PHYSICIAN OFFICE SITE CHARACTERISTICS
A COGNITIVE-BEHAVIORAL APPROACH

by

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This thesis is concerned with a cognitive-behavioural approach toward location theory. Specifically it deals with the 'site characteristics' of medical practice sites and their relationships to the 'Degree of Specialism' and 'Need Constructs' of the physicians operant from the sites.

The 'Need Construct' of physicians is seen to vary between actors as a result of the different temporal and functional practice characteristics found within the Medical Community. The practice site location decisions of specialist physicians are seen to be dependent on the actor's 'internal needs' for complex functional linkages with other specialist physicians and with medical facilities such as hospitals and diagnostic radiology and laboratory sites. Primary care physicians in contrast are seen as making practice site location decisions in response to the 'external needs' of their patients and hence, adopt sites minimizing inconvenience to this group. Physicians are thus seen through function and functioning as adopting sites possessing those characteristics that will satisfy their dominant set of needs. Hence, physicians with a high 'Degree of Specialism' adopt sites with a high degree of linkage with other physicians and ancillary medical facilities, whereas physicians with a low 'Degree of Specialism' adopt sites to minimize inconvenience to their patients.
In order to test the hypotheses derived from the above conceptual structure, an interview survey was conducted in Vancouver, British Columbia, Canada. Instruments were developed and pre-tested using standard psychometric techniques to measure the 'Degree of Specialism' and the 'Need Construct' of a physician actor. The 'site characteristics' of a medical practice site were measured on nine variables falling into two groups. Group one comprised those variables measuring the relative-locational aspects of a practice site to other physician practice sites, diagnostic facilities, hospitals, etc., whereas group two comprised variables measuring intrinsic qualities of the site such as the number of physicians practicing from the site. A random sample of twenty primary care physicians and twenty specialist physicians were interviewed to provide the data for the study.

A hypothesis testing and correlation analysis was performed on the data to test the study hypotheses. These analyses confirmed that statistically significant relationships existed between the 'Degree of Specialism' and the 'Need Construct' of an actor, between the 'Need Construct' and the 'Practice Site Characteristics' of an actor and between the 'Degree of Specialism' and the 'practice Site Characteristics' of an actor. It was also shown that there existed statistically significant differences between the 'site characteristics' of Specialist and Primary Care physicians. This was also the case for the 'Need Constructs' of the two groups. On the basis
of the analyses conducted it was concluded that the conceptual structure of the study provided useful insights into the processes of physician site adoption.

Recommendations for further research suggest that two fruitful areas of study would be to investigate, over time, changes in the spatial pattern of the medical community relating this to changes in the functional structure of the profession and to investigate explicitly the relationships between the 'Degree of Specialism', 'Need Constructs', and 'Time Budgets' of physician actors.
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CHAPTER I

THE PROBLEM DEFINED

This thesis concerns itself with a 'cognitive-behavioral' approach to location theory in which the concept of 'user-need construct' is central. The study focuses on the locational decision of practice site location of a sample of physicians as these relate to the 'need construct' of the users of the site and to the 'degree of specialism' of the physician.

I. THE CONCEPTUAL PARADIGM

Introduction

The structural approach to service activity. One field in which urban geographers have been particularly active is in the study of the intra urban location of tertiary activity. The focus of much of this work has been the study of intra urban retailing patterns; which had its foundations in the typology of urban retail clusters produced by Proudfoot in the late 1930's (Proudfoot, 1937 and 1938), growing out of the existing social ecology (see Bargess, 1925 and Park, 1925) and urban land rent (see Haig, 1926) literature. Building upon this work, and incorporating their findings into the framework of Central Place Theory, Berry and numerous other workers have produced a host of theoretical statements and
empirical studies within the past ten years (see for example Berry, 1959, 1963 and 1967; Garner, 1966; Simmons, 1964 and 1966). These workers, starting from the postulates of central place theory, assume both producers and consumers to be boundlessly rational economic men and attempt to account for real world deviations from predicted patterns by reference to the violence wrought on the theory's assumptions by the 'real world'. A theoretical 'economic landscape' thus develops in which 'consumer-variables' determine the pattern of activity, interaction etc. i.e. entrepreneurs locate in response to the spatial variability of demand so as to maximize profits. In such an 'economic landscape' site characteristics and locations result from the response of boundlessly rational economic men to a pattern of demand characteristics.

The behavioral approach to service activity. Recently, geographers have explicitly recognized the limitations of such an approach and have tentatively formulated 'cognitive-behavioral' approaches toward an explanation of urban-retail patterns. These have explicitly recognized that consumer behavior (see Gollege and Brown, 1967; College, 1967; and Engel et al., 1968) and the behavior of the entrepreneur (see Pred, 1967 and 1969) are more complex than the postulates of Central Place Theory allow and attempt to generate statements regarding spatial form from behavioral postulates rather than inferring human behavior from an observed spatial pattern. These studies explicitly investigate the 'processes'
of spatial organization rather than the spatial structure itself. As Harvey noted "the laws of spatial pattern do not necessarily tell us anything as regards process" (Harvey, 1967, p. 8) and King said "...existing theoretical statements in Geography appear weak..., it is usually the case that the basic spatial structure appears as given, rather than as a logical consequence of the theory" (King, 1969, p. 593).

The major works in 'cognitive behavioral' location theory published to date have been the monographs of Pred (1967, and 1969). Pred's basic thesis is that "every locational decision is viewed as occurring under conditions of varying information ability, ranging, at least theoretically, from null to perfect knowledge of all alternatives and as being governed by the varying abilities (as well as objectives) of the decision maker(s). In the behavioral matrix the information variable is depicted on the vertical axis, and the ability to use variable, which theoretically ranges from total ineptitude to an aptitude for optimal solution, is represented on the horizontal axis. Hence, in any given situation, each locational decision making unit or actor, be it a single person or a firm can be thought of as having a real spatial attribute, (site and situation, land use or path of movement) that is reproducible (conveyable) on a map, and behavioral qualities that can be hypothetically located in the behavioral matrix" (Pred, 1967,
In this formulation the site characteristics of an activity are seen as a function of the goals (objectives), abilities and information of the entrepreneurial actor. The 'better' the 'information' and 'ability to use' of an actor the higher will be the 'quality' of the site chosen in terms of the criteria established by the actor's goal.

The following discussion attempts to clarify the problem of considering the 'site characteristics' of a given intra city activity within the framework established above. Central concepts of the discussion are those of Need Construct, Function, Functioning and Purpose. These concepts will be discussed in the next section.

**Purpose, Function and Functioning**

*Definitions.* In psychological usage "A function is an action of a structure; a purpose, an intention to act; a functioning, the function in operation. To summarize how the three differ; the action called a *walk* is a function; the activity of *walking* is a functioning; and the intention to *walk* is a purpose" (Cowley, 1966, p. 59). Most psychological work concerned with function and functioning concerns itself with need, a complex phenomena discussed below.

*Need.* Need is a construct, i.e. a concept offered as a way of explaining observations and has been viewed from different vantage points. Most theoretical discussions of
need make reference to both physiological and psychological needs. Maslow (1954) listed the 'basic needs' as physiological needs, safety needs, belongingness and love needs, esteem needs, and the need for self actualization. Hull (1943) and Tolman (1938) have similar need systems but other psychologists have constructed much longer lists. Murray (1938) for example listed twelve viscerogenic (physiological) and twenty-eight psychogenic needs. McClelland in a series of articles has also developed a complex need system. The important concept is that need is a 'construct' or conceptualization and is inferred from overt behavior. A need exists only when an actor behaves consistently in a way predicted by the need construct. A work of warning is given by Hilgard and Atkinson. "An inventory of behavior will not be an inventory of motives (goals) because the motive has to be inferred by a somewhat complex process. There is a strong temptation, however, to prepare classifications of motivational dispositions (needs) closely related to human behavior in all its variety" (Hilgard and Atkinson, 1967, p. 139). "The same holds true for functions. Function can only be defined in terms of behavior" (Claus, 1969(b), p. 16). A similar work of warning has been given by Gollant (1970) who in discussing intra-urban migration stresses that the overt behavior of an actor is a reflection of both the Motivation (needs, drives etc. directed toward goals) and of the Motility (i.e. the capability of being Mobile) of the
actor, i.e. the fact that an individual's overt behavior is to remain in his neighborhood does not imply that he is not 'motivated' to migrate. This can only occur if the individual's 'motility' makes him capable of migrating.

Implications for the Study of Service Activity

Supplier-consumer need constructs. The concepts of need constructs, purpose, function and functioning are central to any discussion of the site characteristics of a service activity. Both suppliers and consumers have need constructs (the term supplier is used here to cover suppliers of both goods and services). These need structures differ and as such so do the function and functioning of the actors as they attempt to satisfy the goals (purposes) produced by their corresponding need construct. The effect of these differences on the site characteristics of a service activity will now be discussed.

The dominance of the supplier or consumer need construct. It is asserted that one of the supplier or consumer need constructs will dominate the other in its influence on the site characteristics of an activity and that these will only be seen to produce 'rational patterns' when the sites are seen to fit into the need construct of the dominant set of actors, i.e. into the suppliers need construct or the consumers need construct. The concept of a 'dominant need
construct' is similar to the 'principle of action' which is central to discussions of goal oriented behavior resulting from the 'need construct' of an individual. "Whether we are talking about consummatory or instrumental activity we desire eventually to predict when an organism will shift from one unit of activity to another, what activity the organism will shift to, and also the intensity with which the organism will engage in the activity. To do this, we have stated that we need to know the strength of tendencies at a moment in time. We have assumed a principle of action that states that the strongest of a set of tendencies competing at a given moment will be evoked as an activity" (Birch and Veroff, 1966, p. 2). Implicit within much of the work on intra urban service activity is the assumption that it is the consumer 'need construct' that is the dominant influence on the site characteristics of the activity. A review of some of the literature is here appropriate.

Consumer need constructs in the geographic literature. The biggest body of literature in which it is implied that the consumer's 'need construct' is the dominant one is in the Central Place literature, or more specifically the literature on intra urban tertiary activity. Berry and Pred say "The features of Christaller's theory are now well known. In brief these features are that the basic function of a city is to be a central place providing goods and services for a
surrounding tributary area. The term 'central place' is used because to perform such a function efficiently a city locates at the centre of minimum aggregate travel for its tributary area" (Berry and Pred, 1965, p. 3). They go on to state that they consider this principle holds in regard to the tributary areas of tertiary activities within the city "...central place theory is a theory of the location of tertiary activities. Yet (it is) more general because it also applies within cities" (Berry and Pred, 1965, p. 6).

There is a clear implication in this approach that the location and site characteristics of an activity are dependent upon consumer goals and strategies that are implemented to satisfy the consumers' need structure. Berry and Pred's interpretation of Christaller appears to accurately represent his position "...Consequently the most favorable situation must lie somewhere between where all demands are satisfied and where no demands are satisfied. It must lie where as many demands as possible are satisfied, and where, simultaneously the service results in an income as high as possible for the one who offers the central good....If the central place where the doctor practices does not lie at the centre of the region and its dispersed population, but rather lies eccentrically, then the consumption of central goods, and accordingly, the income of the doctor, are not maximized. In this instance, relatively more people live a greater
distance from his office, and therefore relatively more people are to a lesser degree in the market for central goods" (Christaller, 1966, p. 31). More explicit statements come from Berry "This successive elaboration culminates within a major metropolis like Chicago, in which seven million people spread across nine counties in two states. The overall pattern of consumer orientation of business land use remains" (Berry, 1967, p. 44) and Simmons "From the knowledge of its customers each firm, consciously or not, defines a surface of rent paying ability over the city on the basis of the sales it can expect at various places. This indifference surface is a function of population, income distribution, traffic flows, locations of other business types and competitors. There is another surface of actual land rents across the city. According to land value theory this is the rent which the highest and best use at that point can afford. It is the limiting outer surface, an 'envelope' enclosing the whole set of bid rent surfaces defined by individual firms. The firm under consideration will select locations along lines or within areas of tangency of these two surfaces, i.e. where its rent paying ability is as high or higher than any other land use. The bid rent surface of each firm is unique: each firm appeals to a special set of customers" (Simmons, 1964, p. 34). This is the approach discussed at the beginning of the chapter,
implicit within the assumptions of which is the assumption of the dominance of the consumer need construct.

Supplier need constructs in the geographic literature. This is not the place for a long critique of the underlying assumptions of such workers; made as they are to aid in the deduction of mathematically formulated theory. Suffice to say that although the assumption of dominance of consumer need construct may be valid when convenience retailing is being considered it is very questionable if this is so for all tertiary activity. McCarty and Lindberg offer a word of warning regarding the service activities: "The locational affinities between the service and the spatial distribution of demand for them are particularly strong. All of us know the principal reasons why these conditions prevail. The services generally are classified as extremely 'perishable' and most of them must be performed while in close proximity to the purchaser. Service establishments thus tend to be located near the customer, an affinity that is strengthened by the fact that in many cases the work can be performed by small aggregations of workers, even lone individuals, in some cases. Generalizations of these sorts have prompted many students of Geography to dismiss the services as being found 'wherever there are people with money'. We are discovering however, that the geography of the services is much too complicated to warrant such general conclusions and that
it merits detailed study in its several component branches" (McCarty and Lindberg, 1966, p. 113). Other workers have found that the generalizations often break down even when retailing is being discussed. Claus found that there existed a high correlation between the 'goals' of the supplier and site characteristics in his study of the gas-retailing industry. "Evidence of differences in corporate goals among the actors was noted in site ratings and in interviews. Some companies opted for high gallonage facilities. This purpose was often stated in the interviews and was also apparent in the site ratings. Two companies which stated high gallonage goals as of primary importance had a large share of the higher pumping sites. Other companies, one in particular, opted for long-lived facilities. This goal was stated in the interviews in terms of preferences. Generally the facilities of these actors had site ratings in the middle to lower gallonage ranges. None of these companies had sites rated in the higher ranges" (Claus, 1969(a), p. 17). In this branch of retailing the suppliers need construct would appear to be dominant. Further evidence of the importance of supplier need constructs is given by Rannells in his discussion of downtown activity. "Establishments serve as bases of operations, both for organizations (such as business firms, government agencies) and for individuals (members of establishments) engaged in the activities of
these organizations. In dealing with the various systems of activity as they converge on establishments, it will be useful to simplify systems of action and their effect by dealing with the roles played by establishments in much the same way that the roles in which people act are used to simplify the tangle of activities at the personal level" (Rannells, 1956, p. 23); and "The attitudes and expectations of organizations judging establishments as they may affect business relationships are compounded of both objective and subjective elements: the stubborn facts of each situation and the evaluation of these facts, which may or may not be realistic and objective. Both the facts and their evaluation change; both are powerful factors in the allocation of activities to different locations" (Rannells, 1956, p. 29). The consumer in this formulation is of minor importance in determining the location and site characteristics of an activity.

Type of site as a function of the dominant need construct. It has been argued through reference to the relevant literature that the site characteristics of an activity only form rational patterns when they are viewed as a function of the need construct of the dominant set of actors. That the 'quality' of a site is a function of the behavioral characteristics of the supplier is a concept introduced by Pred (1969); i.e. as the 'information' and
'ability to use' scores of an entrepreneur increase so does the 'spatial logic' of the aggregate locational decisions made. This point is well taken but it is argued that before Pred's model becomes conceptually clear it must be accepted that the 'type' of site is also dependent of the behavioral characteristics of either the supplier or the consumer. Pred's 'behavioral matrix' is in essence a 'constraint matrix' and corresponds to Gollant's (1970) Motility factor. A true 'behavioral matrix' would be concerned with such concepts as 'goal', 'need', etc. Different suppliers have different goals, as do consumers, and it is argued that the type of site is a function of the needs produced by these goals, established through function and functioning whereas the information and 'ability to use' scales are concerned only with the 'quality' of site judged by criteria established by the actors goal. What is proposed therefore is not a rejection of Pred's concepts but rather to use them as a foundation upon which to build further.

The Case of Medical Practice

Before the site characteristics of an activity can be reduced to 'rational patterns' it is necessary, using the above formulation, to determine whether it is the consumers or suppliers need construct that is dominant. In the activity under study, private medical practice, which need structure, the physicians or the patients, is dominant?
Before attempting to answer this question by reference to the relevant medical sociology literature a brief review will be given of previous work within the discipline of Geography that has been concerned with the intra urban locational patterns of medical practice.

**Geographic work on the medical community.** In an early work Morrill (Garrison et al., 1959) approached the problem from the vantage point of Central Place Theory although he himself expressed concern with the theory's basic assumptions: "In reality, particularly in the case of personal services, people do not always make decisions in strictly economic terms. There are overlappings of trade or service areas, long uneconomical movements, and subtle gradations in the attractiveness of supposedly homogeneous services. In the case of medical services, for example, people may go to the family doctor long after they have moved away. Also, people may go miles to a larger centre on the expectation that the quality of medical care must be higher" (Garrison et al., 1959, p. 230). In two case studies, at Cedar Rapids, Iowa and Seattle, Washington, the changing post-war locations of physicians’ practices were investigated and the conclusion drawn that "Physicians seem very dependent, as do other businesses, on shopping centre locations and locations on arterials" (Garrison et al., 1959, p. 249). In a more recent study Schneider concluded
"A physicians choice of an office location is strongly influenced by at least three factors: i) its accessibility to one or more hospitals, ii) its position relative to a suitable patient market and iii) its accessibility to transportation facilities. In addition to these basic considerations, other factors such as rent, floor space, proximity to radiology and clinical laboratory facilities, the prestige rating of the address, and practice preference (for example, solo or group) undoubtedly play an important role in a physicians choice of an office location" (Schneider, 1967, p. 158).

The most comprehensive studies to date have been concerned with the problem of the location of medical facilities in general within metropolitan Chicago. Morrill and Earickson note the close association between physician office location and more general commercial areas. "The pattern of physician location is virtually indistinguishable from the pattern of retail business in general" (Morrill and Earickson, 1966, p. 1). They then go on to discuss the hierarchical structure of the pattern "An hierarchical structure is apparent, if hard to specify. This is partly seen in the distribution of physicians by type and size of commercial area. Almost one fourth are in the loop where few people live. The pattern of specialization is further evidence of the hierarchy. Almost all loop physicians are specialists, as are the majority of physicians in major shopping centres. General practitioners and less exotic specialists are most common in
smaller centres and along business arterials" (Morrill and Earickson, 1966, p. 3). Morgan and Mansfield, in a study on Vancouver, conclude "that Vancouver physicians' offices are centralized; but one only speculates as to cause. Certainly, availability of diagnostic and referral facilities and the presence of 'medical space' are potent influences. The more sophisticated middle and upper classes' greater use of physicians may encourage the establishment of offices nearby. The evidence suggests, however, that population needs may be disregarded in physicians choice of office location. Physicians locate among their professional peers in local areas of their own socio-economic strata, or adjacent to certain facilities such as hospitals" (1969, p. 127). Marsden also found a clustered pattern that was strongly associated with the pattern of retail activity. "A strong positive correlation is found between nucleated retail centres and physician office locations. 87.3% of all physicians offices are located in retail centres with sales over 19 million per year" (Marsden, 1966, p. 40). He found however, as did Morrill and Earickson, that the degree of clustering varied between different elements of the medical community. "The change in location of physicians' offices reflects a decline of CBD frame importance for the General Practitioner (family doctor) and an increase in its importance for the specialist" (Marsden, 1966, p. 24). These changes he suggests may be due to the unwillingness of people to travel long distances to
visit a general practitioner and to the strong linkages present within the specialist community. "The decrease in the number of general practitioners in the Seattle central area may be due to the travel distance to the central area, and the unwillingness of a patient to travel beyond services of a similar quality. Thus, the general practitioner may have experienced a reduction in the number of patients coming downtown, requiring him to decentralize to outlying locations" (Marsden, 1966, p. 33), and "...although general practitioners are probably oriented toward following the population trend to outlying areas, specialists seem to aggregate for purposes of mutual association and linkage with hospital facilities. The strong hospital node of 15 hospitals, containing 2,200 beds, and research facilities, probably produces strong association patterns for the specialist" (Marsden, 1966, p. 39).

This work, to date, has dealt with the spatial structure of the pattern of medical practice, and has not dealt explicitly with the processes by which this pattern is generated. Implicit in Marsden's work is the suggestion that linkage is of great importance but he does not suggest a mechanism whereby a desire for linkages with certain facilities produces observed patterns. Two consistent features emerge from the work reported: 1) that physicians locate so as to be in complementary locations to hospital and diagnostic facilities, often in more general retail nuclei, and 2) that
the pattern of practices becomes more agglomerated as the degree of specialization of physicians rises. The strong similarity between physician office locations and more general retail areas is partially explicable in terms of zoning controls. In many cities hospitals are zoned as conditional uses in residential areas whereas a physician's office is zoned as a commercial use and as such is restricted to areas that are zoned for commercial uses. This however, does not help explain the differential clusterings found within these more general retail areas. Much of the remainder of this chapter attempts to outline a possible process of locational choice that produces the pattern observed.

The medical sociological literature. A review of the relevant medical sociology literature suggests that physicians can be stereotyped into categories that will have important consequences for the site characteristics of medical practice.

Scott and Volkart say "Perhaps the first point to be made is that although one can loosely refer to the 'role of the doctor' there is in fact not one role but many which are as diverse as are the types of physicians, types of practice in which they are engaged and kinds of setting within which they work" (Scott and Volkart, 1966, p. 83). Hughes makes a similar point. "By the same token only some small portion of medical knowledge and skill can be mastered by each member of the
profession itself which leads to their being subcultures within the professional medical culture. This is more than a matter of technique and knowledge, it has its roots in ideas and assumptions" (Hughes, 1956, p. 21). Hanley and Grunberg discuss specifically the research minded physician. "The detached physician is much rarer. He is a bloodhound among the bulldogs and cocker spaniels of the species. His main interest is in the intellectual exercise of medicine. He is, in fact, a frustrated detective, a diagnostician rather than a therapist. This is the research minded physician whose consulting room is his laboratory. He enters into a minimal relationship with his patient, and this is entirely one way. What he can accumulate on the history page is important to him. The general practitioner who refers patients to him will receive in return long letters of detailed description and infinite instructions" (Hanley and Grunberg, 1962, p. 1023). Bucher and Strauss make the point even more forcible. "The split between research missions and clinical practice runs clear through medicine and its specialities. Pediatrics has one of the most rapidly growing fields of practice, but it has also attracted a number of young people, particularly at some centres in the North East, specifically for research. They are people who have no conception of themselves as family pediatricians at all; they are in this field because of what they can do in the way of research. In the two oldest specialities, surgery
and internal medicine, one finds throughout the literature considerable evidence of this kind of split. One finds an old surgeon complaining that the young men are too much interested in research and in internal medicine there are exhortations that they should be doctors not scientists. This latter lament is particularly interesting in view of the traditional mission of the internist to exemplify the finest in the 'art of medicine'; it is a real betrayal when one of them shows too much interest in controlled research" (Bucher and Strauss, 1961, p. 327).

The diagnostician-therapist dichotomy. Physicians, it appears, can be categorized into distinct 'functional groups'; each with a distinct behavioral pattern resulting from differing 'need constructs'. Field investigation suggests however that in the case of medical practice the dichotomy between 'research oriented' and 'therapy oriented' physicians is false and what is present is a continuum ranging from the neighbourhood Primary Care Physician at the therapist extreme through specialists such as General Surgeons and Internists to the research oriented specialties such as Neurosurgery and Cardiology. It is suggested here that 'internal needs' dominate the locational behavior of those physicians toward the 'diagnostician/researcher' end of the continuum and that 'external needs' i.e., those of the patients, dominate in the 'patient/therapist' group.
In this formulation medical practice emerges as an activity in which there exists a split dominance of need construct, i.e., internal needs are dominant for highly specialized physicians but 'external needs' for patient orientated physicians. The implications of this with regard to the site characteristics of medical practice must now be considered.

Site characteristics of medical practice. Before this line of argument can be fruitfully continued the concept of 'site characteristics' must be clarified. Site characteristics, in the sense used here, comprise two groups of variables: - One group concerning itself with the 'relative location' of a site with regard to other medical practice sites and facilities and the other with the intrinsic nature of the site itself. Examples of variables falling in the first category would be 'distance to nearest hospital' or 'distance to nearest diagnostic radiology facility'. Examples from the second group are 'the number of physicians who practice medicine at the site' and 'the number of parking spaces available at the site.' It is asserted that certain variables within the two groups are significantly related to the 'need construct' of a physician operating from the site. The relationships hypothesized will be discussed in the following section and stated explicitly in the Research Model.
The implications of split dominance for the site characteristics of medical practice sites. As was earlier suggested Medical Practice is an activity in which different sectors are dominated by either internal or external need structures. The 'diagnostician/research' oriented specialist physician is dominated by internal needs with regard to the site characteristics of his practice site. The site fulfills a complex function in his practice and he makes heavy demands of it with regard to accessibility to hospitals, clinical laboratories, diagnostic radiology facilities and other specialist physicians. Through function and functioning he will attempt to satisfy his 'need construct' regarding site by adopting a site satisfying the accessibility criteria. As Hanley and Grunberg (1962, p. 1023) and Morgan and Mansfield (1969, p. 27) note, the 'diagnostician/researcher' only enters into a minimal relationship with his patients and so his 'internal needs' dominate his choice of practice site. In the case of the 'therapist' the 'external needs' of his patients are dominant. The physician's goal becomes to satisfy the 'external need construct' of the patient. Thus in function and functioning in an attempt to satisfy his goals he adopts a site from which he can minimize inconvenience to his patients.

In general it is argued that as the degree of technical training and knowledge required to perform a particular medical specialty increases then a) the functions a practit-
ioner of that specialty requires his practice site to fulfill become more complex, and b) his interdependence with other physicians and medical services increases, i.e., the more 'specialized' a practitioner becomes then the higher his demand for internal and external site linkages becomes. Some justification for this relationship between increasing specialization and increasing linkages is found in the literature. Lyon says "In today's context, it must be remembered, however, that the fragmentation of medicine into a great many specialties is one of the strongest reasons for the formation of groups, in order to reintegrate this knowledge into one operating whole, and therefore the majority of young doctors just graduating from medical school may feel that this is the most important operative factor in forming a group from the first day after graduation. The student who is going to specialize may think more in terms of group practice as the 'normal' way to practice than did his forebears. There is still the option of working in a large medical building however without formal group ties with respect to income and other arrangements. This is the 'geographic group' rather than the 'formal group', and it may appeal to a great many specialists in the future, particularly as more and more medical buildings are built" (Lyon, 1967, p. 45).
II. THE RESEARCH MODEL

Nature of the Model

The research model of the study is based on the proposed relationships between the 'need construct' and 'the degree of specialism' of an actor and the 'site characteristics' of the medical practice unit from which the actor operates.

The problem of the study was to measure the 'need construct' and 'degree of specialism' of a sample of Medical Practitioners and relate this to the 'site characteristics' of their practice sites.

The following hypothetical relationships should exist if the conceptual paradigm is to be fruitful. The 'degree of specialism' score of an actor should be highly related to the 'need construct' of an actor. The 'need construct' of an actor should be highly related to the 'site characteristics' of his medical practice site and logically a strong relationship should exist between the 'Degree of Specialism' score of an actor and the site characteristics of his medical practice site.

Figure 1.1 illustrates the hypothesized relationships between the data of the study in a hypothesis testing-correlation format. Only those relationships which should yield statistically significant results and are of theoretical interest are included.
As so far specified the hypothesized relationships are very vague and so the next section presents an explicit statement of the hypotheses of the study.

The Hypothesized Relationships

There are four 'major hypotheses' of the study of which three, hypotheses 2, 3, and 4 consists of groups of nine sub-hypotheses. The site variables are expressed as S1, S2, etc., in the statement of the hypotheses. For identification of the site variables, see Appendix A.

Hypothesis One

That the 'need construct' of an actor with regard to the site characteristics of his practice is significantly correlated with his 'Degree of Specialism' scale score.
Hypothesis Two
That the 'site characteristics' of an actor's practice site as measured on the site variables S1, S2, S3, S5, S6, and S7 are significantly correlated with the 'need construct' of the actor with regard to the site characteristics of his practice but that no significant correlation exists between the site variables S4, S8, and S9, and the actors need construct.

Hypothesis Three
That the 'site characteristics' of an actor's practice site as measured on the site variables S1, S2, S3, S5, S6, S7 are significantly correlated with the 'Degree of Specialism' scale score of the actor but that no significant correlation exists between site characteristics S4, S8, S9 and the Degree of Specialism score of the physician.

Hypothesis Four
That the site characteristics of Primary Care physicians sites as measured on site variables S1, S2, S3, S5, S6, S7 are significantly different from the site characteristics of
Specialist Physicians' sites but that no significant difference exists for site characteristics S4, S8, S9 between the two groups.

These hypotheses are central to the thesis and results are discussed at length in Chapter III.
CHAPTER II

THE METHODOLOGICAL APPROACH OF THE STUDY

This study uses a cognitive-behavioral model to study the locational decisions of a professional group within an urban area. This approach focuses on the individual actor, and the characteristics of his practice site as the units of analysis. Structural, or Ecological, analyses are not presented.

I. THE SAMPLE OF ACTORS

The Population

The population of actors for this study comprised all physicians who practiced medicine within the City of Vancouver. Physicians who held full-time institutional positions were excluded from the population under consideration. The population consisted of 1048 physicians of whom 467 were Primary Care Physicians and 581 Specialist Physicians (Source: College of Physicians and Surgeons of B. C., 1969). The enumeration of physicians in the source is complete in as much as every registered physician in British Columbia must be listed in order to legally practice medicine within the province. The only omissions are those physicians who started to practice medicine within the City of Vancouver.
after the directory was compiled. It is thought that these omissions will not significantly bias the results.

The Sample

A sample of 40 physicians provided the actors studied in this thesis. Twenty of the physicians selected were primary care physicians and twenty were specialists. Within the two groups physicians were selected at random. This sample constitutes roughly a 4 per cent sample of the population of actors which is a small sample. The size of the sample was determined largely for the practical reasons of time and budget limitations and a larger sample would have been more satisfactory. The reason the sample was split between the two groups of primary care and specialist physicians was because the hypotheses of the study suggested that significant differences would exist between the groups. The decision to make the two sample groups of equal size was made for convenience and based on the fact that the two population groups were not of dissimilar size.

II. THE INTERVIEW SCHEDULE

Construction of the Preliminary Instruments and the Pre-Test

One of the problems of the study was to develop instruments to validly and reliably measure the 'degree of specialism' of an individual physician. A preliminary instrument was developed as the first stage in the develop-
ment of sensitive instruments to be used in the final study. The 'preliminary instrument' was applied to ten physicians from the study population; five Primary Care Physicians and five Specialist Physicians. The purpose of this 'pre-test' was to gain insight into the strengths and weaknesses of the instrument so as to allow appropriate modifications to be made before the instrument was applied to the full study sample.

**Item Analysis of the Preliminary Instrument**

Using the data obtained in the pre-test an item analysis of the original instrument was made regarding the instrument in terms of psychological test theory. Test theory, which derives a 'scale-score' from the summation of item scores, assumes that each item contributes to the prediction of the scale score. The items of the scale consisted of continuous and dichotomous variables and as scoring was already a difficult problem due to lack of stable criteria against which to compare the stated performance of the respondents a simple 0, 1, dichotomous scoring system was adopted. Dichotomous scores were assigned on the basis of natural or logical breaks in the responses among the sample of respondents. For many items dichotomization was clear but for others dichotomization was made about the median. When item scores are dichotomized 0, 1 and the internal criterion of total scale score is being used, the point-biserial $r$ is the
appropriate statistic to determine the contribution of each item to the total score (Guilford, 1956, p. 427). The point-biserial correlations obtained are listed in Appendix F. The point-biserial correlation is useful when it is desired to construct a scale from a large number of items. Items with low coefficients can be eliminated from the revised instrument. They also provide a basis for the inclusion of further items by indicating those 'sections' of the scale that discriminate most efficiently with regard to the criterion measure. Based on the results of the item analysis and on experience gained through the administration of the pre-test the instrument was modified for use in the sample study. The revised instrument is presented in Appendix B and the 'degree of specialism' scale items enumerated in Appendix C. The revised instrument was used in the sample study.

The Method of Data Collection

The 'interview' data for the study was obtained by a personal administration of the instrument to each sample actor. Each sample actor was administered the instrument by the author. The site of the interview was in all but six cases the physician's practice site. Of the six exceptions four were interviewed in their own homes and two were interviewed at the Vancouver General Hospital. The practice sites of these physicians were subsequently visited by the author in all cases. The form of the interview consisted of
an administration of the instrument followed by informal discussion. Only the formal 'instrument' provided data for the study; the informal discussion being to provide intuitive insights rather than hard facts.

III. THE SITE DATA

The Site Variables

The site variables used in this study fall naturally into two groups. One group of variables is concerned with the 'relative location' of a Medical Practice Site to other medical facilities and with the structural characteristics of the immediate urban environment. The second group of variables relates to the intrinsic nature of the practice site. The variables included in both groups were selected on the basis of existing literature and on experience gained in the administration of the pre-test.

The variables comprising the relative location group are:

S1  Distance to the diagnostic laboratories used by the physician,
S2  Distance to the diagnostic radiology facilities used by the physician,
S5  Distance to the hospital most frequently used by the physician,
S6  Is the practice site located in a residential area,
S8  Is the practice site located on a public transit route.
The variables comprising the second group are:

S3 What diagnostic facilities exist at the site,

S4 For how many cars is parking provided at the site,

S7 Is the practice site a single practice site,

S9 How many seats are there in the patient waiting room.

The site rating instrument used in conjunction with the interview schedule is presented in Appendix A.

The Method of Data Collection

The site data was obtained from two basic sources: the interview schedule and zoning maps of Greater Vancouver. A two-stage process was used on some of the variables. Variables S6 and S8 were 'measured' from cartographic sources and yielded information of a nominal nature. Variables S3, S4, S7, and S9 were assessed through direct questioning of the physician and yielded information of a nominal nature for variables S3 and S7, and of an ordinal nature for S4 and S9. The remaining variables, S1, S2, and S5 were assessed by a two-stage process. The physician was asked to indicate which facilities he used and this was noted by the interviewer. The distance from the physician's office to the appropriate facility location was later obtained from cartographic sources.
DATA ANALYSIS AND RESULTS

I. THE GENERAL APPROACH TO THE ANALYSIS

The data collection in this study was of two major types: the site data and the interview schedule data. The general approach to the analysis was to first investigate each data set by itself, paying special attention to the scales contained in the interview schedule data, and then to test the hypotheses of the study utilizing the relevant data from both groups.

II. THE SITE DATA

The Level of Measurement of the Site Variables

The level of measurement of the site variables was either nominal or interval. The interval variables are the variables S1, S2, S4, S5, and S9, which are the variables related to the distance to other medical facilities and to the size of the waiting room and number of car parking spaces available to the physician (see Chapter II and Appendix A for a listing of the site variables). The nominal variables are the variables S3, S6, S7, and S8, which are all dichotomous nominal variables. The interval variables were treated as ordinal variables in the analysis as they deviated drasti-
cally from the 'normal' distribution, and in some cases were bimodal. It was considered advisable to consider the variables as ordinal and use non-parametric tests rather than maintain an interval level of measurement, which contains more information, and violate the assumptions of many parametric tests.

The Distributions of the Site Variables

As mentioned in the last section, the distributions of variables S1, S2, S4, S5, and S9 differed radically from normality as can be seen in Figures 3.1 to 3.5 inclusive. This was to be expected for variables S1, S2, and S5, as it was hypothesized in Chapter I that physicians, and especially specialist physicians, tended to locate so as to be reasonably accessible to other medical facilities. This would tend to produce a 'distance decay' effect which can in fact be seen in the histograms, (shown on pages 36 to 40 inclusively). Differences also seem to exist between the general practitioner and specialist physician groups as predicted by Hypothesis 4. This suggestion is tested in a later section.

Differences between the general practitioner and specialist groups can also be seen in the variables S3, S6, S7, and S8 contingency tables which are presented in Tables 3.1 to 3.4 inclusive. Once again tests for the significance of these differences are presented in the section on hypothesis testing.
FIGURE 3.1. Histogram of $S_1$
FIGURE 3.2. Histogram of $S_2$
FIGURE 3.3. **Histogram of $S_4$**
FIGURE 3.4. **Histogram of S_5**
FIGURE 3.5. **Histogram of $S_9$**
### TABLE 3.1

Contingency Table of Site Variable Three  
(Do Diagnostic Facilities Exist at the Practice Site)

<table>
<thead>
<tr>
<th>Response</th>
<th>GP's N 20</th>
<th>Specialists N 20</th>
<th>All N 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>8</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>3</td>
<td>15</td>
</tr>
</tbody>
</table>

### TABLE 3.2

Contingency Table of Site Variable Six  
(Is the Practice Site Located in a Residential Neighbourhood)

<table>
<thead>
<tr>
<th>Response</th>
<th>GP's N 20</th>
<th>Specialists N 20</th>
<th>All N 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>13</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>15</td>
<td>22</td>
</tr>
</tbody>
</table>

### TABLE 3.3

Contingency Table of Site Variable Seven  
(Is the Practice Site a Single Practice Site)

<table>
<thead>
<tr>
<th>Response</th>
<th>GP's N 20</th>
<th>Specialists N 20</th>
<th>All N 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>No</td>
<td>11</td>
<td>20</td>
<td>31</td>
</tr>
</tbody>
</table>
TABLE 3.4
Contingency Table of Site Variable Eight
(Is the Practice Site Located on a Public Transport Route)

<table>
<thead>
<tr>
<th>Response</th>
<th>GP's N 20</th>
<th>Specialists N 20</th>
<th>All N 40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

III. THE INTERVIEW SCHEDULE DATA

The Instrument

The instrument used to collect the data of this section is presented in Appendix B. Many of the questions contained in the instrument are not included in either the 'Need' scale or the 'Degree of Specialism' scale and were included in the schedule for purposes other than testing the hypotheses of this study. We now turn to a consideration of the 'Need' scale.

Need

The measurement technique. In order to obtain a quantitative measure of the 'need' construct of a physician with regard to the site characteristics of a medical practice site a scale was devised utilizing the psychometric method of rank order (see Guilford, 1954, pp. 178-196). Seven stimuli related to the site characteristics of medical practice sites
were presented to the subjects who were asked to rank them in the order that they made a hypothetical site 'attractive' to the physician as a site from which to conduct their practice. The stimuli are presented in Table 3.5.

**TABLE 3.5**

Stimuli Presented in the Need Scale

<table>
<thead>
<tr>
<th>Stimulus</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stimulus A</td>
<td>Laboratory Facilities within 5 blocks of practice site.</td>
</tr>
<tr>
<td>Stimulus B</td>
<td>Hospital within 5 minutes walking distance of practice site.</td>
</tr>
<tr>
<td>Stimulus C</td>
<td>Practice site located at the centre of a large residential area.</td>
</tr>
<tr>
<td>Stimulus D</td>
<td>Good parking available on or near the practice site.</td>
</tr>
<tr>
<td>Stimulus E</td>
<td>Other GP's or Specialists located on or near the site.</td>
</tr>
<tr>
<td>Stimulus F</td>
<td>Practice site easily accessible by public transport.</td>
</tr>
<tr>
<td>Stimulus G</td>
<td>Diagnostic radiology facilities within 5 blocks of practice site.</td>
</tr>
</tbody>
</table>

From this data it is possible to produce a rank order frequency matrix in which the columns represent stimuli and the rows ranks. The elements of this matrix are the frequencies with which the subjects assigned a specific rank to a specific stimulus.
In this study, two such rank order frequency matrices were obtained; one for specialist physicians and one for primary care physicians. The reason for splitting the responses into the two groups was to ascertain on the intuitive level whether the scale would discriminate between the two groups of physicians. The matrices are presented in Tables 3.6 and 3.7.

**TABLE 3.6**

Rank Order Frequency Matrix of Primary Care Physicians

<table>
<thead>
<tr>
<th>Ranks ($r_i$)</th>
<th>Stimuli ($S_j$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r_i$</td>
<td>$R_i$</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

$\sum f_{ji} = 20 \quad 20 \quad 20 \quad 20 \quad 20 \quad 20 \quad 20 \quad 140$

$\sum f_{j}R_{i} = 90 \quad 54 \quad 77 \quad 79 \quad 65 \quad 102 \quad 93$

$\sum c_{ri} = 3 \quad 7 \quad 5 \quad 4 \quad 6 \quad 1 \quad 2$
**TABLE 3.7**

Rank Order Frequency Matrix of Specialist Physicians

<table>
<thead>
<tr>
<th>Ranks (ri)</th>
<th>Stimuli (Sj)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ri</td>
<td>R_i</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>r_i</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>14</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>f_{ji}</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f_{ji}R_i</td>
<td>92</td>
<td>101</td>
<td>28</td>
<td>89</td>
<td>75</td>
<td>80</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cr_i</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From such matrices it is possible to obtain a 'composite ranking' of the stimuli for each of the groups. This is done by converting the 'ranks', $r_i$, assigned to the stimuli into 'rank values', $R_i$. This is done using the simple equation:

$$R_i = n - r_i - 1$$

where: $n$ = number of subjects
A term \( f_{ji}R_i \) is then calculated by multiplying each rank value by the frequency that that rank value was assigned to the stimulus under consideration. These terms are then summed for each stimulus to produce the term \( f_{ji}R_i \). Finally from these values \( f_{ji}R_i \) one can obtain the 'composite rank' of the stimulus, \( cr_i \). The value of \( cr_i \) is 1 for the largest \( f_{ji}R_i \), 2 for the second largest, and so on for all the stimuli. The \( f_{ji} \), \( f_{ji}R_i \) and \( cr_i \) values of the stimuli are presented with the rank order frequency matrices in Tables 3.6 and 3.7.

As had been suggested earlier, differences were found between the \( cr_i \) of the two groups. These differences were, intuitively at least, of the type suggested by the research hypothesis of the study. The two sets of composite rankings are presented in Tables 3.8 and 3.9.

As can be seen specialist physicians showed a marked preference for sites that facilitated a high degree of linkage with other medical facilities. Only stimulus E, accessibility to other physicians, was found to have a low composite ranking. Stimuli concerned with the accessibility of the practice site to the general public received generally low rankings. This indicates that specialist physicians' 'need' constructs regarding the site characteristics of medical practice sites is largely dominated by his 'internal needs' for high linkage facilities.
### TABLE 3.8
Composite Rankings of Specialist Physicians

<table>
<thead>
<tr>
<th>Stimulus</th>
<th>cr_i</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Laboratory facilities within 5 blocks of practice site</td>
<td>3</td>
</tr>
<tr>
<td>B Hospital within 5 minutes walking distance of practice site</td>
<td>1</td>
</tr>
<tr>
<td>C Practice site located at centre of large residential area</td>
<td>7</td>
</tr>
<tr>
<td>D Good parking available on or near the practice site</td>
<td>4</td>
</tr>
<tr>
<td>E Other GP's or specialists located on or near the practice site</td>
<td>6</td>
</tr>
<tr>
<td>F Practice site easily accessible by public transport</td>
<td>5</td>
</tr>
<tr>
<td>G Diagnostic radiology facilities within 5 blocks of practice site</td>
<td>2</td>
</tr>
</tbody>
</table>

### TABLE 3.9
Composite Rankings of Primary Care Physicians

<table>
<thead>
<tr>
<th>Stimulus</th>
<th>cr_i</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Laboratory facilities within 5 blocks of practice site</td>
<td>3</td>
</tr>
<tr>
<td>B Hospital within 5 minutes walking distance of practice site</td>
<td>7</td>
</tr>
<tr>
<td>C Practice site located at centre of large residential area</td>
<td>5</td>
</tr>
<tr>
<td>D Good parking available on or near the practice site</td>
<td>4</td>
</tr>
<tr>
<td>E Other GP's or specialists located on or near the practice site</td>
<td>6</td>
</tr>
<tr>
<td>F Practice site easily accessible by public transport</td>
<td>1</td>
</tr>
<tr>
<td>G Diagnostic radiology facilities within 5 blocks of practice site</td>
<td>2</td>
</tr>
</tbody>
</table>
Primary Care Physicians showed a very different composite rank structure. Stimuli P and C, accessibility of site by public transport and location of site in a large residential area, were both ranked higher moving from rank 5 to rank 1 and rank 7 to rank 5 respectively. Stimulus B, accessibility of practice site to hospital, dropped from rank 1 to rank 7 while stimuli A, D, B, and G held the same ranks. This indicates that the 'need' construct of primary care physicians is dominated more by the 'external' needs of the physicians' patients for 'convenient' locations than is the 'internally' dominated need structure of the specialist physician. The composite ranks of the primary care physicians are presented in Table 3.9

The grouping analysis. As was seen in the last section the Need scale did discriminate in the aggregate sense between Primary Care and Specialist physicians. However, the purpose of the scale was to quantitatively 'measure' the Need construct of the individual physician. To attain this end a hierarchical grouping analysis was performed on the individual physicians' rankings of the seven stimuli presented in the Need scale.

Veldman (1967) discusses hierarchical grouping analysis as follows:

Given a set of N objects (persons, test items, and so forth), each measured on K different variables, one may ask to what extent there exist natural groups among the N objects--groups which are similar in their scores on the K variables used to describe
them. Theoretically, an optimum grouping of the objects can be defined for each particular number of groups from 2 to \( N-1 \),... Such an optimum grouping should maximize the average inter-group distance while minimizing the average intra-group distance. Unfortunately the computational burden is prohibitive even with the aid of a computer. Since every possible grouping of the 20 objects into four sets would have to be used as a basis for calculating an index of cluster separation. Ward (1963) has provided a compromise approach to the goal of determining optimum groupings. The method begins by defining each original object as a 'group'. These \( N \) groups are then reduced in number by a series of step-decisions until all \( N \) persons have been classified into one or the other of two groups. At each step some pair of groups is combined, thus reducing the number of groups by one. The decision regarding the particular pair to be combined at any stage is made on the basis of some particular 'value reflecting' function: the total within group variation which is to be minimally increased at each step in the process....This procedure is a compromise with the theoretical ideal of optimum grouping described earlier, since at each stage of the process the previous grouping is accepted as the basis for determining the next reduction. One can imagine this process leading gradually to a solution which is not optimum, but only under circumstances where the 'natural' clustering of the object's profiles is quite weak. (Veldman, 1967, pp. 308-309)

In this case the \( N \) objects are the 40 physicians and the \( K \) variables the seven stimuli of the need scale. As stated in the last paragraph, the Ward algorithm starts with each object as its own group and successively combines them until all objects are in one group. For our purposes we required the grouping to isolate the 'natural' clusterings of physicians based on their 'need' profiles. The groupings obtained can be seen in the Tree Graph presented in Appendix G. The question was at which level of grouping should one
accept the number of groups as being 'natural'? In this case the error function, the sum of the squared differences between corresponding scores in the profile divided by the number of objects in the potential group summed over all groups, did not rise sharply at any particular stage in the grouping, thus indicating that the previous grouping contained a great deal more information than the next stage, and so the decision to utilize the grouping containing four groups was made on intuitive grounds. The specialties of the physicians within the four groups are presented in Table 3.10.

Intuitively these groups 'make sense' in that they separate Primary Care and Specialist physicians with only four exceptions. Of these one of the two internists in Group One is explicable in that although possessing specialist qualifications the nature of his practice is essentially that of a Primary Care physician. Only 5 per cent of his patients are referred to him by Primary Care physicians, the other 95 per cent being patients for whom he acts as a 'family doctor'.

The four groups were labelled as follows: Group 1, the Primary Care Medical Building group; Group 2, the Primary Care Neighbourhood group; Group 3, the Specialist Hospital Linkage group; Group 4, the Specialist Non Hospital Linkage group. These four groups between them account for all the 40 physicians used in the study and as such member-
**TABLE 3.10**
Specialties of Physicians in the Four Need Groups

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
<th>Group 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=9</td>
<td>N=11</td>
<td>N=14</td>
<td>N=6</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Urology</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Dermatology</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Internal Medicine</td>
<td>Otolaryngology</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Internal Medicine</td>
<td>Otolaryngology</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Internal Medicine</td>
<td>Otolaryngology</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Internal Medicine</td>
<td>Ophthalmology</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Internal Medicine</td>
<td>Ophthalmology</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Internal Medicine</td>
<td>Ophthalmology</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Plastic Surgery</td>
<td>Orthopaedic Surgery</td>
</tr>
<tr>
<td>Internal Medicine</td>
<td>Primary Care</td>
<td>Plastic Surgery</td>
<td>Orthopaedic Surgery</td>
</tr>
<tr>
<td>Internal Medicine</td>
<td>Primary Care</td>
<td>Thoracic Surgery</td>
<td>Orthopaedic Surgery</td>
</tr>
<tr>
<td>Internal Medicine</td>
<td>Primary Care</td>
<td>Urology</td>
<td>Orthopaedic Surgery</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Allergy</td>
<td>Orthopaedic Surgery</td>
</tr>
<tr>
<td>Primary Care</td>
<td>Primary Care</td>
<td>Neurosurgery</td>
<td>Orthopaedic Surgery</td>
</tr>
</tbody>
</table>
ship of a group is equivalent to being assigned a score on a nominal variable measuring the 'need' of a physician, i.e., a four group polycotomous 'need' variable has been generated from the individual stimuli profiles of the physicians. As we have seen the groups produced are intuitively appealing but it is not until the section on hypothesis testing that the usefulness of this construct will be fully investigated.

The Degree of Specialism Scale

The scale items. Central to the research hypothesis of the study is the concept of the 'Degree of Specialism' of a physician. One of the major 'problems' of the study was to devise a scale to quantitatively measure this concept. As was discussed in Chapter II, a preliminary instrument to measure this concept was subjected to a pre-test and item analysis and modified in the light of the results obtained. Discussion in this section concerns itself solely with the instrument as used in the final study.

The items included in the final scale comprised items that belonged to those dimensions of the total scale that showed the highest predictive validity in the pre-test analysis. The dimensions included were as follows:

a) Items concerned with the educational history of the physician

b) Items concerned with the organizational nature of the physician's practice
c) Items concerned with the physician's attendance at medical conferences and his choice of professional journals

d) Items concerned with the physician's teaching and research activities and his past contributions to medical research

e) Items concerned with the 'time budget' of the physician

f) Items concerned with the 'turnover' characteristics of the physician's 'patients'.

The exact nature of the items used can be found in Appendix C. The scoring system adopted for the final scale was the same as in the preliminary scale, i.e., a dichotomous 0, 1 system for each item with the final scale score being the sum of the individual item responses. For a discussion of the system used the reader is referred to Chapter II.

**Item validity.** In order to ascertain the item validity of the items comprising the 'degree of specialism' scale an item analysis was performed on all scale items. The internal criterion of 'total score' was used and as the individual items had been dichotomized the Point Biserial correlation coefficient was the appropriate index of item validity (Guilford, 1954, p. 427). The Point Biserial correlations between item responses and total score are presented in Appendix D. Generally the results of the item analysis were encouraging with high correlations reported for most dimensions. The education dimension was the weakest with several
'poor' items. The 'organization' and 'participation' dimensions showed generally high correlations. Excellent results were obtained for the other dimensions.

The results of the item analysis indicated that the 'degree of specialization' scale consisted of a set of items with high validity to predict the final scale score. Our attention will now be directed to the problem of test reliability.

Scale reliability. Whereas 'validity' is concerned with 'what' an item measures or what an item contributes toward a final scale score, 'reliability' is concerned with the stability of a score obtained after one administration of a test. There have been three standard approaches to reliability known as the 'split half', 'alternate forms' and 'retest' methods of reliability estimation (see Guilford, 1954, pp. 373-398). "All have in common the goal of deriving two sets of scores from the 'same' test administered to the 'same' sample for the purpose of correlation to find \( r_{tt} \)" (Guilford, 1954, p. 373). In this case \( r_{tt} \) ranges for 0 to 1 and can be considered as the probability of obtaining the same scores on a second administration of the 'same' test to the 'same' sample, i.e., it is an index of the stability of the scale scores obtained.

In this study the reliability of the scale was estimated by the use of the Kuder-Richardson Formula 20. The calculation formula used was:
\[ r_{tt} = \left( \frac{n}{n-1} \right) \left( \frac{\sigma_i^2 - pq}{\sigma_i^2} \right) \]

where
- \( n \) = number of items in the scale
- \( p \) = proportion of the respondents responding in the keyed manner
- \( q = 1-p \)
- \( \sigma \) = total variance of the test

Guilford (1954, p. 380) points out that in effect this formula splits the test into 'n' parts of one item each. The formula assumes that the scale is of a unifactor nature with parallel items; an assumption not met in this situation. Brogden (1946) however, investigated the effect of violating these assumptions and concluded that bias was very small unless 'speeding' was involved in scale administration. The use of the formula would appear to be justified in this situation.

The value of the \( r_{tt} \) obtained when applying Kuder-Richardson formula 20 to the degree of specialism scale was 0.9275, a very high figure, indicating that the scores obtained in this study have a high degree of reliability.

The **ordinal degree of specialism score**. As we have seen in the last three sections a scale was devised to validly and reliably measure the 'Degree of Specialism' of an individual physician. This scale will be considered to have produced an ordinal rather than an interval level of measurement, for although the scale scores may seem to belong to the
latter level of measurement we heed Siegel's warning that "Many personality inventories and tests of ability or aptitude result in scores which have the strength of ranks. Although the scores may appear to be more precise than ranks, generally these scales do not meet the requirements of any higher level of measurement and may properly be viewed as ordinal" (Siegel, 1956, p. 24). What then are the 'rankings' of physicians produced by this ordinal degree of specialism scale.

The specialisms of the physicians ranked from one to forty on the 'degree of specialism' scale are given in Table 3.11.

Intuitively the rankings obtained on the scale are very appealing. All specialist physicians are ranked higher than Primary Care physicians and within the specialists surgeons dominate the first seven ranks, followed by the nonsurgical specialties. The internal medicine specialists occupying ranks eighteen and twenty are the only two internal medicine specialists who do not have a sub-specialty within internal medicine and both operate as 'family physicians' to a large proportion of their patients; 40 per cent in the case of the physician ranked eighteen and 95 per cent in the case of the latter. These rankings suggest on the intuitive level that the Degree of Specialism scale has high external validity, i.e., it is measuring what it is intended to. A more rigorous test of the external validity of the scale, however,
<table>
<thead>
<tr>
<th>Rank</th>
<th>Specialty</th>
<th>Rank</th>
<th>Specialty</th>
<th>Rank</th>
<th>Specialty</th>
<th>Rank</th>
<th>Specialty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Urology</td>
<td>11</td>
<td>Orthopaedic Surgery</td>
<td>21</td>
<td>Primary Care</td>
<td>31</td>
<td>Primary Care</td>
</tr>
<tr>
<td>2</td>
<td>Cardiology</td>
<td>12</td>
<td>Diabetics</td>
<td>22</td>
<td>Primary Care</td>
<td>32</td>
<td>Primary Care</td>
</tr>
<tr>
<td>3</td>
<td>Thoracic Surgery</td>
<td>13</td>
<td>Ophthalmology</td>
<td>23</td>
<td>Primary Care</td>
<td>33</td>
<td>Primary Care</td>
</tr>
<tr>
<td>4</td>
<td>Plastic Surg.</td>
<td>14</td>
<td>Urology</td>
<td>24</td>
<td>Primary Care</td>
<td>34</td>
<td>Primary Care</td>
</tr>
<tr>
<td>5</td>
<td>Neurosurgery</td>
<td>15</td>
<td>Otolaryngology</td>
<td>25</td>
<td>Primary Care</td>
<td>35</td>
<td>Primary Care</td>
</tr>
<tr>
<td>6</td>
<td>Dermatology</td>
<td>16</td>
<td>Halmatology</td>
<td>26</td>
<td>Primary Care</td>
<td>36</td>
<td>Primary Care</td>
</tr>
<tr>
<td>7</td>
<td>Plastic Surg.</td>
<td>17</td>
<td>Otolaryngology</td>
<td>27</td>
<td>Primary Care</td>
<td>37</td>
<td>Primary Care</td>
</tr>
<tr>
<td>8</td>
<td>Rheumatics</td>
<td>18</td>
<td>Internal Medicine</td>
<td>28</td>
<td>Primary Care</td>
<td>38</td>
<td>Primary Care</td>
</tr>
<tr>
<td>9</td>
<td>Allergy</td>
<td>19</td>
<td>Ophthalmology</td>
<td>29</td>
<td>Primary Care</td>
<td>39</td>
<td>Primary Care</td>
</tr>
<tr>
<td>10</td>
<td>Nuclear Medicine</td>
<td>20</td>
<td>Internal Medicine</td>
<td>30</td>
<td>Primary Care</td>
<td>40</td>
<td>Primary Care</td>
</tr>
</tbody>
</table>

TABLE 3.11

Rank on Degree of Specialism Scale and Specialty of Sample Physicians
is not possible as no readily acceptable external criterion
for the Degree of Specialism if a physician exists. The rela-
tionships between the Degree of Specialism scale and the other
constructs of the study will be examined in the next section
in which the hypotheses of the study are explicitly tested.

IV. THE HYPOTHESES

Hypothesis One

Statement of the hypothesis. In Chapter I, Hypothesis
One was stated as follows:

That the 'need construct' of an actor with regard
to the site characteristics of his practice is
significantly correlated with his 'degree of
specialism' scale score.

This hypothesis involves calculating an appropriate co-
efficient of correlation and testing for the significance
of the correlation obtained.

The test used. As the level of measurement obtained
on the need scale was of a nominal nature and as the 'degree
of specialism' scale is of an ordinal nature, the appropriate
correlation coefficient to use in this case is Freeman's
Coefficient of Determination, $\theta$ (Freeman, 1965, pp. 108-119).
The appropriate test for the significance of the correlation
obtained is the $x^2$ test with $(n-1)(m-1)d.f.$ where $n$ is the
number of distinct ranks in the ordinal scale and $m$ the level
of the nominal variable.
The results of the test. The results of the test using the method above are presented in Table 3.12. As can be seen from the above table the relationship between actor 'need' and 'degree of specialism' is significant at the 1 per cent level. We therefore accept hypothesis one of the study.

**TABLE 3.12**

Relationship Between Actor Need Construct and Degree of Specialism

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Correlation</th>
<th>Test</th>
<th>Probability</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freeman's $\theta$</td>
<td>0.7136</td>
<td>$x^2$ test</td>
<td>0.0074</td>
<td>40</td>
</tr>
</tbody>
</table>

Hypothesis Two

Statement of the hypothesis. Hypothesis Two was stated in Chapter I as follows:

That the 'site characteristics' of an actor's practice site as measured on the site variables $S_1, S_2, S_3, S_5, S_6, S_7$ are significantly correlated with the 'need construct' of the actor with regard to the site characteristics of his practice, but that no significant correlation exists between the site variables $S_4, S_8, S_9$ and the actor's need construct.

To test this hypothesis it is necessary to test the hypotheses that a significant correlation exists between the 'need' of an actor and the site variables $S_1, S_2, S_3, S_5, S_6, S_7$ taken individually. The site variables are enumerated in Appendix A.
The tests used. As discussed in an earlier section, the level of measurement of the site variables was either nominal or ordinal. The 'need' scale measures at the nominal level. The appropriate coefficient of correlation between a nominal and an ordinal scale is, as in Hypothesis One, Freeman's coefficient of determination, $\theta$, with the $x^2$ test providing the test of significance (Freeman, 1965, pp. 108-119). The appropriate coefficient of correlation between two nominal scales is Guttman's Symmetric Coefficient of Predictability, $\lambda$, with the $x^2$ test with $(n-1)(m-1)$ d.f. providing the test of significance where $n$ is the level of one of the nominal variables and $m$ the level of the second.

Results of the tests. The results of the test of Hypothesis Two are presented in Table 3.13.

As can be seen from the above study Hypothesis Two is only partially verified by the data of the study. The three variables hypothesized as having no significant relation to the need of the actors are in fact not significantly related. However, of the six variables hypothesized as being significantly related, only three are significantly related at the 5 per cent level or better---$S_3$ at the 5 per cent level, $S_6$ at the 5 per cent level and $S_7$ at the 1 per cent level. Variables $S_1$, $S_2$, and $S_5$ would only be significantly related if the level of significance of the test were set at the 20 per cent level. However, these three variables are more
TABLE 3.13
Relationship Between Actor Need Construct and Actor Practice Site Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of Measurement</th>
<th>Coefficient</th>
<th>Correlation</th>
<th>Test</th>
<th>Probability</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Ordinal</td>
<td>Freeman's $\theta$</td>
<td>0.4322</td>
<td>$x^2$</td>
<td>0.1565</td>
<td>40</td>
</tr>
<tr>
<td>S2</td>
<td>Ordinal</td>
<td>Freeman's $\theta$</td>
<td>0.4288</td>
<td>$x^2$</td>
<td>0.1805</td>
<td>40</td>
</tr>
<tr>
<td>S3</td>
<td>Nominal</td>
<td>Guttman's $\lambda$</td>
<td>0.3488</td>
<td>$x^2$</td>
<td>0.0525</td>
<td>40</td>
</tr>
<tr>
<td>S4</td>
<td>Nominal</td>
<td>Guttman's $\lambda$</td>
<td>0.0357</td>
<td>$x^2$</td>
<td>0.2900</td>
<td>40</td>
</tr>
<tr>
<td>S5</td>
<td>Ordinal</td>
<td>Freeman's $\theta$</td>
<td>0.5300</td>
<td>$x^2$</td>
<td>0.1767</td>
<td>40</td>
</tr>
<tr>
<td>S6</td>
<td>Nominal</td>
<td>Guttman's $\lambda$</td>
<td>0.2955</td>
<td>$x^2$</td>
<td>0.0231</td>
<td>40</td>
</tr>
<tr>
<td>S7</td>
<td>Nominal</td>
<td>Guttman's $\lambda$</td>
<td>0.2571</td>
<td>$x^2$</td>
<td>0.0020</td>
<td>40</td>
</tr>
<tr>
<td>S8</td>
<td>Nominal</td>
<td>Guttman's $\lambda$</td>
<td>0.0000</td>
<td>$x^2$</td>
<td>1.0000</td>
<td>40</td>
</tr>
<tr>
<td>S9</td>
<td>Ordinal</td>
<td>Freeman's $\theta$</td>
<td>0.3568</td>
<td>$x^2$</td>
<td>0.3075</td>
<td>40</td>
</tr>
</tbody>
</table>
significantly related than are the three variables hypothesized as not being significantly related. This possibly indicates that the lack of significance may be due to the crude nature of measurement of the 'need' construct and not to a lack of relationship between the variables. In the light of this observation and the fact that six of the nine sub-hypotheses were 'accepted' at the 5 per cent confidence level or better, Hypothesis Two of the study is 'accepted'.

Hypothesis Three

Statement of the hypothesis. Hypothesis Three was stated in Chapter I as follows:

That the site characteristics of an actor's practice site as measured on the site variables S1, S2, S3, S5, S6, S7 are significantly correlated with the 'Degree of Specialism' scale score of the actor but that no significant correlation exists between site characteristics S4, S8, S9 and the 'Degree of Specialism' score of the physician.

As with Hypothesis Two this hypothesis will be tested as nine individual sub-hypotheses by testing for the significance of the correlation between the 'Degree of Specialism' score and each of the individual site variables.

The tests used. As the level of the site variables is either of the nominal or the ordinal level and the 'Degree of Specialism' scale is an ordinal scale, the appropriate correlation coefficients are Freeman's $\theta$ for the ordinal-nominal correlation and Goodman and Kruskal's Coefficient of
rank association, $G$, for the ordinal-ordinal correlation. The significance tests for the correlations are provided by the significance test for $G$ in the ordinal-ordinal case and by the Mann Whitney U test for the ordinal-nominal correlations except in the case of $S3$, which has level three and not two as have the other nominal variables, where the $x^2$ test provides the test of significance (Freeman, 1965, pp. 109-120 and pp. 79-89).

Results of the tests. The results of the test on Hypothesis Three are presented in Table 3.14.

As can be seen from the table shown on page 64, study hypothesis three is verified by the data on all variables except $S3$. The correlations between variables $S4$, $S8$, $S9$ and the 'Degree of Specialism' scale score are not significant for any variable as was hypothesized and the correlations between variables $S1$, $S2$, $S5$, $S6$, $S7$ are significant at the 1 per cent level of significance. Only the relationship between $S3$ and the 'Degree of Specialism' score fails to be significant. No explanation for the lack of relationship is forthcoming. In the light of the above findings, research Hypothesis Three of the study is accepted.

Hypothesis Four

Statement of the hypothesis. In Chapter I Hypothesis Four was stated as follows:
### TABLE 3.14
Relationship Between Actor Degree of Specialism Score and Actor Site Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of Measurement</th>
<th>Coefficient</th>
<th>Correlation</th>
<th>Test</th>
<th>Probability</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Ordinal</td>
<td>G</td>
<td>0.6077</td>
<td>sig.test for G</td>
<td>0.0014</td>
<td>40</td>
</tr>
<tr>
<td>S2</td>
<td>Ordinal</td>
<td>G</td>
<td>0.6321</td>
<td>sig.test for G</td>
<td>0.0006</td>
<td>40</td>
</tr>
<tr>
<td>S3</td>
<td>Nominal</td>
<td>θ</td>
<td>0.5704</td>
<td>x^2</td>
<td>0.9857</td>
<td>40</td>
</tr>
<tr>
<td>S4</td>
<td>Nominal</td>
<td>θ</td>
<td>0.0263</td>
<td>U</td>
<td>0.9502</td>
<td>40</td>
</tr>
<tr>
<td>S5</td>
<td>Ordinal</td>
<td>G</td>
<td>0.4068</td>
<td>sig.test for G</td>
<td>0.0035</td>
<td>40</td>
</tr>
<tr>
<td>S6</td>
<td>Nominal</td>
<td>θ</td>
<td>0.4399</td>
<td>U</td>
<td>0.0179</td>
<td>40</td>
</tr>
<tr>
<td>S7</td>
<td>Nominal</td>
<td>θ</td>
<td>0.8037</td>
<td>U</td>
<td>0.0003</td>
<td>40</td>
</tr>
<tr>
<td>S8</td>
<td>Nominal</td>
<td>θ</td>
<td>0.0000</td>
<td>U</td>
<td>1.0000</td>
<td>40</td>
</tr>
<tr>
<td>S9</td>
<td>Ordinal</td>
<td>G</td>
<td>-0.1440</td>
<td>sig.test for G</td>
<td>0.3342</td>
<td>40</td>
</tr>
</tbody>
</table>
That the site characteristics of Primary Care physicians' sites as measured on site variables S1, S2, S3, S5, S6, S7 are significantly different from the site characteristics of Specialist physicians' sites but that no significant difference exists for site characteristics S4, S8, S9 between the two groups.

As in Hypotheses Two and Three, nine sub-hypotheses are tested with each site characteristic being individually tested.

The tests used. Unlike Hypotheses One through Three which were hypotheses regarding the significance of a correlation between two scales, Hypothesis Four is concerned with the differences between the site characteristics of two groups of physicians:—namely Primary Care physicians and Specialist physicians. The appropriate test to use to test for this difference when the site variable being considered has achieved ordinal measurement is the Mann-Whitney U test (Siegel, 1956, pp. 116-127), while the $x^2$ test provides the test when the variable is measured at the nominal level (Siegel, 1956, pp. 104-111).

Results of the tests. The results of the Mann-Whitney U tests on the ordinal variables will be reported first followed by the results of the tests on the nominal variables. The results of the U tests are presented in Table 3.15.
TABLE 3.15
Mann-Whitney U Test Results.
Primary Care vs. Specialist Physicians

<table>
<thead>
<tr>
<th>Variable</th>
<th>Primary Care Mean N=20</th>
<th>Specialists Mean N=20</th>
<th>U</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>10.80</td>
<td>4.20</td>
<td>285.5</td>
<td>2.3127*</td>
</tr>
<tr>
<td>S2</td>
<td>12.85</td>
<td>4.20</td>
<td>296.0</td>
<td>2.5968**</td>
</tr>
<tr>
<td>S4</td>
<td>0.30</td>
<td>0.10</td>
<td>200.5</td>
<td>0.0135</td>
</tr>
<tr>
<td>S5</td>
<td>26.45</td>
<td>8.30</td>
<td>293.0</td>
<td>3.1648**</td>
</tr>
<tr>
<td>S9</td>
<td>8.55</td>
<td>7.25</td>
<td>264.0</td>
<td>1.7300*</td>
</tr>
</tbody>
</table>

p < .05 *  
** One tailed tests.

As both n₁ and n₂ were twenty, the normal approximation, z, of U was used to determine the significance level of the difference between the two groups. As the alternate hypothesis to the null hypothesis of equal means was that the means of the Primary Care group were greater than those of the Specialist group, one tailed tests were employed (Siegel, 1956, p. 122).

As can be seen from the table the hypothesized relationship were all verified by the data of the study with the exception of the hypothesized lack of difference for variable S9, i.e., there was no significant difference between the two groups for variable S4 but that differences significant at
the 5 per cent or 1 per cent level were found for the other four variables. The significant difference was as hypothesized for variables S1, S2, and S5 but contrary to the hypothesis for variable S9. However, the difference, although unexpected, is intuitively reasonable in terms of the conceptual paradigm of the model for if one group were to provide larger waiting rooms for their patients one would expect this to be the Primary Care group where fewer patients have appointments and 'drop-in' patients increase the average waiting period before being seen by the physician. We now consider the nominal variables.

Contingency tables of the nominal site variables broken down into the two groups are presented in Tables 3.1 through 3.4 and so only the $x^2$ values and their significant levels will be reported in this section. Table 3.16 provides a summary of the test results for the nominal variables.

**TABLE 3.16**

$x^2$ Test Results. Primary Care vs. Specialist Physicians

<table>
<thead>
<tr>
<th>Variable</th>
<th>$X^2$ Value</th>
<th>Degrees of Freedom</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3</td>
<td>8.24</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>S6</td>
<td>4.95</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>S7</td>
<td>9.18</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>S8</td>
<td>0.00</td>
<td>0</td>
<td>--</td>
</tr>
</tbody>
</table>
As can be seen, the hypothesized differences are all supported by the data of the study. No difference was found between the two groups on variable S8. In fact all physicians were located at sites served by public transit facilities. The hypothesized differences between the two groups on the other variables were found to be significant at either the 5 per cent or 1 per cent levels.

Of the six hypothesized significant relationships all six proved to be significant at the 5 per cent or 1 per cent level. Of the three hypothesized non-significant relationships two proved to be non-significant and one was significant at the 5 per cent level, but this was understandable in an 'after the fact' fashion. In the light of these findings research Hypothesis Four of the study is accepted.
SUMMARY OF MAJOR FINDINGS AND RECOMMENDATIONS FOR FUTURE RESEARCH

I. SUMMARY OF THE MAJOR FINDINGS

Degree of Specialism Can Be Measured

One of the major problems of this study was to develop a scale that reliability and validly measured the 'Degree of Specialism' of a medical practitioner. A preliminary scale was developed that was designed to cover the major dimensions of this 'construct' and applied to a small 'pre-test' sample. The item responses were dichotomized to achieve a scale score for the individual respondents and an item analysis conducted. The results of this item analysis were then used to modify the scale for use in the study proper. The preliminary instrument is reproduced in Appendix E and the item analysis results of this scale in Appendix F. The revised scale was then incorporated into a larger interview schedule and administered to the study sample. Once again, item responses were dichotomized and an item analysis conducted. The Point-Biserial correlations between item responses and the internal criterion of scale score were generally high indicating that the revised scale had high internal consistency. To investigate the reliability of the scale a Kuder-Richardson formula
reliability coefficient was calculated yielding an $r_{tt}$ value of 0.9275—a satisfactorily high figure. The revised scale is presented in Appendix C and the item analysis results in Appendix D.

The revised 'Degree of Specialism' scale then had high internal consistency and reliability indicating that some confidence can be placed on it as an accurate 'measure' of the 'Degree of Specialism' of an individual medical practitioner. As discussed in Chapter III, the level of measurement attained by the scale is considered to be that of an ordinal variable.

The 'Need Construct' of an Actor Can Be Measured

The other major 'construct' utilized in this study was that of the 'need construct' of an individual physician with regard to the site characteristics of his practice site. In order to 'measure' this construct, a rank-order methodology was adopted in which seven stimuli were presented to the respondent actors who were asked to rank them in terms of the degree to which they made a hypothetical practice site attractive to them as a site from which to conduct their practice. The stimuli are presented in Table 3.4. From the responses obtained two rank-order frequency matrices were generated, one for Specialist physicians, Table 3.7, and one for Primary Care physicians, Table 3.6. From these matrices composite rankings of the seven stimuli were calculated for
each of the two groups and shown to differ in a predictable manner. A grouping analysis of the physicians' responses was then performed and a decision made to accept the grouping containing four classes of physicians. These groups were intuitively appealing and constituted the numerical assignment rule for 'measuring' the 'need construct' of the individual physician, i.e. membership of a group was used to assign the value of a level four nominal variable to each physician. The specialties of physicians in the four groups are reproduced in Table 3.10 and the Tree Graph of the grouping analysis is reproduced in Appendix G.

**Need Relates to the Degree of Specialism**

In the research model of the study adopted in Chapter I the 'Degree of Specialism' of a physician was seen to affect the 'need construct' of the physician with regard to the site characteristics of his practice site which in turn affected the locational decisions of the physicians with regard to his choice of practice site. Thus Hypothesis One of the study posited a significant relationship between the 'Degree of Specialism' of a physician and his 'need construct' with regard to practice site characteristics. Utilizing the 'measures' provided by the 'Degree of Specialism' and 'need' scales a Freeman's correlation coefficient was calculated and a $x^2$ test used to test the significance of the correlation.
The value of obtained was 0.7136 which was significant at the 1 per cent level. Hypothesis One of the study was thus 'accepted' at the 1 per cent level of significance.

Need Relates to Site Characteristics

The second hypothesis of the study posited that the 'need construct' of an actor was significantly correlated with certain site characteristics of his practice site but that no relationship would be found between other site characteristics and the actor's need. None of the hypothesized non-significant relationships proved to be significant. Of the six hypothesized significant relationships three were significant at the 5 per cent of 1 per cent level and the three that were not significant at the 5 per cent level showed a stronger relationship than the hypothesized non-significant relationships. The results are reproduced in Table 3.13. On the basis of these results Hypothesis Two of the study was 'accepted'.

Degree of Specialism Relates to Site Characteristics

Hypothesis Three of the study completed testing of the relationships expressed in the research model of the study (see Figure 1.1) positing significant relationships between six site characteristics and actor 'Degree of Specialism' scores and non-significant relationships between the other three site characteristics and actor 'Degree of Specialism'
scores. The three hypothesized non-significant relationships were found to be non-significant and five of the six hypothesized significant relationships were found to be significant at the 5 per cent level. The results of the tests are presented in Table 3.14. On the basis of the tests made, Hypothesis Three of the study was accepted.

II. SUGGESTIONS FOR FUTURE RESEARCH

This study has focused on two aspects of the locational decisions of Medical Practitioners within an urban area; namely the relationships between the 'Degree of Specialism' of a physician, the 'need construct' of a physician and the site characteristics of the Medical Practice site occupied by the physician. No attempt was made to explicitly analyze the spatial structure of Medical Practice sites within the study area although the conceptual paradigm of the study implies that certain 'properties' should be found within this structure if the paradigm adopted is to prove useful. Suggestions regarding the investigation of this aspect of the problem are discussed in the following section.

The Need For a Structural Analysis

The relationships hypothesized in the conceptual paradigm between the 'Degree of Specialism' of a physician and the site characteristics of his practice imply that two
'structural' characteristics of the spatial pattern of medical care should be found at the intra-urban level. These are:

1) That the 'Degree of Specialism' of the practitioners of a certain medical specialty should be related to the 'degree of agglomeration' of the spatial pattern of that particular specialty, i.e., the higher the 'Degree of Specialism' of a certain specialty the greater should be the 'clustering' found in the spatial pattern of that specialty.

In terms of the 'Degree of Specialism' rankings given in Table 3.11, this would mean that surgeons would be the most 'clustered' group, followed by other specialists with Primary Care physicians displaying the least clustered spatial pattern of practice. Some evidence that this situation is the case for two major U.S. cities is provided by Marsden (1966) for Seattle and Morrill and Earickson (1966) for Chicago. A test of this hypothesis using point pattern analysis techniques such as Nearest Neighbour Analysis could yield interesting results.

ii) That as Specialist physicians become more highly specialized over time the spatial pattern of specialist practice sites should become more clustered.
To test this hypothesis in any strict sense is impossible as it is not possible to recover the 'Degree of Specialism' scores of physicians as they were in the past. It is only the present 'Degree of Specialism' that we are able to measure. However, if one is prepared to accept that increasing specialism occurs over time for the specialist medical community in aggregate, it would be possible utilizing point pattern statistics, to investigate the clustering found within the spatial pattern of practice sites at points in the past. If clustering had increased over time this would lend some support to the hypothesis and further validation of the conceptual paradigm.

The Need For An Explicit Linkage Analysis

Much of the conceptual paradigm of this study was concerned with the physicians' 'need construct' regarding the internal and external linkages of potential practice sites with other medical facilities. External site linkage with diagnostic facilities and a major hospital were essential characteristics for a Specialist physician's practice site it was argued. The 'need construct' rank-order frequency matrix of Specialist physicians (Table 3.7) and the significant differences found between Specialist and Primary Care physicians in Hypothesis Four (see Tables 3.15 and 3.16) lend credance to this concept. However, an explicit Linkage
Analysis utilizing 'time-log' data for physicians would be a very useful study. In this way one could analyze the 'Degree of Specialism', Linkage, Site characteristics relationships explicitly rather than in the implicit way with which they have been handled in this study. Such a study would be a very valuable addition to the study reported in this thesis.
LITERATURE CITED


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Claus, R. J. Spatial dynamics of gasoline service stations. *Vancouver: Tantalus, 1969(b)*.


Pred, A. Behavior and location, part II. Sweden: The Royal University of Lund, 1969.


### APPENDIX A

#### THE SITE VARIABLES

<table>
<thead>
<tr>
<th>S1</th>
<th>Number of city blocks from practice site to diagnostic laboratory facilities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2</td>
<td>Number of city blocks from practice site to diagnostic radiology facilities.</td>
</tr>
<tr>
<td>S3</td>
<td>Do diagnostic radiology or laboratory facilities exist at the practice site.</td>
</tr>
<tr>
<td>S4</td>
<td>Number of car parking spaces available to the physician at the practice site.</td>
</tr>
<tr>
<td>S5</td>
<td>Number of city blocks from practice site to the hospital of affiliation of the physician.</td>
</tr>
<tr>
<td>S6</td>
<td>Is the practice site located in a residential area.</td>
</tr>
<tr>
<td>S7</td>
<td>Is the practice site a single practice site.</td>
</tr>
<tr>
<td>S8</td>
<td>Is the practice site located on a public transit route.</td>
</tr>
<tr>
<td>S9</td>
<td>Number of seats in the patient waiting room.</td>
</tr>
</tbody>
</table>
APPENDIX B
APPENDIX B

THE INTERVIEW SCHEDULE

<table>
<thead>
<tr>
<th></th>
<th>CHARACTERISTICS OF THE PARTNERSHIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td><strong>Size of the Partnership</strong></td>
</tr>
<tr>
<td>111</td>
<td>No. of physicians in partnership.</td>
</tr>
<tr>
<td>112</td>
<td>Total number of physicians in clinic (not partnership).</td>
</tr>
<tr>
<td>113</td>
<td>How many offices do you/the partnership operate?</td>
</tr>
<tr>
<td>114</td>
<td>Where are these offices?</td>
</tr>
<tr>
<td>120</td>
<td><strong>History of the Practice</strong></td>
</tr>
<tr>
<td>121</td>
<td>For how long have you practiced medicine?</td>
</tr>
<tr>
<td>122</td>
<td>For how long have you practiced medicine in Vancouver?</td>
</tr>
<tr>
<td>123</td>
<td>For how long have you practiced medicine at the present site?</td>
</tr>
<tr>
<td>124</td>
<td>Where else in Vancouver have you practiced medicine?</td>
</tr>
<tr>
<td>125</td>
<td>How long have the auxiliary offices of the partnership been open?</td>
</tr>
<tr>
<td>130</td>
<td><strong>Capitalization/Expenditures of Practice</strong></td>
</tr>
<tr>
<td>131</td>
<td>Do you/the partnership own your office(s)?</td>
</tr>
<tr>
<td>132</td>
<td>Do you/the partnership lease your office(s)?</td>
</tr>
<tr>
<td>133</td>
<td>Do you/the partnership rent your office(s)?</td>
</tr>
<tr>
<td>134</td>
<td>If the partnership owns the office(s), have you formed a corporation that technically owns the office and that charges you rental?</td>
</tr>
</tbody>
</table>

82
135 - If so, is the sharing of capital in the corporation the same as in the partnership?

136 - What is the capital involved in the clinic if you/the partnership own it in:

   (a) Real capital (real estate)?
   (b) Fixed capital (equipment, etc.)?
   (c) Working capital (salaries, etc.)?

140 - Legal Status of Partnership

141 - Is the partnership a formal legal agreement?

142 - If so, for how long is it valid?

143 - What are the most important terms for separating from the clinic?

200 - CHARACTERISTICS OF INDIVIDUAL PHYSICIAN

210 - Medical Education

211 - How many years did you spend in university/college prior to going to medical school?

212 - What subject(s) did you major in at college?

213 - How many years did you spend in medical school (excluding internship)?

214 - How many years structured post-graduate training did you do?

215 - Did you obtain the degree of Ph.D.?

216 - Which university/college did you attend?

217 - Which medical school did you attend?

218 - Where did you do your post-graduate training (if any)?

219 - At which hospital did you do your internship?

21A - If this was in the U.S.A., did you serve a specialist or rotating internship?
21B - Date of graduation from medical school.

21C - Were you in the upper or lower half of the class in medical school?

220 General Social Characteristics

221 - Were you born in Canada?

222 - If so, which province?

223 - If not B.C., when did you come to B.C.?

224 - If not, what country?

225 - If not, when did you come to Canada?

226 - What is your religion (if any)?

227 - Are you married?

230 Past Medical Experience

231 - How long have you been in medical practice?

232 - Where and for how long were you in medical practice previous to your present location?

233 - For how long have you practiced medicine as a registered specialist?

234 - How did you enter the present partnership?

240 Hospital Affiliation

241 - To which hospitals are you affiliated?

242 - What is the nature of your affiliation?

250 Functional Characteristics of Practice

251 - Do you use an answering service?

252 - Do you make house calls?

253 - Do you make house calls at night?

254 - How many days a week do you hold surgery?
255 - What are your surgery hours?
256 - What proportion of your patients are referred to you?
257 - What proportion of your patients are from 'out of town'?

260 Income
261 - What is your gross income?
262 - What percentage of your gross income is consumed by overheads?

270 Professional Group Membership
271 - Of how many professional bodies are you a member?
272 - How many medical journals do you subscribe to?
273 - How many of these are of a specialist nature?
274 - How many 'professional medical conferences' do you attend annually?

300 PERSONNEL CHARACTERISTICS OF THE PRACTICE
310 Division of Labour of Medical Partners
311 - Do each of the doctors within the partnership fulfill the same administrative function?
312 - If not, what are the specialisms of the partners?
313 - What are the most important specialties not included in the partnership?

320 Administrative Structure of the Practice
321 - Do each of the doctors within the partnership fulfill the same administrative function?
322 - If not, what is the 'division of labour'?
DECISION MAKING PROCESS

Use of Financial Advisors

- Do you use professional accountants to scrutinize your financial records?

Use of Other Outside Professional Advisors

- Did you consult a realtor when deciding whether to own, rent or lease your present office(s)?
- With whom did you discuss the problem of deciding where to locate your office(s)?
- Did you build or remodel your present office?
- If so, did you obtain the services of an architect experienced in working with medical facilities?

Major Decision Making Factors

- Note any other factors that you consider should be important in the decision of where to locate a physician's office?
- What were the major factors that influenced you in your choice of site?

QUANTITY OF INFORMATION

Record Keeping

- If you have more than one office, do you (personally) keep separate financial records for each office?
- If you have more than one office, do you (personally) keep separate medical (in terms of patients' records) records for each office?
- If the partnership operates several offices, are the records kept separately for each office?
- Are separate records kept for each member of the partnership if you operate from the same site?
- Do you receive information regarding the development of medical centres within Vancouver?
516 - Do you solicit such material?

517 - Do you know the cost of maintaining an office in a major medical centre such as the Fairmont Building?

518 - Do you know the range of facilities available in the major medical centres?

520 Classification of Information

521 - How do you classify your information regarding:
   (a) your practice--i.e., between offices/partners?
   (b) possible alternative sites for your practice?

530 Use of Computer Facilities

531 - Do you use computer facilities for any purpose?

532 - If so, for what purpose?

533 - If so, where are they located?

534 - If so, have you a remote terminal at the practice?

600 QUALITY OF INFORMATION

610 Sources of Information

611 - What are your sources of data re:
   (a) the medical centres?
   (b) other possible practice sites?
   (c) successes and failures of other physicians?

612 - If any of the above information is collected formally, indicate the methods used.

620 Age of Information

621 - In what year was your latest data collected regarding the classes of information indicated above?

800 FUNCTIONAL SPECIALISM OF PHYSICIAN

810 Attitudes Toward Research
811 - What were the primary motivations that led you into GP/specialist practice?

812 - What were the primary motivations that led you into your particular specialty?

813 - Are you engaged in active 'basic research'?

814 - Are you engaged in active 'clinical research'?

815 - If so, does this research require special facilities?

816 - If yes, where are they located?

817 - Have you had any papers published in professional journals?

818 - If so, how many?

819 - Were these papers concerned with:
   (a) Basic research?
   (b) Clinical research?
   (c) Medical economics?
   (d) Other topics (specify)?

820 - Referral Patterns

821 - What percentage of your patients are referred to you by other physicians?

822 - On what grounds do you refer a patient to an appropriate specialist (e.g. by reputation, ease of access, personal friend)?

823 - Do you refer patients consistently to the same group of appropriate specialists?

825 - How would you regard a rapid proliferation of:
   (a) GP's offices
   (b) Specialists' offices in the location of your practice?

830 - Use of Time

831 - What do you consider to be the 'most characteristic' act of your specialty (e.g. diagnosis, surgery, treatment, teaching, research)?
What do you consider to be your most characteristic act?

What percentage of each 'work week' do you spend:
(a) In your office?
(b) In the hospital?
(c) Elsewhere?

When you are not seeing patients in the office or on duty at the hospital but still engaged in medical affairs, what functions take up most of your time:
(a) Reading?
(b) Research?
(c) Teaching?

Attitude Toward Present Site
- Do you consider your site to be adequate?
- What are the major disadvantages of the site?
- Do you consider there are more advantageous sites in Vancouver for your practice?
- If so, where?
- If so, on what grounds do you regard them as being superior to your present site?

Aspiration Level
- What income do you hope to be earning at the peak of your career?
- What function do you hope to be fulfilling at the peak of your career?

Nature of Clientele
- What proportion of your patients are a transient clientele (i.e., non family patients)?
- Do you prefer regular to transient patients?
- If so, why?
- Do you have a high turnover rate of patients on your list?
865 - Do you prefer a high or a low turnover rate of patients?

866 - Why?

867 - Where do you feel you make your biggest contribution to society?
APPENDIX C

THE DEGREE OF SPECIALISM SCALE

The following items from the interview schedule were included in the Degree of Specialism Scale. Readers should refer to the Interview Schedule in Appendix B for the content of the items.

| Numbers of the Items in the Degree of Specialism Scale |
|-----------------|-----------------|-----------------|
| 111              | 242             | 813             |
| 112              | 252             | 814             |
| 211              | 253             | 817             |
| 212              | 256             | 818             |
| 213              | 257             | 819             |
| 214              | 271             | 831             |
| 215              | 272             | 832             |
| 218              | 273             | 833             |
| 21A              | 274             | 834             |
| 21B              | 433             | 845             |
| 233              | 811             | 861             |
| 241              | 812             | 864             |
### APPENDIX D

**POINT BISERIAL CORRELATIONS BETWEEN DEGREE OF SPECIALISM SCALE ITEM RESPONSES AND SCALE SCORE**

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\( p = \) proportion of actors scoring 1 on item
\( q = 1 - p \)
\( r_{pbi} = \) the point biserial correlation coefficient
THE PRELIMINARY INSTRUMENT USED IN THE PRE-TEST

Ability to Act Dimensions

100 CHARACTERISTICS OF THE PARTNERSHIP

110 Size of the Partnership

111 - Number of physicians in partnership.

112 - How many offices does the partnership operate
   (a) in Vancouver
   (b) elsewhere?

120 Life Cycle Characteristics

121 - How long has the present partnership been located in
   (a) Vancouver
   (b) present site?

122 - How long has the present practice been located in
   the present site?

123 - At what dates did you open auxiliary offices (if any)?

130 Capitalization/Expenditures

131 - Does the partnership own your office(s)?

132 - Does the partnership lease your office(s)?

133 - Does the partnership rent your office(s)?

134 - What are the main areas of capital outlay in your
   practice?

135 - Is the building occupied by the partnership owned
   by a corporation the stock of which is held by the
   members of the partnership?
136 - If so is the percentage of stock held by the partners in the corporation the same as the percentage they own in the partnership?

137 - What is the capital the partnership has in
      (a) Real capital (real estate)?
      (b) Fixed capital (equipment, etc)?
      (c) Working capital (salaries, etc.)?

138 - What percentage of total income does the partnership spend on:
      (a) Salaries?
      (b) Supplies and drugs?
      (c) Others (travel, laundry, legal fees, etc.)?

140  Legal Status of Partnership

141 - Is the partnership a formal legal agreement?

142 - If so, for how long is it valid?

143 - Is it possible for a partner to leave the partnership if he so desires without the consent of the other partners?

200  CHARACTERISTICS OF THE INDIVIDUAL DECISION MAKER

210  Education (Type/Time/Place)

211 - How many years did you spend in college prior to medical school?

212 - How many years did you spend in medical school (excluding internship)?

213 - Which college did you attend?

214 - Which medical school did you attend?

215 - Date of graduation:
      (a) from college
      (b) from medical school.

216 - Did you serve a rotating or a specialist internship?

217 - Was the type of internship you served the type for which you applied?
218 - Were you in the upper or lower half of the class in medical school?

220 **Racial/Social Background**

221 - Were you born in Canada?

222 - If so, which province?

223 - If not, which country?

224 - To which census ethnic group do you belong?

225 - What is your religion (if any)?

230 **Past Medical Experience**

231 - Is the present practice the first in which you have been involved?

232 - Did you enter the present practice
   (a) by entering into partnership with an established physician?
   (b) establishing a new practice?
   (c) taking over a vacant practice?

233 - Where and for how long have you practiced medicine
   (a) Vancouver?
   (b) rest of B.C.?
   (c) rest of Canada (specify province(s))?
   (d) U.S.A. (specify state)?
   (e) elsewhere (specify)?

240 **Hospital Affiliation**

241 - To which hospital(s) are you affiliated?

242 - Are your patients sent to the same hospital irrespective of the treatment required?

250 **Income Level/Source**

251 - Do you obtain your income from
   (a) fees for service?
   (b) a capitation agreement?
   (c) a salary?
252 - Into which income group do you fall?
   (a) $10,000 - $15,000
   (b) $15,000 - $20,000
   (c) $20,000 +

260 Practitioner Patient Relations (Factual)
261 - Do you use an answering service?
262 - If so, can you be reached at all times by a patient?
263 - If not, can a patient at all times get in contact with another member of your partnership?
264 - How many hospital admissions did you have per hundred patients last year
   (a) for surgery?
   (b) for observation?
   (c) for intensive care (non surgical)?
265 - Do you make house calls? at night?
266 - If so, how many per week?

270 Group Membership
271 - Of what professional bodies are you a member?
272 - In which of these are you an active member?
273 - To which medical journals do you subscribe?

300 INTERNAL STRUCTURE OF FIRM
310 Division of Medical Labour of Practitioners
311 - Do each of the doctors within the partnership fulfill the same professional function?
312 - If not, what are the specialisms of the partners?
313 - What is the most important specialty not included in the partnership?

320 Division of Administrative Labour of Practitioners
321 - Do each of the doctors within the partnership fulfill the same administrative function?
322 - If not, what is the 'division of labour'?

330 Other Permanent Personnel

331 - Does the partnership employ a business manager to deal with organizational, financial and personnel questions?

400 DECISION MAKING PROCESS

410 Use of Outside Advisors on Financial Matters

411 - Do you use professional accountants to scrutinize your financial records?

412 - Do you work in conjunction with professional advisors when making financial decisions?

420 Use of Outside Advisors re Suitability of Sites, etc.

421 - Did you consult a realtor when deciding whether to own, lease or rent your office?

422 - Who did you talk to when deciding where to locate your office?

423 - Did you build or remodel your present office?

424 - If so, did you obtain the services of an architect experienced in working with medical facilities?

430 Internal Segmentation of Decision Making

431 - Do 'committees' of the partners exist to deal with different areas of policy decision making?

432 - If so, are the decisions of these committees final or do they merely make recommendations to all the partners?

433 - Do all the partners have an equal voice in making major policy decisions or is there a ranking by seniority, etc.?
Method of Appraisal

What are the major considerations that should be considered when choosing the site of your medical practice unit?

Did you consciously locate your office within convenient distance of:
- major traffic arteries?
- public transport?

Did you locate your office so as to avoid noise pollution from:
- traffic arteries?
- railroad yards?
- industry?

Did you locate your office so as to avoid industrial air pollution?

Did you locate your office so as to avoid areas of present or possible future deterioration of visual building standards?

How do you assess areas of 'growth' and 'decline' in the city?

Information Dimension

QUANTITY OF INFORMATION

Orientation and Perspective

If you have more than one office do you keep separate financial records for each office or aggregated records for the whole partnership?

Do you keep in touch with public sources of information regarding areas of population change in:
- Vancouver?
- Lower Mainland?
- B.C.?
- elsewhere?

Do you obtain information on new commercial development in:
- Vancouver?
- Lower Mainland?
- B.C.?
- elsewhere?
514 - Do you receive information regarding the development of new medical complexes in:
   (a) Vancouver?
   (b) elsewhere (specify)?

515 - Do you know the cost of maintaining an office in the major medical centres?

516 - Do you know the range of facilities available in the major medical centres?

517 - Do you obtain information on other physicians' practices in terms of:
   (a) number of patients?
   (b) income?

520 Format for Organization of Information

521 - How do you classify your information regarding:
   (a) other practices?
   (b) the medical centres?
   (c) socio-economic characteristics of Vancouver?

530 Storage and Retrieval of Information

531 - Do you use a computer data bank?

532 - What information do you store in the data bank (if any)?

533 - If you use computer facilities, where are they situated?

534 - Do you have a computer terminal at the practice?

600 QUALITY OF INFORMATION

610 Sources of Data

611 - What are your sources of data re:
   (a) other physicians?
   (b) the medical centres?
   (c) socio-economic characteristics of Vancouver?

612 - If any of the above information is collected privately indicate the collection methods used?
Age of Data

In what year was your latest data collected regarding the classes of information indicated above?

Behavioral Characteristics of Physicians

CHARACTERISTICS OF INDIVIDUAL DECISION MAKER

Organizational Membership

See 200.

CHARACTERISTICS OF INDIVIDUAL DECISION MAKER

(ATITUDES)

Attitudes Towards Research

What were the primary motivations that led you into specialist practice?

Are you engaged in active medical research?

If so, does this research require special facilities?

Do you devote the majority of your time to:

(a) seeing patients?
(b) teaching and research?

Have you had any papers published in professional journals?

If so, how many?

Were these papers concerned with:

(a) research (basic)?
(b) research (clinical)?
(c) medical ethics?
(d) other topics?

What is the nature of your association with the hospital with which you work in conjunction?

Attitudes Towards Other Physicians

What percentage of your patients are referred to you by other physicians?
Do you refer patients to specialists whose offices are near your own office?

If not, on what grounds do you choose between professional colleagues to whom you refer patients?

Do you have any fee-sharing arrangements with specialists to whom you refer patients?

Do you refer patients who require treatment beyond your capabilities consistently to the same specialist in the appropriate field?

Which of the following is the most accurate representation of what you call a colleague?
(a) another practicing physician
(b) a physician with the same specialty
(c) a physician you know personally
(d) a physician to whom you refer patients
(e) a partner?

How would you regard a rapid proliferation of physicians' offices in the immediate vicinity of your office.

**Attitudes Re Specialism**

What do you consider to be the 'most characteristic act' of your specialty?

What is your 'most characteristic act'?

What do you consider to be the major motivations in your choice of specialism (other than those that motivated being a specialist in general)?

**Attitudes Towards Present Site**

Do you consider your site to be adequate?

Do you consider that your patients would receive better care if you were located nearer a hospital with its additional diagnostic facilities?

Do you consider that there exist more advantageous sites in Vancouver for your practice?

If so, where?
If so, are these more advantageous in terms of:
(a) proximity to research facilities?
(b) proximity to other physicians?
(c) access to hospital facilities?
(d) access to specialist libraries?
(e) ease of patient access?
(f) prestige?
(g) economic return?

Aspiration Level

What do you expect to earn at the peak of your career?

What function do you hope to be fulfilling at the peak of your career?

Where do you feel you make your most important contribution to science?
APPENDIX F
### APPENDIX F

**POINT BISERIAL CORRELATIONS BETWEEN ITEM RESPONSES AND SCALE SCORE ON THE PRELIMINARY INSTRUMENT**

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APPENDIX G
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