'Topology of the conceptual network of language,' *Physical Review E*, **65**, 065102.
- Pattison, P. E. and G. L. Robins (2002), 'Neighbourhood-based models for social networks,' *Sociological Methodology*, **32**, 300–337.
- Popielarz, P. and J. M. McPherson (1995), 'Niche position, niche overlap, and the duration of voluntary memberships,' *American Journal of Sociology*, **101**, 698–720.
- Ragin, C. C. (1987), *The Comparative Method*. University of California Press: Berkeley, CA.
- Ridgeway, C. (1991), 'The social construction of status value: gender and other nominal characteristics,' *Social Forces*, **70**, 367–386.

- Rotolo, T. and J. M. McPherson (2001), 'The system of occupations: modeling occupations in sociodemographic space,' *Social Forces*, **79**, 1095–1130.
- Sahlins, M. D. (1972), *Stone Age Economics*. Aldine de Gruyter: Amsterdam.
- Singer, B., C. D. Ryff, D. Carr and W. J. Magee (1998), 'Linking life histories and mental health: a person-centred strategy (in linking qualitative and quantitative methods),' *Sociological Methodology*, **28**, 1–51.
- Smith-Lovin, L. (1999), 'Core concepts and common ground: the relational basis of our discipline,' *Social Forces*, **78**, 1–23.