THE IMPACT OF DIFFERENTIATION AND CENTRALITY
ON THE AGE-SPECIFIC MIGRATION IN KANSAS COUNTIES, 1960-1970

by

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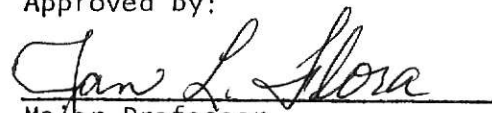
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CHAPTER 1

THEORY, VARIABLES, AND HYPOTHESES

Introduction to the Problem

The United States has been characterized by migratory movements throughout its history. Beginning on the Atlantic seaboard, the colonists settled the land by a process of westward migration that lasted for more than three centuries. Throughout the entire national history, as a part of the growing up process, young men and women have asked themselves seriously whether or not they could better their fortunes (fortunes as used here refers to material possessions or wealth owned by individual) by moving to some other place and by striking out on their own. Among the newcomers, it often meant moving with no personal resources except ambition and courage. The legend of great statesmen, scholars, and businessmen beginning their careers by moving to a differentiated community almost penniless has been reenacted by American youngsters frequently, all over the country (Bogue, 1959).

Migration can change the size or the composition of a particular population rather quickly. Such changes can result from a mass exodus of people, a mass invasion of people, or a large-scale selective interchange of people with other social units (Bogue, 1959).

The main objective of the study is to see how the struggles to accumulate possessions and wealth by individuals, which are considered

to be part of the motivations behind migration, has affected the age-specific net migration in Kansas social units.

The independent variables used are differentiation, and centrality. The dependent variable is the age-specific net migration. These variables received recognition in this research because people moved from one social unit to more developed or differentiated social unit to acquire the needed fortunes. Differentiation and centrality are considered as appropriate variables for the study because they are useful tools which can help to determine the level of development of different social units.

At the same time, we are aware of the differences in migration patterns which occurred among the people. For this purpose, the age-specific net migration was utilized as a dependent variable. At what age in life people started to move? What age category moved to differentiated social units to acquire their fortunes? At what age category was the rate high? And what age category showed a decline in the migration rate?

Differentiation

In the following section, different concepts of differentiation and related concepts are reviewed.

Development as a desirable phenomenon for all social units, brings more resources for the people to improve their living and to acquire material possessions. In order to achieve this goal, people move from one locality to another to improve their standard of living,

engage in various employments and participate in various activities to that end. In such a process of development, many benefit, but some do not because neither resources nor development are equally distributed. The issue in this study is to observe the effects of these resources on the age-specific net migration.

The concept of development is closely associated with the concept of differentiation. As Eisenstadt (1964, p. 376) said,

> Differentiation describes the ways through which the main
> social functions or the major institutional spheres of society
> become disassociated from one another, attached to specified
> collectivities and roles, and organized in relatively specified
> and autonomous symbolic and organizational frame works within
> the confines of the same institutionalized system. . .develop-
> ment proceed through various states of specialization and
> differentiation.

Etzioni defined differentiation as the process in which one social role or organization diverges into two or more that function more effectively in a new historical setting. The new social units are structurally distinct from each other, but taken together are functionally equivalent to the original unit (Etzioni, 1964, p. 261). A criticism of this definition is that it implies that differentiation always increases from one multi-functional role structure to several more specialized structures. Such a theory suggests that a given function always existed merely and its method of function is changed as differentiation increases.

Governmental, economic, educational and religious institutions and different types of services must be set up before a social unit can perform all needed functions. Recreation, transportation, light and

water supply are highly desirable in every social unit as well. The ecologists view a social unit as forming symbiotic relationships within its structure (Scott, 1970, p. 431-434).

In an attempt to characterize different types of societies, the sociologists have emphasized level of differentiation. "The term differentiation refers to the degree of separation between institutions in a society as well as to the degree of internal diversity within those institutions" (Newman, 1973, p. 24). The degree of differentiation in any given society may vary from simple to complex. The simple societies will be considered as having a small number of social institutions, each of which has a number of social functions. For example, in a society which is composed of a single tribe or class, a rudimentary division of labor may prevail, but membership in the tribe will be at once a social, religious, and political membership. Complex societies will contain a large number of separate and distinct social institutions which will be internally differentiated. For instance, in the United States, religious, political and economic institutions are very distinct from each other and a great number of activities are involved in these institutional spheres.

Emile Durkheim's discussion on polar types is a good illustration here. He labelled his continuum solidarity and his extreme types as mechanical and organic. Both mechanical and organic solidarities exist and help to promote cohesion in a less differentiated social unit. The difference is that the organic alone exists in a more differentiated social unit. The kind of cohesion which Durkheim referred to here was

brought about by the division of labor, which combined the productive power and the ability of the workman (Durkheim, 1964, p. 50).

The concepts of differentiation given by these men have the same elements so they were applied to Kansas counties. It is assumed that these concepts will help to determine the counties that are complex and those that are simple. A complex county will be one which has a large number of institutions and services. Its level of differentiation will be higher than a simple one because of the difference in number of institutions and services. We take for granted that the net in-migration will be higher for a county which is highly differentiated than a less differentiated county because people would be at an advantage to meet their goals, needs, and to acquire the needed fortunes and wealth.

Centrality

One of the theories which has been used in the past to explain the development of any social units was that of central place theory. The central place concepts are similar to the concept of relative centrality, which was one of the independent variables in this study.

Centrality was defined by Flora as the access which each sub-system has to the total information in the entire system relative to the other sub-systems (Flora, 1967, p. 11), or ". . .a community's position relative to other communities in the total configuration of communication path'' (Young, 1966, p. 67). These definitions suggest that information and the position of a community in term of its communication are essential to a central place.

Ecologists in general, and central place theorists, particularly, received recognition in devising measurable variables which synthesized economic and social structure of any society. The most important works of these ecological theorists are (1) the gravity model and (2) the gradient theory. In our present study we are concerned with the gravity model.

The gravity model presents an area as a center, where trade, communication, transportation, services and employment opportunities make interaction of people possible, thus increasing the flow of information. The difference in the level of the interaction depends largely upon the distance that the people of surrounding areas need to cover in order to participate in these various services and facilities. The interaction between two cities is expected to vary directly as a function of their population size and inversely with a function of the distance between them (Carrothers, 1956, p. 94).

The basic concept was first formulated in general terms more than a century ago and was subsequently employed in the analysis of migration. The gravity model's formula is expressed as

$$\frac{P_1 \cdot P_2}{D^n}$$

where P_1 and P_2 are the respective population of the two cities under consideration.

D is the distance between them and

n is the exponent of D.

The fraction is equal to the *interchange* between the two counties measured in migration.

Exchange of Goods

Several studies which used this formula found variation in the value of the exponent n. For example, in a study of frequency of telephone calls between fifty small cities and Flint, Detroit, Lansing, Saginaw, and Bay City, Michigan, Carroll found that the exponents varied between 2.3 and 3.3. At the same time, when Carroll used the data collected by the Michigan State Highway Department for travel between Detroit and one hundred smaller places within a three hundred mile radius, he found the exponent to be 2.98 (Carroll, 1955).

In 1929, Reilly developed a Law of Retail Gravitation, which was an adaptation of the gravity model, to measure the influence by (retail trade) of two places on a third. He applied this method to 255 cases of linking cities and towns of various sizes in Texas. He found that the appropriate exponent for populations was the first power and the exponent of inverse distances was nearer the second power than to any other power (Reilly, 1929, p. 50). His findings postulated that two cities attracted retail trade in style and fashion goods from an inter-mediate town approximately in direct proportion to the populations of the two cities and in inverse proportion to the square of the distance from the intermediate town to the two cities.

For his 255 cases, Reilly obtained distance exponents which ranged from 0.0 to 12.5 but selected two because the modal value fell within the range 1.51 to 2.5 (Reilly, 1929; reprinted in 1959). Yet the model

class contained only one-third of the values and another one-third ranged from 3.5 upward (Schwartz, 1963, p. 19).

Carrothers (1956) suggested that the distance exponent itself could be a variable, which inversely may be related to the size of population and to distance itself (Carrothers, 1956, p. 97-98). He proposed that populations of different sizes could be raised to variable powers greater than one, partly on account of the greater influence exerted by larger centers through agglomeration economies. The differences in the studies discussed here are quite enough evidence to believe that no one particular value of the exponent is better than another.

For the purpose of this study an exponent of one as well as gravity model was used because we dealt with the linear distance. A complete discussion on linear distance is presented in Chapter 2. The study also used the concept of centrality which Young gave to illustrate the effects of information upon the net migration. If a county served as a central place (where trade existed, mail flew smoothly and transportation was available) its net in-migration will be expected to be high. People would migrate in to participate in the trade. News will be carried to friends, relatives and families in form of mail. This information can help the people in their decisions as to where they could migrate. Transportation will be essential to carry on the trade within and outside the community as well as for bringing people in to take part in the trade.

Migration

Migration, mortality and fertility are the three major components which affect the growth and size of a population. A community can gain population only through the fertility of its inhabitants or by in-migration, and it can lose population only through deaths among its residents or by out-migration. As a component of population change, migration occupies a central place in demographic analysis (Hauser and Duncan, 1959, p. 486).

Hauser and Duncan defined migration as a change of residence from one county to another while remaining within the same national boundaries (Hauser and Duncan, 1959, p. 489). Bogue found migration to be a major aspect of basic social change. Its evidence was demonstrated by the regions and nations that had undergone extensive industrial development and had simultaneously undergone a redistribution of their population. The industrial revolution in Europe and North America has been paralleled by a great rural-to-urban migration of more than one hundred and fifty years duration. Other nations now experiencing technological change of this same type are being subjected to the same migration experience. The building of great metropolitan centers, the exploitation of new resources, and the opening up of new regions all involved large inflowing streams of migrants (Bogue, 1959, p. 375).

Generalizations about migration as a source of social change have existed for many years. Becker and Barnes (1961) supported this in their study of interrelationship of migration and cultural contact by thinkers as early as Herodotus, Thucydides, Plato, Aristotle and others. In a section which dealt with the Greco-Roman mobility and mentality, Becker

and Barnes pointed out that migration received one of its earliest treatments in Thucydides' writing (471-400 B.C.).

Hypotheses

The following hypotheses will be tested in the study:

(1) The higher the level of differentiation of a county, the higher its net in-migration rate.

If a county can provide services such as manufacturing, industries, factories, wholesale trades, retail sale trades and other related services, the outsiders will be attracted to migrate in to share and enjoy these various services.

(2) The higher the level of centrality of a county, the higher its net in-migration rate.

If a county serves as a central place for the surrounding counties, it means that commercial goods, agricultural products and many other services can be exchanged for money in this central place. It also means that trade exists and transportation is sufficiently developed so that people in the hinterland have ready access to services in this central place. A county may also have high centrality if it is located adjacent to a differentiated county. That is, a county is central if it has access to a complex set of services, regardless of whether those services are within the county or outside it. In either case, it is hypothesized that migrants would be attracted to that county.

In Chapter 2, the measurements of the variables are presented.

CHAPTER 2

THE MEASUREMENTS OF THE VARIABLES

In an attempt to understand why net migration differs from county to county, the present study used indicators of two dimensions of county structures--the relative centrality of each county and the level of differentiation within the county. The following pages present the measurement of differentiation, relative centrality and net migration for 105 counties in Kansas.

The measurements of the variables are based on county and community. The relationship between the community and the county is presented in the following paragraph.

The migration data are available on the county level, but not for each community. Differentiation and centrality of counties cannot be measured directly since the count is not a true social unit. A county is not the same thing as the trade area for any single community within the county. But a community is the central location in which various services are centralized. County differentiation was approximated by the differentiation level of the largest city and/or the county seat. This means if a service existed in one or the other (when the county seat was not also the largest town), it was counted as being present for the county. Usually the largest city and the county seat were the same. The centrality of the largest community was used to indicate the centrality of the county (Flora, 1973).

Measurement of Differentiation

Marsh indicated in his 1967 study that the ideal indicator of differentiation would be a mere count of the total number of differentiated roles and collectivities in each society. The count of the specialized roles or the differentiated occupations in the labor force can also be used to indicate the degree of differentiation in each society (Marsh, 1967, p. 33). The reliability of this method would be doubtful because of the technical problem of counting roles.

According to the communication framework, Young defined differentiation as ". . .the diversity of meaning areas maintained by a social system" (Young, 1970, p. 30). Using the Guttman Scale technique, he and his students devised the scales of system level of differentiation for states (MacCannell, 1968), communities (Fujimoto, 1965; 1966; Huang, 1966; J. Flora, 1971), and organizations (C. Flora, 1971).

They found Guttman Scale of differentiation to be useful because it focuses on the addition of different institutions in the community. It demonstrates an adequate conception of community growth, and allows one to rank communities from simple to complex; even when the communities are from different cultural contexts, it is possible to calculate the increase and decrease in differentiation to measure "community growth" (Young, Spencer, and Flora, 1968, p. 344).

In 1971, Flora developed three differentiation scales for the Cauca River Valley of Colombia. They are general differentiation, organization differentiation and agricultural differentiation (J. Flora, 1971, Chapter 3). The general differentiation items were chosen to

include the general institutional sectors including the educational, medical, recreational, governmental, commercial, and community services. Agricultural differentiation items included all community-based agriculturally related services. Organization differentiation items included clubs, associations, and cooperatives. All the three scales correlated highly.

For the purposes of the present study, eleven community differentiation subscales were devised for 105 Kansas counties. The categories were assigned a priori as part of a larger study conducted by the Population Research Laboratory of Kansas State University. The data were coded by the employees of the Population Research Laboratory from the yellow pages of 1970 telephone books. The categories (which refer to services in this study) included medical, financial, recreational, agricultural, governmental, commercial goods, transportation and communications, religion, construction, social services and social welfare. These services included 339 items which were factor analyzed so as to reduce the number of variables to a smaller number of conceptual variables. The factor analysis was presented in Table 1 and the eleven subscales were presented in Appendix I.

Nine of the eleven subscales fit into the general differentiation scale. The recreational scale and agricultural scale were not included in the general differentiation scale because they loaded on a different factor. The items in the recreational scale referred to various types of sports facilities and sport clubs. As a community becomes differentiated a limited number of recreational facilities will accompany it. Apart from

TABLE 1

FACTOR LOADINGS OF DIFFERENTIATION SUB-SCALES FOR KANSAS COUNTIES, 1970

	Factor Loadings	
Type of Differentiation	Factor 1	Factor 2
Establishments Selling Goods	0.95	*
Commercial Services	0.94	*
Construction	0.91	*
Financial	0.91	*
Transportation and Communications	0.90	*
Medical	0.88	*
Social Services	0.87	*
Church	0.83	*
Governmental	0.82	*
Recreational	0.30	-.74
Agricultural	0.35	.66
Eigen Value	7.35	1.01
Cumulative Percentage of Variance Explained	66.8%	76%

*All loadings which are not significant at the .01 level
(less than .25) are omitted.

these limited facilities, recreational items are not established as other differentiation items such as dentist's service, doctor's service, *building contractor* and sporting goods store. Some recreational facilities depend upon the collective action of the members of the community.

The agricultural scale was expected to correlate highly with differentiation, but did not. When this was compared to Colombia's situation, we found that agricultural scale correlated highly with general differentiation. In Colombia agriculture is the most important economic activity whereas in Kansas agricultural related services are not so important in highly differentiated communities. A town in a differentiated community is able to supply the necessary agricultural related services which the less differentiated communities need. Again, looking at the items under agriculture in Kansas, we find that they did not correlate with one another so it was thought not to be a good scale to include in the general differentiation scale. The general differentiation scale was therefore formed from nine community differentiation subscales which loaded on the same factor. The scales are commercial goods, transportation and communication, religion, construction, social services, social welfare, governmental, medical, and financial. Table 2 shows the general differentiation scale.

The Guttman scale arranged the items in the general differentiation scale in a way to indicate that communities with a particular service or agency at a certain step on the scale would also have all of the other services above it on the scale. For example, a community with a florist store will also have a dentist's office and a plumbing contractor.

TABLE 2

GUTTMAN SCALE OF GENERAL SOCIAL DIFFERENTIATION, 105 KANSAS
COUNTIES, 1970-71

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Plumbing contractor (Construction)	98	9	.81
2	Dentist (Medical)	95	1	.16
3	Florist (Goods)	93	5	.41
4	Optometrist (Medical)	90	9	.47
5	Jeweler (Goods)	90	2	.15
6	Chiropractor (Medical) Wrecker service (Service)	87	9 15	.60 .65
7	Store which sells large electric appliances as major function (Goods)	84	9	.50
8	Electrical contractor (Construction)	83	6	.50
9	Heating contractor (Construction)	77	7	.25
10	Catholic Church (Religious)	75	26	.65
11	Store which sells air conditioning and/or heating equipment and systems as primary function (Goods)	73	17	.41
12	Barber shop (Service)	70	12	.38
13	Trucking - motor freight (Transportation and Communication)	68	15	.40
14	Bakery (Goods)	64	11	.26
15	Savings and Loan Association (Finance)	60	11	.29
16	Shoe store - retail as only function; shoe in title (Service)	56	13	.31

TABLE 2 (cont'd)

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
17	Photographer (Service)	55	10	.22
18	Printer (Service)	53	14	.32
19	Upholstery store as primary function (Service)	52	14	.29
20	Sporting goods store (Goods)	50	12	.24
21	Exterminating and fumigating (Service)	50	14	.29
22	Building contractor (Construction)	49	18	.40
23	Inter-city bus line stops in community (Transportation and Communications)	47	11	.25
24	Surgeon (Medical)	45	21	.47
25	Daily newspaper (Service)	44	6	.14
26	Credit agency (Finance) Telegraph company (Transportation and Communications)	42	11 12	.22 .27
27	Osteopath (Medical)	41	26	.50
28	Certified Public Accountant (Finance) Taxi service (Service)	40	8 4	.17 .10
29	Investment securities sold in the community (Finance)	39	17	.38
30	Radio station (Transportation and Communications) Music store (Goods)	38	5 14	.12 .36
31	Mobile home dealer sale of mobile homes primary function (Goods)	36	15	.36

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
32	Company which makes signs as major function (Goods)	35	9	.23
33	Collection agency (Finance)	33	9	.26
34	Episcopal Church (Religion)	32	12	.31
35	Nazarene Church (Religion)	31	19	.43
	Roofers principal function (Construction)		11	.26
36	College or university (Social Welfare)	30	3	.10
	Wholesale beer distributor (Goods)		10	.37
37	Store which sells office furniture and equipment as primary function (Goods)	29	10	.29
	Architect (Construction)		7	.25
38	Private or public employment agency (Social Welfare)	28	7	.23
39	Store which sells motorcycles and motor scooters (with "cycle" in title) (Goods)	27	11	.35
	Appraiser (Finance)		7	.24
	Orthodonists (Medical)		7	.24
40	Painting contractor with painting as primary function (Construction)	25	15	.51
	Book store		9	.31
41	Church of God (Religion)	24	15	.53
42	Photographic equipment and supply store (Goods)	23	11	.47
43	Southern Baptist Church (Religion)	22	16	.43
	Telephone answering service (Service)		11	.45
	Adjuster (Finance)		7	.29
44	Travel bureau or agent (Transportation and Communications)	21	8	.33
	Copying and duplicating service (Service)		5	.21

TABLE 2 (cont'd)

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
45	Park board (Government)	20	10	.52
	Airline company (Transportation and Communications)		6	.31
	Obstetrics and Women's Diseases (Gynecology) (Medical)		8	.53
46	Army, Air Force, Navy or Marine recruiting station (Government)	19	9	.52
47	Automobile renting and leasing (as primary function) (Service)	18	9	.34
48	Podiatrist (Medical)	17	3	.14
	Hearing aids sold in community (Goods)		8	.44
49	Church of Jesus Christ of Latter Day Saints (Religion)	16	9	.45
	Delivery service (as major function) (Service)		8	.47
	Pawnbroker (Finance)		5	.31
50	Day nursery (Social Welfare)	15	8	.36
	Wholesale liquor establishment (Goods)		7	.46
51	Bicycle dealer (with "cycle" in title) (Goods)	14	6	.31
	Salvation Army (Religion)		6	.40
	Optician (Medical)		6	.46
52	Social security office (Social Welfare)	13	6	.50
53	Internal medicine (Diagnostician) (Medical)	12	9	.50
	American Baptist Church (Religion)		9	.64
54	Pediatrician (Medical)	11	3	.23
55	Bible Church (Religion)	10	11	.52
56	Landscape architect (Construction)	9	5	.50
57	Swimming pool contractors or dealer (as primary function) (Construction)	8	2	.25

TABLE 2 (concluded)

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
	Firm which does blueprinting (with blueprinting in title) (Goods)		2	.25
	Burglar alarm systems sold in community (Goods)		4	.50
58	Diaper service (Service)	7	3	.37
	Laboratory diagnosis (Pathology) (Medical)		4	.57
	Nervous and mental disease (Neuropsychiatry) (Medical)		1	.16
59	Veterans Administration Center (Social Welfare)	6	5	.45
	Urinary diseases (Urology) (Medical)		5	.55
	Detective agency (Service)		1	.14
60	Boys' Home (Social Welfare)	5	4	.44
	Division of Vocational Rehabilitation (Social Welfare)		4	.44
	Skin specialist (Dermatologist) (Medical)		0	.00
61	Pentecostal Church (Religion)	4	1	.20
62	Unitarian Church (Religion)	3	2	.40
	Adoption agency (Social Welfare)		1	.25
	Barber school (Service)		0	.00
	Modeling agency (Service)		0	.00
	Child Guidance Center (Social Welfare)		2	.66
63	Civil Service Commission (Government)	2	0	.00
	Small Business Administration (Government)		0	.00
	Federal Housing Administration (Government)		0	.00
	Pilgrim Church (Religion)		0	.00
	Youth Opportunity Center (Social Welfare)		0	.00
	Neurosurgeon practices in community (Medical)		0	.00
64	Election commissioner (Government)	1	1	.50
	Physician who specializes in pulmonary diseases (Medical)		0	.00

In other words, the lower the scale step of the service, the more common the services are; the higher the scale step, the less likely one is to find that service in a Kansas community. The communities with a high rank on the scale are more complex because there are many services within the community. Guttman scale allows us to predict the presence or absence of particular service in the system, allowing us to compare the degree of service complexity among communities.

Measurement of Centrality

Centrality indicates the degree of linkage of communities to the larger system. The concept as used here is closely related to the "centrality" used by central place theorists such as Zipf (1941), Taafe (1962), and Reilly (1929).

In the community, there is a certain spot that is considered to be the center. Usually this central spot is the place where people have to go to get certain kinds of goods or services. If this conceptualization is extended to the hinterland of a service center, the urban service area and metropolitan region emerge. It is generally accepted that persons may be directly dependent on urban services by traveling to the urban unit to acquire the service, or obtain it by mechanical means as is the case of public utilities. The territory which the urban services covered includes services such as retail shopping, public utilities, transportation, medical facilities, recreation, religion, education, manufacturing centers, factories and other employment activities in which people can be engaged, and delineates the service area of the central place.

The dependence of persons on an urban unit was further seen to go beyond the periphery of primary service areas. Each large city was surrounded by territory which contained people who are secondarily dependent on its services. The form of dependence was characterized by the existence of an intermediary to transfer the service of the central place to the individual. The most common intermediary may be the retail establishment. For example, a community's retail establishment may still depend upon urban wholesale establishments even when the community is far away from the urban center. This kind of relationship may be the beginning of the metropolitan region among the urban centers (Gibbs, 1961, p. 256).

If the distribution of many communities in a large regional system is based upon the direct and indirect dependence on the central place, every community will have its service area in some extent, and will have some degree of dominance over other communities. Central places occur where a community has strong dominance over other communities. The sub-dominant communities are dependent on the dominant community. It is similar to the relationship between metropolitan centers and hinterland cities which Bogue found in his 1949 study.

Those kind of measurements imply that the position of a place in the central place hierarchy is perfectly correlated with the functions which are performed by that place. Flora in 1967 pointed out that this perfect correlation between centrality and central function complexity may not always be true (Flora, 1967, p. 10). Because a city in a less developed area of a larger system could have rather simple functions while serving a hinterland which allowed it to be placed in the same

position in the centrality hierarchy as another functionally more complex city in a more developed region. Central place theory provides the framework of actual physical contacts between communities in terms of the functional interdependence of communities.

In Kansas, Flora and Wang derived the measure of centrality as part of an Agricultural Experiment Station project. The communities are divided into five areas based upon the size of their populations and geographic locations. In each division, the counties are put in "orders" in accordance to their level of differentiation. The first order includes Johnson, Wyandotte and Sedgwick counties. Wichita serves as the central place for Sedgwick while Kansas City serves as a central place for Johnson and Wyandotte counties. The second order includes Shawnee, Saline, Reno, and Douglas, and Topeka, Salina, Hutchinson and Lawrence serve as their respective central places. The third order contains twelve counties, fourth order contains eighteen counties and the fifth order is composed of sixty-eight counties. The complete orders and the scores from one county to another are presented in Appendix II. An exponent of one was used because the distance covered from one county to another county is not double or squared as one travels. The area that a person covers in this type of travelling is different from the area that the rays of light will cover. If a light shines on a surface of a glass at a certain distance and we move the glass twice its original distance, the area covered by the rays will be four times as great. Whereas if a person travels from his own original county to another county, the space covered is not doubled because we are dealing with the space on the land and it is like linear distance which does not double like the ray of light or sun.

Measurement of Migration

The methods of measuring the number of migrants can be classified as either direct or indirect. The direct method requires counting persons who change their residence across defined boundaries. The method is most appropriate in areas where there are systems of residence registration or where direct migration questions are asked at a census enumeration.

In nations where these statistics are not available, birth and death registration can be combined with two or more good consecutive censuses to estimate migration indirectly. From the tabulation of these data, one can easily estimate net migration rates through the vital statistics and the survival ratio methods. These methods are essential because each can accomplish results that the other cannot accomplish. The vital statistics help to estimate the total net gain or loss in population that a community experiences between two censuses as a result of migration. The survival ratio method helps to estimate the proportion of the population for each age category that is expected to live during a decade.

One should take caution in calculating these rates for both procedures are subject to errors because the estimations of net migration are based upon residuals. Errors may stem from census count. It is taken for granted that if the net balance of error is near zero, then the residual approach will be accepted as a reliable measure of net migration.

Net migration is the difference between in-migration and out-migration and hence may be either a negative or positive figure. The net rates used here were taken from computations made at the Population Research Laboratory, Kansas State University, and published under the title, Migration in Kansas: Out-migration and Population Trends (Flora et al., 1971). The vital

statistics method was used in calculating the net rate for the entire population of each county. The vital statistics method is a way of estimating net migration rates employing a simple equation as follows:

$$P_1 = P_o + B - D + M$$

where
P_1 = population at time one

P_o = population at a previous time

B = births

D = deaths

M = net migration

or population change during a period minus natural *increase during that period* is equal to net migration. The net migration rate is essential so that we can compare one county to another county. The comparison which can not be done by mere absolute number of population because the population of all the counties is not the same. The net migration rate was therefore obtained by dividing M by P_o. The vital statistics method depends on the complete registration of births and deaths and also upon an accurate census. This method is still subject to the errors which may occur in such data. For example, every birth as well as every death might not be registered. Under-enumeration may also be a problem.

For our immediate concern, the forward survival rate method, which was considered to be free from some of the errors which accompanied other methods which have been discussed, was utilized. The age-sex specific rates used were taken from the project of the Population Research Laboratory, Kansas State University (C. Flora, 1973). The rates were

computed by using the forward survival rate method. The basic formula for estimating net migration is

$$M_{X + t} = P_X^t {}_{+ t} - SP_X^o$$

where   M   = net migration

X   = age or age group

t   = interval in years between censuses

$P_X^t {}_{+ t}$ = population at the next census at age X + t

$P_X o$ = population aged X at the first census

S   = survival rate (Shryock and Siegel, 1971, p. 630).

The net migration rate was obtained by dividing M by P_o in 1960. The 1960 population was used as the denominator for Kansas because our interest is focused on the change during the ten-year period from 1960 to 1970.

The survival ratio method of measuring net migration here rests on the following logic. If two censuses are taken exactly t years apart, the population that is age X at the first census will be age X + t at the second. The number of people counted at the older age at the second census will be fewer in number, even in the absence of migration, because of mortality during the intercensal period. Each age group may be looked upon as a set of real cohorts, born in specified years, that pass through time together. If none of the basic group were to move to another community during the period and if no one from outside moved in and if a count can be maintained or estimated of the number of deaths that occurred to the cohort that was age X at the earlier census, it will then be possible to

know how many non-migratory persons to be expected to be alive and in
the same community at the date of the final census. The difference
between the expected number and the actual number counted at the second
census will be accepted as a measure of net migration (Hauser and Duncan,
1959, p. 492).

In this study, the number of deaths by age in Kansas counties is not
published but was estimated by applying a survival ratio taken from life
table in 1960 (or a ratio that could estimate what proportion of the
population for each age category would survive until the 1970 census)
assuming no migration during 1960 to 1970 in Kansas. The difference be-
tween the surviving expected population in 1960 and the actual population
in 1970 served as an estimate of net migration of the age group during the
ten-year intercensal interval. In a case where the expected population
was smaller than the final census count, the community was assumed to have
experienced net in-migration of the amount indicated by the difference.
If the expected population was larger than the census count, the difference
will be taken as a measure of net out-migration.

If a survival ratio is established for each age group and used in
making an estimation of net migration, a total count of net intercensal
migration can be obtained by summing the results for all age groups. The
total, of course, will not include the net migration of persons less than
t, in this case ten years of age in 1970, because these persons would
have not survived for the full intercensal time. One virtue of this
procedure is that it yields an estimate of net migration by age groups
and its weakness is that it fails to make such an estimate for the age
group born during the intercensal period (Hauser and Duncan, 1959, p. 493).

Age-Sex Specific Types of Migration: The
Dependent Variables

The age-sex categories were factor analyzed to determine the
clustering of correlations of the various age-sex-specific migration
rates. Table 3 presents the factor loading of age-sex-specific net
out-migration rates for Kansas counties, 1960-1970.

The grouping was based upon their scores in the factor analysis.
The dependent children are grouped highly with one another. This suggests
that wherever the parents go their dependent children would follow them.
The females who were 20-24 in 1960, and 30-34 in 1970, were included in
this group. The inclusion of these females suggests that they are married
to men a few years older than themselves and they also demonstrated the
same migration patterns as their husbands. The migration rate of males
who were 20-24 in 1960, and 30-34 in 1970, were found to load highly in
factor three so they were included in class three. The females who were
40-44 in 1960, and 50-54 in 1970, although loading highest on factor six,
were included with the age categories in factor one because the age
groups immediately older and immediately youmger loaded on factor one.
Females age 50-54 in 1970 loaded secondarily on factor one.

The males who were 55-59 in 1960, and 65-69 in 1970, were included
in factor four because this age group loaded almost as highly on that
factor as on factor six, and with respect to age, they fit with those
persons in factor four. Females age 60-64 in 1960, and 70-74 in 1970,
were the only group loading solely on factor six. They were placed in
a class by themselves. Males age 60-64 in 1960, and 70-74 in 1970,

TABLE 3   29

FACTOR LOADINGS OF AGE-SEX SPECIFIC NET OUT-MIGRATION RATES FOR KANSAS COUNTIES, 1960 to 1970

SEX	AGE		FACTOR LOADINGS					
			1	2	3	4	5	6
Male	1960	0-4						
	1970	10-14	.87		.26			
Male	1960	30-34						
	1970	40-44	.87					
Female	1960	0-4						
	1970	10-14	.86					
Female	1960	30-34						
	1970	40-44	.83					
Female	1960	25-29						
	1970	35-39	.79					.25
Female	1960	35-39						
	1970	45-49	.79			.26		
Male	1960	25-29						
	1970	35-39	.76	.43				
Male	1960	40-44						
	1970	50-54	.71					.25
Male	1960	45-49						
	1970	55-59	.68				.26	
Male	1960	35-39						
	1970	45-49	.66			.35		
Female	1960	20-24						
	1970	30-34	.63	.34	.56			
Female	1960	45-49						
	1970	55-59	.41	.29		.29	.28	
Female	1960	10-14						
	1970	20-24		.96				
Male	1960	5-9						
	1970	15-19		.96				
Female	1960	5-9						
	1970	15-19		.95				
Male	1960	10-14						
	1970	20-24	.26	.86				

TABLE 3 (concluded)

SEX	AGE		FACTOR LOADING 1	2	3	4	5	6
Female	1960	15-19						
	1970	25-29			.81		.31	
Male	1960	15-19						
	1970	25-29		.29	.81			
Male	1960	20-24						
	1970	30-34	.56		.59			
Male	1960	60-64						
	1970	70-74			-.75			
Female	1960	55-59						
	1970	65-69				.84		
Female	1960	50-54						
	1970	60-64				.83		
Male	1960	50-54						
	1970	60-64	.27			.81		
Female	1960	65+						
	1970	75+					.77	
Male	1960	65+						
	1970	75+					.64	.39
Female	1960	60-64						
	1970	70-74						.70
Female	1960	40-44						
	1970	50-54	.42					.66
Male	1960	55-59						
	1970	65-69				.56		.61
EigenValues			8.99	4.29	3.46	1.88	1.50	1.10
Cumulative Proportion of Variance Explained			32.1	47.4	59.8	66.5	71.8	75.8

NOTE: All loadings which are not significant at the .01 level (correlation less than .25) are omitted.

although loading on factor three, were placed in a class by themselves since they loaded negatively on that factor.

As a result of the factor analysis the categories were combined into seven classes according to the degree of their correlations. The seven classes which turned out are related to different life-cycle stages, and emerged in this order:

(1) Class one. Persons 5-14 in 1960, and 15-24 in 1970, who were in transition age from high school to college or to work force formed this class.

(2) Class two. Persons 15-19 in 1960, and 25-29 in 1970, who were in transition age from college to work force or from unstable to stable jobs (or from temporary to permanent occupation).

(3) Class three. This class contained persons 20-49 in 1960, and 30-59 in 1970, with their dependent children 0-4 in 1960, and 10-14 in 1970. This group is the stable middle productive age group.

(4) Class four. This class included persons age 50-59 in 1960, and 60-69 in 1970, who passed the peak of productivity and are approaching retirement.

(5) Class five. Presented all males age 60-64 in 1960, and 70-74 in 1970, who were in transition from work force to retirement.

(6) Class six. Included all the females 60-64 in 1960, and 70-74 in 1970, who were in transition age from work force to retirement and possibly from wifehood into widowhood.

(7) Class seven. This class showed persons 65 and above in 1960, and 75 and above in 1970, who were in retirement age.

Results of the Combined Age-Sex Specific
Migration Rates for the State

The combined age-sex specific rates showed that class two, persons age 15-19 in 1960, and 25-29 in 1970, had the highest net out-migration rate (-.11) in Kansas. This was followed by class three, persons age 20-49 in 1960, and 30-59 in 1970, with their dependent children, who were 0-4 in 1960, and 10-14 in 1970, which had a net out-migration rate of -.07. Class seven, persons age 65 and above in 1960, and 75 and above in 1970, who have retired, showed a slight net out-migration rate (-.02). Only the females age 60-64 in 1960, and 70-74 in 1970, who were in transition from work force to retirement, showed a very slight net in-migration rate (.01) in Kansas. The state-wide age-sex specific net migration rates are presented in Table 4.

TABLE 4

STATE-WIDE AGE-SEX SPECIFIC NET MIGRATION RATES, AND NUMBER OF COUNTIES
WITH POSITIVE AND NEGATIVE RATES, KANSAS, 1960-1970

Year 1960	Year 1970	Standard Deviation	% Net Migration Rate	Number of Counties With Net Out-Migration	Number of Counties With Net In-Migration
5-14	15-24	.49	-.04	95	10
15-19	25-29	.22	-.11	90	15
0-4 & 20-49	10-14 & 30-59	.09	-.07	86	19
50-59	60-69	.07	-.02	52	53
60-64	70-74 (males)	.08	-.03	54	51
60-64	70-74 (females)	.09	.01	37	68
65+	75+	.04	-.02	73	32

CHAPTER 3

RELATIONSHIP BETWEEN INDEPENDENT VARIABLES

The independent variables which we used are differentiation and centrality. They correlated positively but very low (.25). This low correlation can be explained in terms of the functions of differentiation and centrality as related to urbanism. Urbanism is a way of life characterized by access to complex services. Thus an urban center may either be a differentiated place and/or a central place where there is ready access to such services.

Interrelationship of Independent and Dependent Variables

The correlations between independent and dependent variables are presented in Fig. 1.

(1) Class one. Persons 15-24 in 1970, who were in transition age from a high correlation with differentiation and positive correlation with centrality. This is an indication that once the persons in this age group finished high school, they moved to colleges that are located in the communities which are moderately central but highly differentiated. This class is the only age group whose migration pattern depends on one institution. The persons in this age group are not affluent. They are either students or persons with low-pay jobs (because of inexperience). They cannot afford to drive a considerable distance from home to school
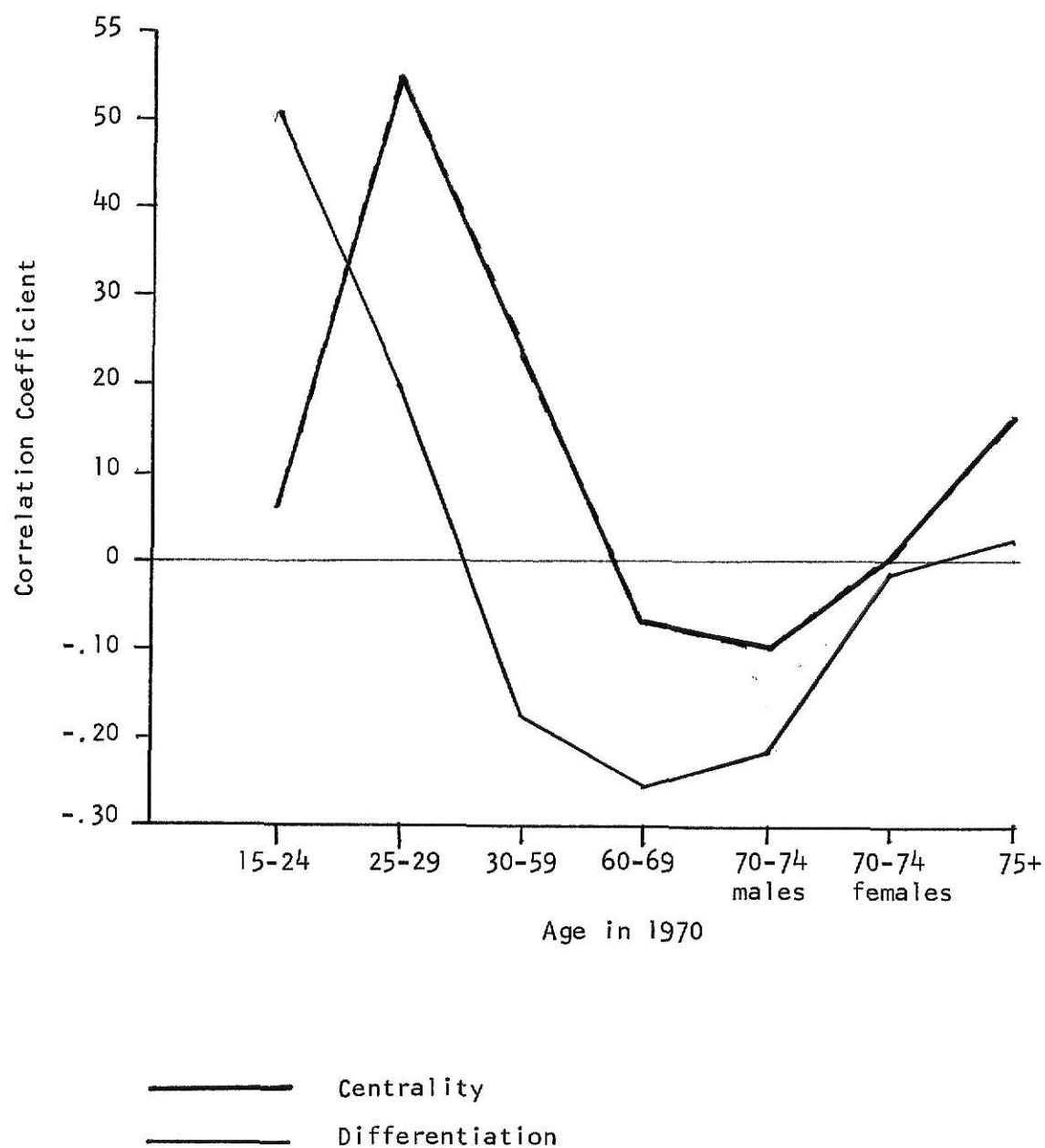
FIG. 1. INTERCORRELATION OF CENTRALITY AND DIFFERENTIATION (1970) WITH AGE SPECIFIC NET MIGRATION, 1960-1970, in 105 KANSAS COUNTIES.

or work. Therefore, they live in the community where they attend school or work. We can therefore assume that the more differentiated a community, the higher the number of in-migrants in this age group.

(2) Class two. Persons 25-29 in 1970, who were in transition age from college to work force or from unstable to stable job and from temporary to permanent occupation correlated highly with differentiation but more highly with centrality. The correlation shows that persons at this age migrated to a community which was highly central and quite differentiated. At this stage since these people were looking for jobs or trying different jobs to choose their careers, most of them will be expected to live in a central place while some will probably live in differentiated areas.

The two classes that we have discussed thus far showed a similar pattern of migration because both of them lived in communities which are quite differentiated and central. Class three showed a significant gap between the relationship of centrality and differentiation.

(3) Class three. Persons 30-59 in 1970, who were in stable middle productive age showed a positive correlation with centrality and negative correlation with differentiation. This is the largest class because it included the broadest adult age grouping and their dependent children. It is also the most important group because persons at this stage are in the productive stage of their life. The correlation suggests that they lived in different places. Persons in this group are sufficiently affluent that they can afford to live in a small, quiet town and commute to work in a more urbanized center.

(4) Class four. Persons 60-69 in 1970, who have passed the peak of productivity correlated negatively with both differentiation and centrality. This is an indication that persons at that age migrated to communities which have low level of differentiation and low level of centrality. This is the youngest age group for which their pattern of migration is not due to seeking employment. Most of these persons at this age would have retired so the movement at this late age in life will be to settle down in a nice small, quiet town to enjoy life. At this time many of them would consider it appropriate to go back to their original community.

(5) Class five. This class included males 70-74 in 1970, who were in transition age from work force to retirement, correlated negatively with differentiation and centrality. The correlation further indicates that as people get older their movement is not again for hunting for jobs but is for a settlement or rest after many years of work. One will find that this age group left communities which provided great number of services to communities which provided fewer services. At this stage in life, people wanted small, quiet and peaceful communities. In a small community every one knows each other, and cares for themselves. It is easy to make friends and their social life will be secured in small communities.

(6) Class six. Females 70-74 in 1970, who were in transition age from work force to retirement correlated positively with centrality and negatively with differentiation. At that age the gap between the relationship of differentiation and centrality became closer.

(7) Class seven. Persons 75 and above in 1970, who have retired showed a similar correlation with differentiation and centrality as class six. This similarity may be that these females are married to the males who were a bit older than they. It may also be that many of these females have lost their husbands and were widows so they moved to communities where the services they needed can be provided.

The correlations of these two groups proved that they even moved to more differentiated communities than those from which they came. This suggests that for these persons at this time, emphasis is on medical care. They needed nursing homes where their health can be carefully watched.

Classes one, two and three correlated very highly with total net migration because these groups contributed most to the total net migration. Correlation of dependent variables are included in Appendix III.

Total net migration had equal correlations with differentiation and centrality (.30). The correlation proved that the higher the level of differentiation and centrality, the higher the net migration will be for that community or that the higher the number of migrants, the more likely the level of differentiation and centrality of that community will be higher. It also indicates that the migrants will go to a place where services are available and where they can get access to the services. Differentiation and centrality have equal strength on the net-migration. The correlation of the dependent and independent variables are included in Appendix IV.

CHAPTER 4

CONCLUSION AND IMPLICATION

Findings

This study has utilized differentiation and centrality to determine net migration in Kansas communities. We found that the net in-migration was higher in communities whose level of differentiation as well as centrality was high. The total findings seemed to follow the life cycle of the people of Kansas.

Persons in classes one to three (15-59 years in 1970) were found to present a similar migration pattern. They moved to communities which are moderately central and differentiated. This similarity occurred because the classes can be merged together to form the productive age group. It is at this stage in life that most activities are done. People attended high schools, finished high schools and joined the work force. Many of them who made it to college finished college and joined the work force as well. A lot of people were not sure about their careers in life so they tried many jobs. Once they stayed or settled with a job, they became the stable middle productive group.

We found that as people got older and passed productive age, the migration pattern became different. Beginning from age 60-75 and above in 1970, the pattern of migration was for settlement and rest after long years of hard labor. At early stage of this group, the concern would be preparation for retirement and people at the middle and at the end of

this category would have retired. This idea has been seen to take place among persons 60 to 69 in 1970, and males 70-74 in 1970, when they moved to communities which are not as central and differentiated as the communities they left. The concern was not to go to communities with various services but to go to a nice, quiet, and peaceful community where their social life will be secured.

The study further showed that as people became older the pattern of migration shifted slightly. This was demonstrated by females 70-74 years in 1970, and persons 75 and above in 1970. We assumed that females 70-74 years in 1970 were married to persons in the next group who were a bit older than they. We therefore expected them to show the same pattern of migration as their husbands. In some cases, the females at this age might have lost their husbands so they moved to communities where they could receive care. The difference between persons 75 and above in 1970, and females 70-74 years in 1970, is that persons 75 and above in 1970 still moved to communities which are more central and moderately differentiated than the communities they left. We assumed that the basic reason for it is that people at this age are mostly concerned with their health and medical care. We take for granted that the best place to receive such care will be in nursing homes, so they moved to communities which can provide for such care.

Implications

In order to illustrate the value of this study, a number of potentials to community and state development planning are discussed.

(1) If the planners are trying to develop a community, they will be able to determine the services and facilities which that particular community is lacking. Differentiation can be used to test this notion.

(2) Transportation and communication approach gives clues to how outside agencies (governmental or private) can intervene to provide communities with facilities which they cannot easily provide for themselves. Particularly the rural communities may want to cut down on the out-migration rate by providing the services and facilities which they are lacking. It will become necessary to have assistance from the government.

(3) In the future, it would be of great help to the big industries, manufacturers and large retail store managers in their judgment of locations for their plants. Because differentiation is a more sensitive measure of institutional readiness for a particular service than is population or any other measure of community complexity, it will become easier to determine where certain types of service should be located.

(4) The central place theorists made provision for "natural systems." These natural systems can be utilized by official governmental power structure. For example, if agricultural extension were to be re-established, it should be allowed to follow the natural system rather than the governmental power.

(5) City and county as well as state planners can utilize this analysis in considering future needs for specific areas of the state of Kansas.

APPENDICES

GUTTMAN SCALE OF MEDICAL DIFFERENTIATION OF KANSAS COUNTIES, 1970-71

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Dentist	98	4	.67
2	Hospital	97	7	.70
3	Chiropractor	89	5	.33
4	Optometrist	85	2	.11
5	Osteopath	62	14	.27
6	General Surgeon	42	6	.14
7	Orthodontist	28	6	.21
8	Podiatrist	21	3	.14
9	Optician	18	6	.46
10	Specialist in Internal Medicine (Diagnostician)	16	5	.28
	Obstetrician		4	.27
11	Radiologist	15	5	.33
12	Pediatrician	13	1	.08
13	Ophthalmologist	11	7	.41
14	Gynecologist	10	5	.71
15	Bone and Joint Specialist	9	2	.22
	Anesthesiologist		3	.50
16	Urinary Diseases (Urologist)	8	3	.33
17	Specialist in Laboratory Diagnosis (Pathologist)	7	2	.29
18	Neuropsychiatrist	6	0	.00
19	Skin Specialist (Dermatologist)	4	1	.20
20	Neurologist	2	1	.33

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
20 (cont.)	Child and Adolescent Psychiatrist	2	1	.33
	Cardiologist		1	.33
	Specialist in Chest Surgery (Throacic)		0	.00
	Plastic and Reconstructive Surgeon		0	.00
	Neurosurgeon		0	.00
21	Public Health Doctor	1	1	.50
	Endocrinologist		1	.50
	Specialist in Osteopathy--eye, ear, nose and throat		1	.50
	Specialist in Osteopathy-- x-ray		1	.50
	Specialist in Diseases of Aging (Geriatrics)		0	.00
	Specialist in Physical Medicine and Rehabilitation		0	.00
	Osteopathy--eye		0	.00
	Specialist in Industrial Medicine		0	.00
	X-ray Specialist (Therapeutic Radiology)		0	.00
	Specialist in Digestive Diseases (Gastroenterology)		0	.00
	Specialist in Aviation Medicine		0	.00
	Specialist in Pulmonary Diseases		0	.00
	Cytologist		0	.00

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
21 (cont.)	Specialist in Blood Disorders (Hematology)	1	0	.00
	Osteopathy-Internal Medicine (Diagnosticians)		0	.00

Coefficient of Scalability = .720

NOTE: Out of 52 potential items, 10 items did not fit in the scale.
1. Pharmacies
2. General Practice
3. Ear, nose and throat (Otolaryngology)
4. Christian Science Practitioner
5. State Board of Health Office
6. Family Practitioner
7. Specialist in Allergy Diseases
8. Physical Therapist
9. Osteopathy-Surgeon
10. Psychiatrist-General

GUTTMAN SCALE OF CHURCH DIFFERENTIATION OF KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Baptist	76	14	.36
2	Roman Catholic	68	6	.15
3	Assembly of God	55	8	.16
4	Church of Christ	44	15	.33
5	Church of the Nazarene	40	10	.23
6	Episcopal	34	8	.21
7	Southern Baptist	30	10	.27
8	Church of God	25	10	.36
9	Wesleyan	19	15	.60
10	Church of Jesus Christ of Latter Day Saints	17	8	.40
11	Salvation Army	14	4	.27
12	Bible Church	11	9	.47
13	American Baptist	10	8	.57
14	Reorganized Church of Jesus Christ of Latter Day Saints	8	6	.50
15	Foursquare Gospel Church	6	5	.45
16	Covenant	4	3	.43
	Pentecostal		1	.20
17	Church of God in Christ	3	3	.50
	Unitarian		2	.40
	Pilgrim		1	.50
18	Eastern Orthodox	2	0	.00
19	North American Baptist	1		.50

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
19 (cont.)	Missionary Church	1	1	.50
	Reformed Presbyterian		1	.50

Coefficient of Scalability = .661

NOTE: of 37 potential items, the following 13 items did not scale: United Brethren; Full Gospel; Evangelical; Non-Denominational; Christian; Pentecostal Holiness, United Pentecostal, Church of God; Brethren, Church of the Brethren, Mennonites and Friends; Congregational and United Church of Christ; Baha'i World Faith, Christian Science, and Unity Church; Seventh Day Adventists and Jehovah's Witnesses; Free Methodist, Methodist, United Methodist, Evangelical United Brethren, and Evangelical Methodist; Lutheran and Lutheran-Missouri Synod; United Presbyterian, General Presbyterian, and Presbyterian Cumberland.

GUTTMAN SCALE OF GOVERNMENTAL DIFFERENTIATION, KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	City Police Department	92	8	.50
2	Water and/or Street and Sewer Department	74	10	.32
3	National Guard Armory	48	8	.19
4	Office of Civil Defense (City or County)	32	8	.25
5	City Park Board	20	6	.32
6	Army, Air Force, or Navy Recruiting Station	15	5	.29
7	County or State Motor Vehicle Department	10	11	.50
8	Kansas Income Tax Division Office	3	0	.00
9	U.S. Civil Service Commission Office	2	0	.00
	Justice of the Peace		0	.00
	Federal Housing Administration Office		0	.00
	Small Business Administration Office		0	.00
10	County Election Commissioner	1	1	.50

Coefficient of Scalability = .668

NOTE: The following 14 items did not scale: Sheriff or Marshall, Fire Department, Kansas Highway Commission, Selective Service Office, City Clerk, Highway Patrol, Dog and Animal Control, Trash Collection Service, Juvenile Court and Probation Officers, Coroner, Zoning Administrator, Planning Department, Federal Bureau of Investigation, Local Housing Authority.

GUTTMAN SCALE OF AGRICULTURAL DIFFERENTIATION, KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	New Truck Dealer	96	5	.71
2	Veterinarian	95	4	.44
3	Farm Tractor Dealer	82	7	.29
4	Dairy	71	9	.24
5	Fertilizer Manufacturing or Sales (with "fertilizer" in name)	48	15	.32
6	Water Well Drilling and Service	37	8	.22
7	Commercial Livestock Feedlot	23	11	.38
8	Grain Broker	7	3	.30

Coefficient of Scalability = .635

NOTE: Of 29 potential items, only 8 scaled. The following 21 items did not: Grain Elevator, Farm Equipment Store, Agricultural Stabilization and Conservation Service Office, Soil Conservation Service Office, Feed Dealer, Weed Supervisors Office, Livestock Commission Company, Office of Department of Agriculture, Livestock Hauling Service, Butchering Service, Crop Dusting, Seeding, and Spraying Service, Farmers Home Administration Office, Animal Hospital, Flour Milling Company, Poultry Hatchery, Registered Livestock Breeder, Wholesale Egg Firm, Wholesale Feed Dealer or Manufacturer, Farm Management Service, Soil Conservation District Office, Federal Crop Insurance Corporation.

GUTTMAN SCALE OF RECREATIONAL DIFFERENTIATION, KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Park with Playground	93	5	.42
2	Swimming Pool (Municipal or Other)	90	2	.15
3	Tennis Courts	85	15	.48
4	Movie Theatre	78	18	.58
5	Picnic Area	59	13	.33
6	Park Building	54	16	.34
7	Wading Pool	48	13	.27
8	Campground	37	15	.54
9	Horseshoe Court	28	8	.26
10	Recreational Center Hall	18	11	.50
11	Croquet Court	11	4	.33
12	Bowling Lanes	5	3	.38
13	Commercial Ballroom	3	3	.50

Coefficient of Scalability = .618

NOTE: Of 32 potential items, the following 19 would not fit in the scale:
Ball Diamond, Billiard Parlor, Full-time, Year-round Recreation Program, Shuffle Board, Golf Course, Park Pavilion, Civic Center, Lake or Reservoir, Private Club, Museum, Dancing Instruction, Archery Range, Gun Club Range, Entertainment Bureau, Tot-Lot, Skating Rink, Race Track, Day Camp, Zoo.

GUTTMAN SCALE OF TRANSPORTATION AND COMMUNICATIONS DIFFERENTIATION
OF KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Telephone Company Office	88	7	.35
2	Trucking Company	71	9	.24
3	Airport	58	18	.35
4	Cable Television	50	19	.38
5	Telegraph Company	47	8	.18
6	Inter-city Bus Depot (primary function)	43	9	.20
7	Radio Station	38	3	.07
8	Aircraft Charter Service	29	9	.27
9	Travel Bureau or Agent	24	5	.21
10	Airline Company	18	2	.11
11	Truck Stop	12	9	.75
12	Television Station	7	2	.22

Coefficient of Scalability = .693

NOTE: Thirteen items were put in the scale. All items fit in the scale
       except one item -- Railroad.

GUTTMAN SCALE OF FINANCIAL DIFFERENTIATION, KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Real Estate Agency	93	2	.22
2	Tax Return Preparation Listed in Yellow Pages	75	12	.32
3	Savings and Loan Associations	67	4	.11
4	Credit Reporting Agency	52	8	.16
5	Certified Public Accountant	43	5	.11
6	Investment Securities Sold in the Community	37	11	.25
7	Collection Agency	33	5	.15
8	Appraiser	26	4	.14
9	Insurance Adjuster	21	2	.08
10	Pawnbroker	16	1	.06
11	Bail Bond Company (with "bond" in title)	7	2	.22

Coefficient of Scalability = .780

NOTE: All eleven potential items scaled.

SOURCE: 1970 Kansas Telephone Directories.

GUTTMAN SCALE OF DIFFERENTIATION OF SOCIAL SERVICES IN 105 KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Public Library	90	11	.55
2	Parochial or Private School	75	6	.23
3	Community Health Department	45	4	.09
4	Employment Agency	29	4	.13
5	College or University	25	6	.20
6	Psychiatric Clinic	22	10	.59
7	Day Nursery	17	4	.18
8	Social Security Office	14	7	.58
9	Marriage and Family Counselor	11	6	.50
10	Veterans Administration Center	10	3	.27
11	Office of Division of Vocational Rehabilitation	7	2	.22
12	Boys' Home	6	3	.33
13	Adoption Agency		1	.25
	Child Guidance Center	3	2	.67
14	Office of Commission on Civil Rights		1	.33
	Office of Workman's Compensation		1	.33
	Youth Opportunity Center	2	0	.00

Coefficient of Scalability = .691

NOTE: Of 23 potential items, 6 items were found not to scale: Maternity Home, Mental Health Clinic, Treatment Centers and Information on Alcoholism, Elderly Persons Homes, Welfare Board, Schools: High Schools.

GUTTMAN SCALE OF CONSTRUCTION DIFFERENTIATION, KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Plumbing Contractor	94	4	.40
2	Electric Contractor	90	1	.08
3	Heating Contractor	77	3	.11
4	Building Contractor	62	10	.23
5	Cabinet Maker	50	18	.50
6	Firm Which Specializes in Roofing	43	8	.19
7	Firm Which Specializes in Sale of Pipe and Steel	36	18	.56
8	Painting Contractors with Painting as Primary Function	30	11	.38
9	Architect	27	5	.19
10	Engineer	24	12	.36
11	Paving Contractor (Primary Function)	17	10	.45
12	Masonry Contractor (Primary Function)	13	7	.46
13	Landscape Architect	10	2	.20
14	Swimming Pool Contractor or Dealer (Primary Function)	7	1	.13
15	Firm Which Does Blueprinting (with Blueprinting in Title)	6	2	.25

Coefficient of Scalability = .683

NOTE: Of 21 potential items, 6 items did not scale: Sand and Gravel Contractor, Ditching Service, Wholesale Hardware, Retail Lumber Yard, Restaurant Equipment and Supply Firm, Oil Well Drilling Companies.

GUTTMAN SCALE OF DIFFERENTIATION OF COMMERCIAL SERVICES, KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Wrecker Service	88	9	.41
2	Self-Service Laundry	79	11	.38
3	Barber Shop	74	8	.26
4	Machine Shop	65	13	.33
5	Retail Shoe Store (shoe in title)	62	12	.30
6	Printer	59	12	.28
7	Photographer	54	10	.23
8	Upholsterer	52	13	.28
9	Exterminating and Fumigating Company	47	11	.23
10	Daily Newspaper	43	5	.12
11	Taxi Service	38	2	.05
12	Shoe Repair Store (not necessarily primary function)	30	16	.42
13	Automobile Renting and Leasing Service (as primary function)	28	9	.35
14	Commercial Copying and Duplicating Service Listed in Yellow Pages	26	4	.17
15	Commercial Kennels	23	15	.60
16	Telephone Answering Service	21	10	.42
17	Dog and Cat Grooming Service Listed in Yellow Pages	17	5	.29
18	Trash Hauling Service	13	9	.52
19	Establishment Specializing in Delivery Service	11	9	.52

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
20	Store Which Provides Custom Tailoring (not necessarily primary function)	10	5	.33
	Intra-city Bus Line		4	.33
21	Establishment Specializing in Catering	8	4	.40
22	Diaper Service	6	4	.50
23	Detective Agency	5	2	.29
24	Barber School	3	0	.00
	Modeling Agency		0	.00

Coefficient of Scalability = .651

NOTE: Of 40 potential items, 26 scaled. The 14 non-scale items included: Secretarial Service, Auctioneer, Frozen Food Locker Plants, Ambulance Service, Weekly Newspaper, Electric Light and Power Company, Television Service, Automobile Body Repairing and Painting (as primary function), Cleaners, Automobile Repairing and Service, Funeral Home, Newspaper, Hotel or Motel, Beauty Salon.

GUTTMAN SCALE OF DIFFERENTIATION OF ESTABLISHMENTS SELLING GOODS, KANSAS COUNTIES, 1970

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
1	Store Specializing in Sale of New Automobile Parts and Supplies	95	4	.44
2	Florist		4	.33
	Jeweler	90	3	.23
3	Store which Sells Ladies Ready to Wear	88	10	.59
4	Store Specializing in Sale of Electrical Appliances	83	8	.44
5	Bakery	71	11	.27
6	Store Specializing in Sale of Heating Equipment and Air Conditioning Systems	64	9	.22
7	Store Which Sells Grave Stones (Monuments)	52	13	.26
8	Music Store Which Sells Musical Instruments	49	15	.39
9	Sporting Goods Store	47	11	.22
10	Store Specializing in Making or Selling Signs	39	7	.18
11	Store Which Sells Office Furniture and Equipment as Primary Function	35	7	.21
12	Wholesale Beer Distributor	32	11	.41
13	Mobile Home Dealer; Sale of Mobile Homes Primary Function	31	14	.34
14	Store Which Sells Motorcycles and Motor Scooters (with "cycle" in title)	28	10	.32
15	Book Store	25	5	.17

Step No.	Content	Cumulative Percentage of Sample Included	Errors	Errors/ Non-Modals
16	Wholesale Grocer	24	14	.61
17	Photographic Equipment and Supply Store	20	8	.35
18	Bicycle Dealer (with "cycle" in title)	18	8	.42
19	Hearing Aids Sold in Community	16	7	.39
20	Store Which Sells Automobile Glass (with "auto" in title)	15	9	.43
21	Store which Sells Health Food Products	13	5	.33
22	Store Which Sells Maternity Apparel	12	5	.50
23	Wholesale Liquor Establishment	10	6	.40
24	Bridal Store	10	5	.38
25	Burglar Alarm Systems Sold in Community	7	1	.13
26	Store Which Specializes in Sale of Poultry (Retail)	4	4	.50

Coefficient of Scalability = .659

NOTE: Of 37 potential items, 27 fit in the scale. The following 10 items did not scale: Wholesale Produce Establishment, Pumps, Store Which Sells Campers and Pick-up Coaches, Men's Clothing Store, Fabric Shop, Retail Liquor Store, Retail Furniture Dealer, Retail Hardware, Automobile Dealer. Service Stations.

APPENDIX II

CENTRALITY OF KANSAS COUNTIES MEASURED BY THE GRAVITY MODEL IN 1970

County	City	Score	Order
Johnson	Kansas City	200,000	
Sedgwick	Wichita	179,894	1
Wyandotte	Kansas City	3,000	
Shawnee	Topeka	141,094	
Douglas	Lawrence	70,956	
Reno	Hutchinson	20,529	2
Saline	Salina	18,270	
Leavenworth	Leavenworth	20,713	
Riley	Manhattan	7,367	
Lyon	Emporia	7,013	
Geary	Junction City	4,823	
Crawford	Pittsburg	4,063	
Montgomery	Coffeyville	2,589	3
Cowley	Arkansas City	2,548	
Barton	Great Bend	2,402	
Ellis	Hays	1,855	
Ford	Dodge City	1,498	
Finney	Garden City	1,294	
Seward	Liberal	1,141	

County	City	Score	Order
Atchison	Atchison	2,030	
Harvey	Newton	1,950	
Butler	El Dorado	1,608	
Franklin	Ottawa	1,369	
McPherson	McPherson	993	
Labette	Parsons	906	
Neosho	Chanute	897	
Sumner	Wellington	809	
Bourbon	Ft. Scott	791	4
Dickinson	Abilene	597	
Allen	Iola	586	
Cloud	Concordia	455	
Pratt	Pratt	430	
Russell	Russell	306	
Cherokee	Baxter Springs	301	
Pawnee	Larned	273	
Sherman	Goodland	160	
Thomas	Colby	152	
Miami	Paola	424	
Woodson	Yates Center	238	
Clay	Clay Center	208	5
Anderson	Garnett	205	
Brown	Hiawatha	194	

County	City	Score	Order
Jackson	Holton	190	
Greenwood	Eureka	184	
Osage	Lyndon	181	
Rice	Lyons	174	
Kingman	Kingman	170	
Pottawatomie	Westmoreland	164	
Marion	Marion	147	
Mitchell	Beloit	135	
Wilson	Neodesha	135	
Marshall	Marysville	125	
Morris	Council Grove	123	
Coffey	Burlington	109	5
Harper	Anthony	102	
Nemaha	Sabetha	99	
Republic	Belleville	96	
Jefferson	Oskaloosa	90	
Ottawa	Minneapolis	88	
Scott	Scott City	81	
Ellsworth	Ellsworth	80	
Barber	Medicine Lodge	75	
Phillips	Phillipsburg	73	
Norton	Norton	71	
Rooks	Stockton	70	
Grant	Ulysses	68	

County	City	Score	Order
Doniphan	Troy	67	
Linn	Mound City	64	
Edwards	Kinsley	63	
Wabaunsee	Alma	61	
Smith	Smith Center	60	
Trego	Wakeeney	56	
Lincoln	Lincoln Center	56	
Kiowa	Greensburg	56	
Chase	Cottonwood	55	
Chautauqua	Sedan	54	
Osborne	Osborne	53	
Washington	Washington	52	5
Stafford	St. John	50	
Stevens	Hugoton	50	
Graham	Hill City	47	
Rush	La Crosse	46	
Logan	Oakley	46	
Meade	Meade	43	
Ness	Ness City	43	
Decatur	Oberlin	40	
Gray	Cimarron	36	
Jewell	Mankato	35	
Wichita	Leoti	34	
Lane	Dighton	33	

County	City	Score	Order
Morton	Elkhart	33	
Kearny	Lakin	30	
Sheridan	Hoxie	29	
Hamilton	Syracuse	29	
Rawlins	Atwood	28	
Clark	Ashland	27	
Cheyenne	St. Francis	26	
Haskell	Sublette	26	
Hodgeman	Jetmore	25	5
Comanche	Coldwater	25	
Elk	Howard	22	
Gove	Quinter	21	
Stanton	Johnson City	17	
Greeley	Tribune	17	
Wallace	Sharon Springs	17	

APPENDIX III

CORRELATION OF DEPENDENT VARIABLES

Variables	1970							
	Population of persons 15-24 yrs	Population of persons 25-29 yrs	Population of persons 10-14 and 30-59 yrs	Population of persons 60-69 yrs	Population of males 70-74 yrs	Population of females 70-74 yrs	Population of persons 75+ yrs	Net migration
1970 population of persons 15-24 years	–	.03	-.20	-.09	-.17	-.09	.09	.54
1970 population of persons 25-29 years		–	.55	.07	-.46	-.11	.35	.55
1970 population of persons 10-14 and 30-59 years			–	.38	.12	.13	.14	.65
1970 population of persons 60-69 years				–	.28	.24	.07	.29
1970 population of males 70-74 years					–	.24	-.06	-.08
1970 population of females 70-74 years						–	.17	.08
1970 population of persons 75+ years							–	.25
1970 net migration								

All correlations which are not significant at the .01 level (less than .25) are not included in the discussions.

APPENDIX IV

CORRELATIONS BETWEEN INDEPENDENT
AND DEPENDENT VARIABLES

Variables	Differentiation	Centrality
1970 population of persons 15-24 years	.51	.06
1970 population of persons 25-29 years	.20	.55
1970 population of persons 10-14 and 30-59 years	-.18	.23
1970 population of persons 60-69 years	-.26	-.07
1970 population of males 70-74 years	-.22	-.10
1970 population of females 70-74 years	-.02	.00
1970 population of persons 75 and above years	.02	.16
1970 net migration	.30	.30

All correlations which are not significant at the .01 level (less than .25) are not included in the discussions.

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THE IMPACT OF DIFFERENTIATION AND CENTRALITY
ON THE AGE-SPECIFIC MIGRATION IN KANSAS COUNTIES, 1960-1970

by

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The units of analysis for this study are 105 counties in Kansas. Variables used are differentiation, centrality, and age-specific net migration. Differentiation is the complexity of institutional resources in the community, measured by a Guttman scale of community services. Centrality refers to the reciprocal relationships of the community with the outside and was measured by the gravity model based on travel distance to places in higher orders of centrality. Net age-specific migration was calculated for each county, using the forward survival method. The migration rate for the entire population was calculated using the vital statistics residual method.

Differentiation and centrality are two aspects of urbanization so it was hypothesized that: (1) the higher the level of differentiation of a county, the higher its net in-migration rate. If a county can provide services such as industries, factories, wholesale trade, retail trade and other related services, migrants will be attracted; and (2) the higher the level of centrality of a county, the higher its net in-migration because centrality indicates access to services via transportation and communication facilities. If services are available in a nearby county the outsiders will be tempted to migrate in.

The migration rate for the entire population (non-age-specific) correlated positively and significantly with both differentiation and centrality, thus confirming the hypotheses. However, there was considerable variation in these relationships according to age.

Life cycle migration showed the following pattern. Persons in transition from high school to college or to work force (ages 15-24 in 1970, the end of the decade under consideration) migrate to highly differentiated, moderately central counties, possibly because colleges are located in the most differentiated counties. For all other age groups, in-migration relates more positively to centrality than to differentiation. As people enter the late productive and early retirement years, they tend to migrate to rather undifferentiated, but moderately central counties. The trend reverses in the later retirement years, as with age and failing health the few who do migrate seek somewhat more central and more differentiated communities.