CHAPTER 10

Location, Place, Region, and Space

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The most fundamental concepts in the sciences are often expressed in ordinary language. In physics, it is *mass* and *energy*; in chemistry, the *elements*; *demand* and *supply* in economics; the *organism* in biology—and the list goes on. It is largely through such familiar-sounding concepts that the continuity between science and the everyday world is maintained, that the formal and formidable blends with the informal and familiar.

Geography too has its basic concepts, and they also are expressed in common English words: *location*, *place*, *region*, *space*. Of these, *space* is probably the most fundamental. But unlike $E = mc^2$, space resists definition in either formulas or words. A look at the dictionary suggests why:

> *space*: An interval between things, this regarded as empty of matter, sum of these as opposed to matter, this together with the room taken up by matter regarded as containing all things, any part of such s., regions beyond ken, a distance, an area, room available or required, a period or interval of time, ... (*The Pocket Oxford Dictionary*, 4th edition)

So space is both expanse and confine, both what is between things and what contains them, both empty of matter and defined by the presence of matter; space is even a period or interval of time! The broadness of the dictionary definition is characteristic of the difficulty of pinning down space. It is also indicative of the fact that, unlike most concepts developed to refer to some specific thing or property of the real world, space is part of the definition of that world; it thus belongs more in the realm of the philosopher and theorist than in the worlds examined by empirical researchers.

In his *Critique of Pure Reason* the eighteenth-century philosopher Kant speculated that space is a *synthetic a priori*, that is, an innate precondition of human knowing that makes it possible to understand the empirical world. Space is not another thing *in* the world, but a reality created by the interaction of human reason *with* that world. Thus it reflects properties of both the observed and the observer. Only three other concepts—time, morality, and aesthetics—have similar extra-empirical foundations, according to Kant. Although Kant's focus on Euclidean geometry (the only geometry known at the time) was later shown to be mistaken, his arguments on the extra-empirical nature of space in general continue to be at the center of scholarly discussions of the concept (Entrikin 1977). Whether they follow Kant or not, geographers must come to grips with the idea of space and with a variety of related concepts such as location, place, and region. These ordinary language terms may appear unproblematic and self-explanatory, but each corresponding concept is rooted in a somewhat different understanding of space, even though that understanding is usually tacit.

Geographers are not concerned with space for its own sake, only for what it may mean for the phenomena they study. No other empirical discipline allows space to play such a central role in its approach to the world and in its own self-definition. For physicists and other natural scientists the problem of space has long been solved, and the concept—as embedded in numerous formalisms—is for the most part taken for granted. Most social scientists on the other hand, and economists in particular, tend to ignore it; they have been accused (primarily by geographers) of seeing the world unfold on the head of a pin. For geographers, by contrast, a concern for space in its different implications and manifestations is an unbreakable common thread underlying an extreme diversity of interests that range from the humanities to social and physical science.

The primary goal of this chapter is to articulate a number of different conceptions of space underlying the work of geographers and others. Notions of space progress from more to less formal, from more to less well understood, and also from poorer to richer in human interest and meaning. The modern mathematician, the spacecraft designer, the industrialist trying to decide where to build a new factory, the urban commuter, the youth roaming the ethnic ghetto, the baby learning to reach for objects over its crib, and the mystic contemplating the perfection of a sphere all deal with space in its different manifestations. Indeed, we may speak of a hierarchy of spaces: mathematical, physical, socioeconomic, behavioral, experiential.

There is no single best conceptual scheme for discussing space. Sack (1980), who published an entire book on the different conceptions of space, chose as the basis for his framework a two-fold distinction between subjective and objective on one hand and between space and substance on the other. In Sack's scheme, conceptions of space that maintain these distinctions are called *so-*

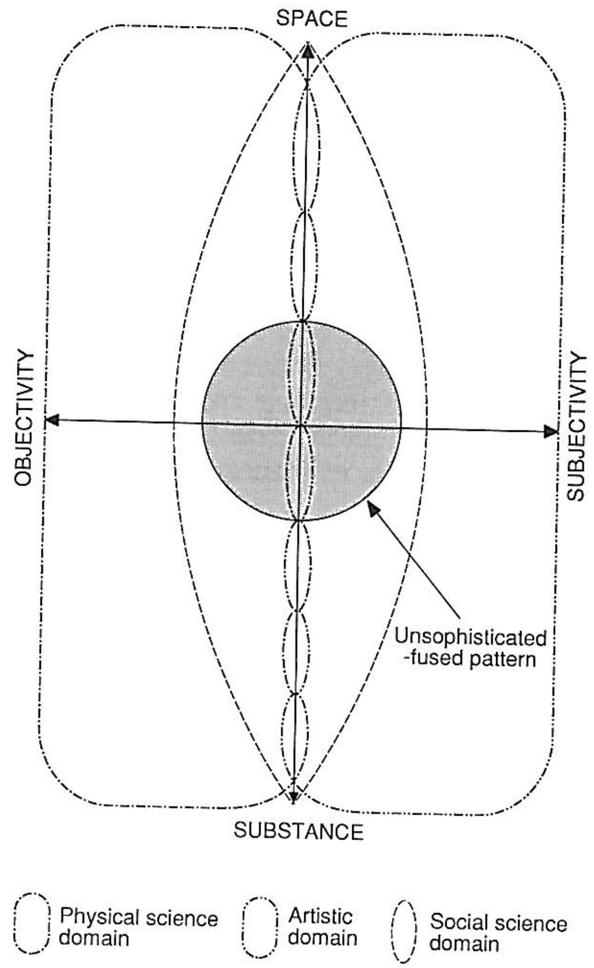


Fig. 10.1. Sack's Framework of Space Conceptions. SOURCE: Sack 1980:25.

phisticated-fragmented, whereas those that merge them are called *unsophisticated-fused* (fig. 10.1). The spaces of science and social science are of the first kind; those of everyday life, and of myth and magic, are of the latter. Many insights about the meaning of space emerge from such oppositions. Other insights arise from a view that different notions of space form an ordered sequence, as outlined in this chapter.

MATHEMATICAL SPACE

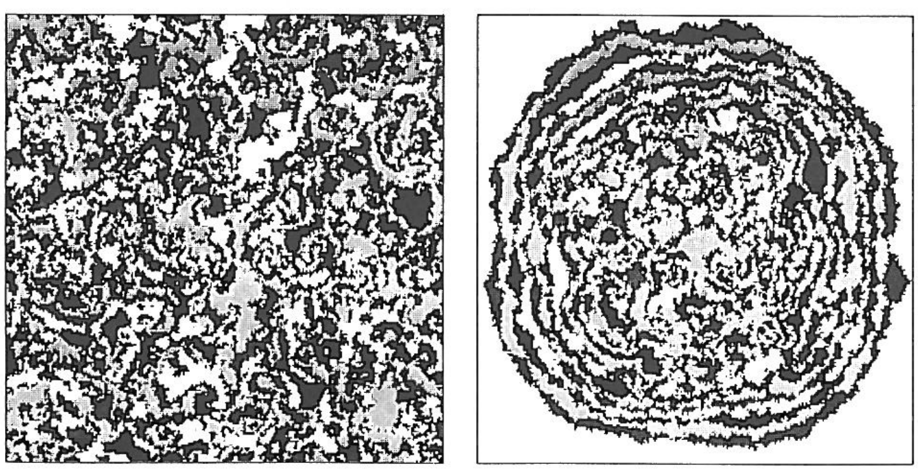
"It is said of the Socratic philosopher Aristippus, so Vitruvius wrote in the preface to the sixth book of his *De Architectura*, that being shipwrecked and cast on the shores of Rhodes and seeing there geometrical figures on the sand, he cried out to his companions, 'Let us be of good hope, for indeed I see the traces of men.'" (Glacken 1967, epigraph). For the ancient Greeks, and for much of the Western intellectual tradition that followed their lead, geometry was the signature of human intelligence. In a world that remained inexplicable and unpredictable for so long, the certainty of the geometrical truths and the conceptual elegance of their derivation were contemplated with almost religious reverence.

Geometry has its empirical roots in the need to reestablish field boundaries following the annual floods of the Nile in ancient Egypt. *Geometry*, in Greek, means measurement of the earth, just as *geography* means description of the earth. Literally, then, geometry was the oldest and purest form of what modern geographers think they have only recently invented—quantitative geography. It was, and remains, the formal science of space and spatial relations. David Harvey (1969), one of the foremost scholars to discuss space in the context of geography, called geometry "the language of spatial form." In recent decades pure geometry has moved in directions that few geographers care to follow, but the mathematical clarity and power it brought to the description of space remains a standard by which other approaches are measured.

For over two thousand years the Euclidean geometry of the ancient Greeks was the only one known. Now there are many more geometries, and inventing new ones is within the reach of today's generation of doctoral students in mathematics. But the geometry of two-dimensional and three-dimensional Euclidean space and its extension to the curved surface of the earth remain the foundations of geographical description. This is the geometry represented in most ordinary maps and the one underlying most mathematical models of geographic processes. But geographers have explored and made creative use of several other kinds of formal spaces as well. I mention here only two: *discrete* and *fractal* spaces.

Imagine a space made up of tiny grains that cannot be decomposed any further. These grains or cells make up a space that is *discrete*, unlike the smoothly continuous, infinitely divisible space that Euclidean geometry describes. A granular space runs counter to intuitive understanding of the world around us, and yet discrete spaces have become popular in geography and several other sciences, in part because the mathematics of discrete spaces (like that of discrete time) is on the whole simpler to work with. It is also more compatible with the binary logic of the digital computers, which cannot represent continuous entities without error. Models of geographical phenomena based on discrete space make the most of computer capabilities, and in some cases they allow geographers to explore processes that are difficult to represent by other means.

Members of one class of discrete-space models of special interest to geographers are called *cellular automata*. They represent the development over time of spatial processes based on local interactions, that is, on rules or laws that operate at particular locations and their neighborhoods rather than across an entire space. For example, a forest fire spreads from burning trees to neighboring trees; it does not attack all trees simultaneously, nor does it jump capriciously from one point to other distant points. The same is true of the spread of an epidemic, of a rumor or a fad, of an urban neighborhood that starts decaying once a few houses become derelict, and of many other phenomena where things that happen at one place strongly influence what happens in surrounding places. In fact, geographers made use of the properties of discrete space to study spreading or diffusing phenomena long before cellular automata became fashionable (Morrill, Gaile, and Thrall 1988). Still, the introduction of cellular automata provides a more general and systematic understanding of how complex and unpredictable the results of such processes can be, and of the ways small differences in initial local circumstances can lead to widely differing outcomes (see Couclelis 1988 for a discussion of cellular automata in geography). The irregular but far from random patterns (fig. 10.2) resulting from application of a cellular automaton rule operating at the scale of the individual cell remind one of the patterns of destruction left in the wake of a fire, of the form of an urban area, or of the distribution of species in an ecological community. For geographers, they are vivid demonstrations of how the small and large scales interact, and of how closely space, time, and substance are intertwined in spatial processes.



(a) (b)

Fig. 10.2. Cellular Automata Patterns: *a*, from uniform randomness; *b*, from a small patch of randomness. Source: Toffoli and Margolus 1987:92. Copyright © 1987 by MIT Press.

Fractal spaces became widely known only in the past decade, and their exploration has been closely linked with the analytical and display capabilities of modern computers (Mandelbrot 1982). Fractal geometry knows no straight lines, smooth shapes, or tidy, regular volumes. It is the geometry that best describes the tortuous, irregular forms usually found in nature: clouds, rocks, rivers, mountain-scapes, tree canopies, and bushes. Many human-induced forms such as urban areas seem to have fractal contours as well. Whereas conventional geometry sees the world in 1, 2, 3, . . . n dimensions, fractal geometry fills the noninteger dimensions in between. A convoluted shoreline may have a dimension of 1.4, rough terrain one of 2.25 or 2.6—somewhere between the perfectly flat plain of dimension 2 and a 3-dimensional parallelepiped, cone, or sphere. Fractal geometry allows the reproduction of natural shapes on computers with unequaled realism. It also encourages geographers to think about scale in novel ways, as fractal shapes will keep revealing more and more detail as one looks closer and closer. Fractal geometry is a new tool for geographers, and applications to actual problems outside the area of graphic displays are only beginning to appear in the literature. What are the deeper implications of this tool for geographic research? The future will show whether fractals are a passing fad or a new departure (Batty and Longley 1986; Goodchild and Mark 1987).

PHYSICAL SPACE

Space station, space capsule, space travel, outer space, intergalactic space. Space is a term readily associated with the physical world, especially with the unthinkable vastness of what lies beyond. The scientific and technological conquests of the last few decades have made the unthinkable thinkable, and we have become comfortable with discussions of space probes that send signals from interplanetary space, and with images of humans in space suits floating in space.

A significant clue to how we understand space lies in the preposition *in*, which indicates containment. We conceptualize space as a container of objects: things are in space just as oranges are in a box or fish are in water. That intuitive view is formalized in the notion of *absolute space* in Newtonian mechanics: space is a neutral background against which the positions of objects can be pinpointed and their motions described. The classical scientific view of space is compatible with human experience of the everyday world, which is also the world of the geographer. But there are other kinds of physical space and other kinds of geographical space inspired by these alternative conceptualizations.

Hand in hand with the development of non-Euclidean geometries, modern physics introduced the notion of *relativistic space*. This is a space (actually, a space-time) whose structure both influences the distribution and motion of matter and is governed by it. Even stranger spaces are said to exist at the level of elementary particles, some of which have several tightly curled dimensions, others of which are structured more like Swiss cheese. In the physical world such unconventional notions of space become relevant only at either the astronomical or the infinitesimal scale; they do not apply at the scale of neighborhoods, regions, and oceans. Yet, the idea of a space with structure and properties that are intimately tied to process proved extremely attractive to geographers. Cartographic expressions of the relative-space idea soon appeared in the form of map transforms and cartograms. In these, distances between points on a map are made proportional to some measure that expresses the phenomenon under study, rather than to actual geographical distance. For example, cities can be placed on a map in such a way that the distances between them on paper are proportional to travel time or travel cost, which in many cases are more relevant measures of distance than actual mileage. In this way, a relative space can be mapped that represents more accurately than Euclidean space some of the key constraints governing interactions among places. In one of the earliest and best-known illustrations of this technique (fig. 10.3), Hägerstrand suggested that distances away from a place are experienced logarithmically rather than linearly, with longer movements costing (both materially and psychologically) proportionately less than shorter ones. It is indeed a common experience that a thirty-minute commute does not seem twice as long as a fifteen-minute commute.

More abstract expressions of the idea of relative space in geography are represented in the numerous mathematical models of socioeconomic processes developed since the 1960s. Indeed, the notion of a space constituted by spatial relations and processes proved particularly attractive to human geographers because the most relevant spatial notions from a social science perspective—spatial relations, spatial organization, spatial process, spatial dynamics, restructuring, and change—resist being conceptualized as objects in a container. Physical geographers by contrast have little practical reason to depart from the absolute conception of space that has served so well in the description of the physical world at geographical scales. Still, approaches developed in the physical sciences stressing spatiotemporal dynamics and used in physical as well as in human geography have given wide currency to the notion that space and process are interwoven in all branches of the discipline. The result of these conceptual and technical developments is a more abstract, flexible, sophisticated view of geographical space, one that is for the most part closer to relative than to absolute conceptions.

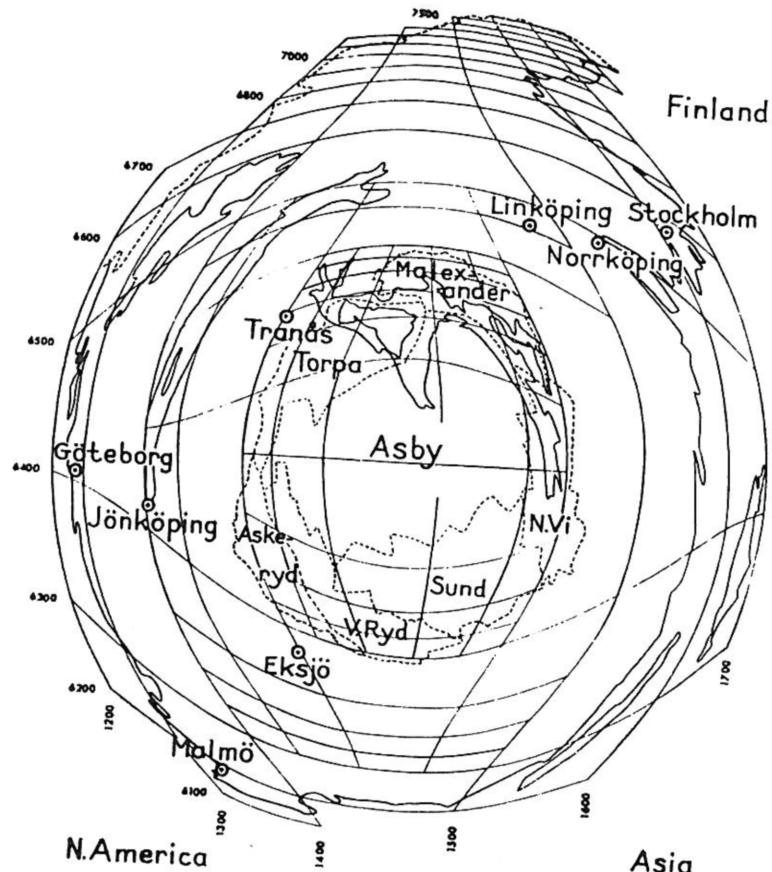


Fig. 10.3. A Celebrated Relative-Space Cartogram: Hägerstrand's Logarithmic Map of Distances from Asby, Sweden. SOURCE: Tobler 1963:65; by courtesy of Torsten Hägerstrand and the American Geographical Society.

SOCIOECONOMIC SPACE

Imagine a completely flat and featureless landscape with a town or two and a few copper and iron mines here and there. Workers live in the towns or perhaps in a few villages also in the area. The towns, the villages, and the mines are so compact that they are virtually points in the landscape. The transportation network is so homogeneous and dense that travel is equally easy in all directions, and you can always take a straight line between two points. An industrialist examines the area, trying to decide where to locate a steel factory. Being an economically rational person, the industrialist knows that the less money spent on transportation, the greater the profits will be. The best location will thus be the one where the combined transportation costs of raw materials from their sources to the factory and of the finished products from the factory to the markets are the lowest possible. If the workers have no means of transportation, the factory may have to be at one or the other of the towns where they live. In this case, cheaper labor in one village may offset a slightly lower total transportation cost at another.

That unlikely landscape could be anywhere, or rather, nowhere at all. It is an instance of an abstract *economic space*, defined by the spatial relations between consumers, producers, labor, and raw materials. It is a relative space, the properties of which (for example, the existence of points where total transport costs are minimized) arise through two features: the location of other critical points relative to each other, and certain economic conditions and principles assumed to hold in that space. The value of thinking about the world as an economic space is that such a view allows us to develop general theoretical statements about the effect of geographic factors such as distance on economic activity. What can be said of one economic space is true of all economic spaces of a similar kind at all times. Although the empirical world is always infinitely more complex, the basic interdependencies between spatial and economic factors highlighted in economic space are valuable guides for thinking about real issues in real places, and even for trying to predict or guide economic development in a region. Economic geography, developed around the investigation of the properties of economic space, is a thriving subfield in modern human geography (Lloyd and Dicken 1977).

The concept of economic space can be extended to other kinds of problems not explicitly concerned with economic factors but that also focus on the relative location of human activities. In such cases geographers speak more generally of *socioeconomic space*. As with economic space, the insights gleaned from an analysis of socioeconomic space are usually consistent with intuition. For example, all other things being equal, there will be more exchanges among places that are near each other than among places that are far apart, and more among large cities than among small villages, and the farther a commodity has to be transported, the higher its cost will be to the producer or the consumer. By developing analytical models of socioeconomic space it is possible to figure out not only the general thrust of these intuitively obvious relationships, but also their relative importance in quantitative terms (Haynes and Fotheringham 1984).

Spatial analysis is the general approach that uses mathematics and statistics to derive the quantitative properties of spaces of interest to geographers, and of socioeconomic space in particular. Spatial analysis is closely associated with the quantitative revolution in geography that took place in the sixties, though it is by no means restricted to geography. Regional science and urban economics have both developed spatial analytic methods in their investigations of regional or urban growth and restructuring, for example, how the industrial structure of a region may change as a result of local labor becoming more expensive, or of changing conditions in the supply of raw materials. Archaeologists have borrowed spatial analytic models and techniques to speculate on the locations of lost settlements of ancient cultures and connections among them.

Within spatial analysis, *location theory* looks at socioeconomic space from the special perspective of trying to determine optimal locations for specific services, facilities, or functions. In socioeconomic space, *optimal* means lowest-cost, least-time, least-effort, least-risk—generally speaking, least of something undesirable. Applications are numerous: find the location for a school that will keep the total time children spend on school buses as low as possible, or find the location for an ambulance station that will ensure that patients or accident victims in an urban neighborhood are reached and transported to a hospital as quickly as possible. The hypothetical steel factory case that opened this section on socioeconomic space, taken from a classical problem in industrial location theory (Weber 1929), is another example of seeking an optimal location within economic space.

Socioeconomic space, and in particular the kind that location theory examines, highlights a characteristic property of relative spaces that sets them apart from Newtonian absolute space: the various points in them are not undifferentiated and neutral; they are intrinsically better or worse for some purpose because of their position relative to some other meaningful points. The value that a place has in socioeconomic space by virtue of its relative position is captured in the notion of *situation*, in contrast to its value as a *site*, which consists of whatever relevant characteristics or attributes are to be found at that place—vegetation, slope, land use, buildings, and so forth. The site/situation distinction in socioeconomic space is a concrete geographical expression of the difference between absolute and relative space, and it highlights the significance of that difference for geography.

Socioeconomic space, the relative space defined by social and economic activities and relations, is also of interest to geographers who do not espouse the quantitative methodology of spatial analysis. A number of alternative approaches based on fundamentally different premises—realist epistemologies, Marxian theory, or the theory of structuration—have contributed insightful analyses of the interplay between social relations and spatial structure. For example, several recent studies have examined how the distribution of employment in urban regions, coupled with transportation conditions, places constraints on the lives of disadvantaged population groups such as working women or low-income minorities. Another series of studies has tried to determine how capitalist modes of production have led to a decentralization of the garment industry (which depends heavily on low-paid female labor) in Los Angeles. In historical context, others have documented how the replacement of open fields by enclosures in Northern and Western Europe led to a restructuring of social relations among the farming population (Pred 1986). From these perspectives, space is interesting only when viewed as a *social production*: something constituted, reproduced, and changed by social relations, and in turn constraining the unfolding of such relations. Abstract spatial properties, as defined through spatial analytic approaches to socioeconomic space, are, according to this view, of limited relevance to social processes.

This is the view taken by geographers inspired by critical social theory, and Marxist theory in particular. Others, arguing from the standpoint of the theory of structuration, object to what they see as an implied sociospatial determinism in such reasoning and have stressed the contributions of conscious human agents to the shaping of social (and therefore also spatial) relations. This latter emphasis parallels that highlighting the economic decision maker in traditional spatial analysis (Gregory and Urry 1985).

Because of profound philosophical and methodological differences, geographers on either side of spatial analysis often think that they have very little to share with each other. Yet at issue on both sides is a relative space, the properties of which are determined by social and economic relations and processes. It is thus appropriate to include both perspectives in a section on socioeconomic space. To highlight the still considerable distinctions between the two, let us call *social space* the conception of space underlying the work of geographers espousing the critical social theory viewpoint.

BEHAVIORAL SPACE

Everyone knows the feeling: rush to meet a loved one at the airport, and the trip seems to last forever; drive to a dreaded dentist's appointment, and you are there in no time. Drive away from a city center, and things appear fairly spaced out; drive back on the same road, and distances seem to contract. Distances as experienced by people are not the same as distances on the map. Perceptions of how near or how far things are from each other are affected by personal levels of knowledge of an area, by psychological effects of habit, anticipation, fear, stress, or boredom, and by a host of other subjective or even biological factors. These perceptions, in turn, affect human behavior in space. People may patronize a neighborhood store for years in the mistaken belief that it is closer to home than some other. They may fail to use a reasonably accessible public library because for some reason it feels too far away. They may avoid a perfectly efficient route to work that is perceived to be dangerous or stressful. The space people experience and in which they make daily decisions differs from the objectively definable, theoretical spaces that fall under the rubrics of mathematical, physical, and socioeconomic space.

The key insight contributed by the approach known as behavioral geography is that people respond to environments largely as they perceive and understand them (Moore and Golledge 1976). Mathematically optimal locations and routes are not necessarily the ones people will, or for that matter, should adopt. Behavioral geography recognizes two facts: first, individual behavior and decision making in space is based on knowledge that is incomplete and distorted; second, complexities of human psychology lead to behavior and decisions that may not be optimal in a theoretical sense, but that are considered best at the time by the individuals who make them.

According to behavioral geography, individuals function in a subjective world—a world in the head. Numerous empirical studies have explored behavioral space, documenting its properties with experiments involving subjects from different population subgroups: young and old, female and male, disabled and able, well-educated and illiterate. Major insights into the structure and properties of behavioral space gleaned from such studies are found in the extensive literature on *cognitive maps*. Cognitive maps attempt to represent graphically an individual's understanding of the spatial structure of the environment (Downs and Stea 1973; Gould and White 1974). In a series of studies that launched the specialty in the 1960s, Lynch (1960) explored people's perception of urban space by asking subjects to sketch from memory maps of the city in which they lived. Behind the wide variety of graphic abilities and styles, Lynch found that five kinds of spatial elements were almost always mentioned: landmarks, paths, districts, nodes, and barriers. In more recent years, studies of cognitive maps have become more sophisticated. Computer-aided approaches were developed that allow the cartographic representation of *cognitive configurations*, that is, presumed representations of the spatial structure of a city, neighborhood, or building in the minds of experimental subjects. These methods do not rely on subjects' map-sketching abilities but use instead more directly available and robust information, thus bypassing the problem of distinguishing the picture from the spatial knowledge contained in it. In addition, the geometrical properties of configurations obtained in this fashion can be thoroughly investigated with analytic tools. For example, samples of individual cognitive configurations were obtained from residents of Columbus, Ohio, along with an average configuration derived from the responses of all the subjects in the experiment (fig. 10.4). What would be a square grid on an ordinary map of Columbus appears to be stretched, twisted, folded or torn in various ways in the minds of the experimental subjects. Discussions of cognitive maps have addressed such issues as how these distortions arise and their relation to overt behavior (Downs 1981; Golledge and Stimson 1987).

There are other, more direct approaches to the study of behavioral space. One popular method is to observe the spatial choices of a group of people—say, where they go shopping, where they search for a house to buy, or where they migrate—and then try to find a relationship between that spatial behavior

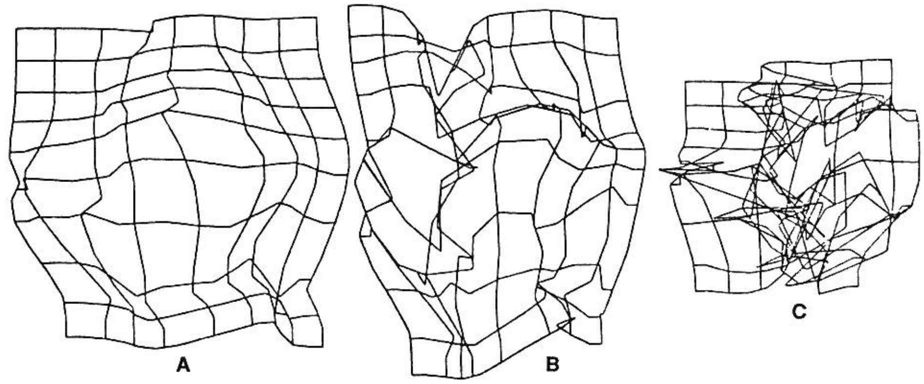


Fig. 10.4. Distortions in Cognitive Maps: How Two Residents of Columbus, Ohio (*b,c*) and the Average Subject in That Experiment (*a*) May Perceive the Spatial Structure of Their City as Referenced by a Square Grid. SOURCE: Golledge and Stimson 1987:80.

on the one hand, and socioeconomic and other personal characteristics on the other. Issues of behavioral space that may arise within such a framework are the ways in which income, education, race, and gender affect the extent of the urban space within which a person's daily activities unfold, or whether increased length of residence in a community produces less distorted perceptions of local distances (Golledge and Rushton 1976).

Another approach to the study of behavioral space is that of *time geography,* where individual movements are observed not only across space but also through time. In typical time geography experiments, participating subjects agree to keep daily records of when they go where, and how long they stay at each place. By the end of the day, each person has described her or his path in daily time-space: left home at 7:40, at work at 8:10, left for a dentist's appointment at 10:15, got there at 10:30, and so forth. Each day, the space-time paths of different individuals come together in shared activities, then separate, then regroup elsewhere in different combinations, and then separate again, giving rise to what one geographer has called the daily choreography of existence (fig. 10.5). The basic insight upon which time geography is built is that there is a direct trade-off between behavioral space and behavioral time, because time is needed to overcome space (distance). The more time spent by an individual moving from place to place, the less time left to spend at any one place engaging in productive or personally fulfilling activities; conversely, the more time one is obliged to spend at a particular place (say, home or work), the less that person's access will be to other places. This simple observation has profound implications for the relationship between the spatial distribution of daily activities on the one hand, and the constraints imposed on a person's life by societal demands of work and family care on the other (Pred 1981).

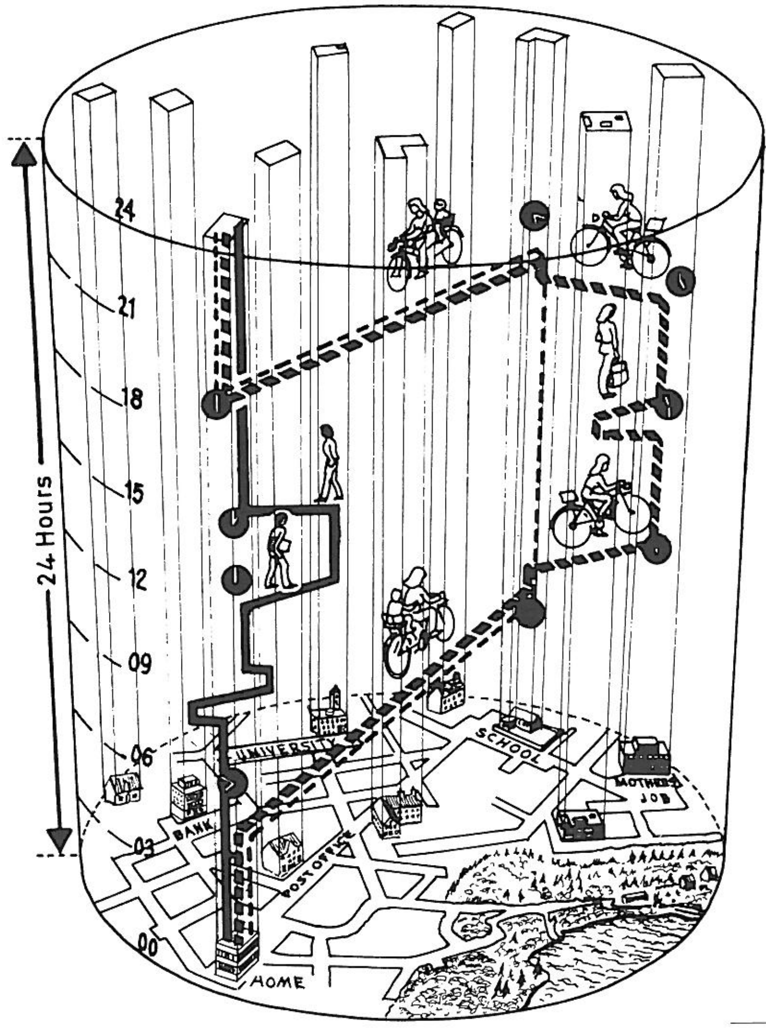


Fig. 10.5. The "Daily Choreography of Existence" of a Typical Family. SOURCE: Parkes and Thrift 1980:252.

EXPERIENTIAL SPACE

Whether one sees them as creations of the human intellect or as discoveries of things that really exist, mathematical, physical, socioeconomic, and behavioral space are all constructs belonging to natural or social science. They are the result of theoretical thinking and of the application of sophisticated mathematical and statistical techniques created for particular rational purposes—for the scientific understanding of the natural and the social world. Even behavioral space, in its deliberate attempt to be objective in measuring the subjective, belongs in the category of sophisticated-fragmented spaces of Sack's (1980) scheme (see fig. 10.1).

Experiential space, on the other hand, is the space human beings actually experience before it is passed through the filters of scientific analysis. It embraces all the intuitive, unanalyzed, unexamined, or unarticulated forms of spatial understanding, including the practical, commonsense understanding of space in everyday life, the imperfect but growing understanding of the infant and the small child, that of the disabled, that of the alien culture, the tribe that time forgot. Experiential spaces also include the contemplative kinds of spatial experience inherent in the apperception of sacred and mythical spaces, as well as the aesthetic experience of symmetry, proportion, balance, and so on that is central to the creation and appreciation of art. Sack (1980) called these latter conceptions of space *unsophisticated-fused* because they seem to collapse the objective and the subjective, space and substance. In reality, it is only from the scientific, analytic perspective that these conceptions may appear unsophisticated. They are far from simple if one recognizes the refinements of intuitive spatial knowledge required by even the most ordinary of everyday tasks, or the subtlety and complexity of meaning projected on the sacred geographies of even the most primitive of cultures.

Take everyday tasks, for example. The spatial skill involved in grasping a cup of coffee, bringing it to one's mouth, and drinking out of it without spilling is barely matched by the most sophisticated robotic devices of the day. Anything more complex than that—be it the tennis-playing skill of a mediocre athlete or the navigational prowess of an illiterate islander—exceeds human analytic understanding and the ability to construct mechanical or formal models of the task. Nor is it human spatial skills alone that fill us with wonder. It is only in the last few years that one of the world's most advanced engineering laboratories at the Massachusetts Institute of Technology was able to concoct a device that can balance itself on its six spindly legs and walk like an insect.

Bodily mastery of spatial skills is thus one form of knowledge of experiential space that all living beings share. It is a preconceptual, gut knowledge of space, a basic intuition developed over eons of evolutionary adaptation to a world shaped by the constraints of physics, biology, and in the case of humans, culture as well. Gravity gives humans the sense of vertical and horizontal, up and down; the asymmetrical build of their bodies, that of back and forth; inertia and friction, their sense of motion; their abilities to receive and process light and sound, their sense of spatial layout; and some argue that being born and raised in a world of rectangular buildings, objects, and street patterns gives people a Euclidean conceptualization of space. Kant was right after all: space is a synthetic a priori, an innate precondition of conceptual knowledge, even though its Euclidean appearance may be to some degree a cultural artifact.

That part of experiential space that we know with our bodies rather than with our minds is called *sensorimotor space*. An aspect of sensorimotor space important enough to merit separate consideration is *perceptual space*, the space deriving from sight, hearing, and the other senses. The workings of the sense organs are easier to grasp with analytical apparatus than are the more primitive and obscure bodily senses of balance or movement. Still, decades of studying human vision have not come close to answering the simple question of how we comprehend what we see. Perceptual space remains more mysterious than the most arcane multidimensional space of mathematical geometry.

While sensorimotor and perceptual space make up the practical space of *skills*, on the other side of the analytic divide we find the symbolic space of *meanings*. Unanalyzed but not unsophisticated, unarticulated but not unexplicated, mythical and sacred spaces transform geography into a projection of the cosmos. Spirit becomes place, God becomes Eden, the Dreamtime becomes territory in the song lines of the aborigines; Mt. Olympus and Mt. Fuji have always been holy; Earth herself is the Great Mother Gaia. Myths are spun around these transformations, projecting timeless realities of one kind (spiritual) onto timeless realities of another kind (geographic). In the reverse transformation, the homeland (geography) becomes sacred (spirit). One's hometown is like no other place in the world; the home is where the heart is.

We have come a long way from the space of mathematics and physics. By now, space—space enriched with human experience and meaning—has become *place*. This is indeed how Tuan (1977) and other humanistic geographers view the distinction: place is space infused with human meaning.

It is easy to imagine a primitive geography bereft of the notions of mathematical, physical, socioeconomic, or behavioral space. But geography would be unthinkable without experiential space—without the intuitive notions of up and down, near and far, contiguous and disjoint, here and there; without the sense of vision in particular, to which we owe the knowledge of distant horizons; and without the meanings associated with the sense of place that is present everywhere where humans are, but condensed and sublimated in mythical and sacred places. Thanks to humanistic geography, the part of geography that considers itself a scholarly pursuit rather than a science, these most elusive and subtle of spaces are not lost to the discipline. For many cognitive scientists and linguists these days, experiential space is considered fundamental enough to underlie all human thinking and language (Lakoff 1987). Perhaps other traditions in geography will find experiential space increasingly relevant to what they study.

CLOSING THE CIRCLE

We have come full circle. Our sequence of spaces began with a pure space of formal symbols; it ended with another space of symbols—of affective and spiritual realities, private experiences, and collective memories. The former kinds of space are perfectly objective and can be fully described and communicated by the most rational means known; the latter are intensely subjective and can be shown but not defined, talked about but not described, acted in but not rationalized, shared but not communicated. Mathematical spaces are pure form, devoid of human meaning; experiential spaces have no form but are replete with human meaning. The symmetry appears complete.

Geography as spatial science spans the entire range of spaces: no wonder tension is felt within the discipline, but also symmetry. Analytic geographers, Marxist geographers, humanistic geographers—human and physical geographers, for that matter—sometimes think that they have little in common. And yet they all seek understanding side by side, along the same spectrum of space conceptions. Even the variety of spatial terms they use, a variety that can be confusing even to trained geographers, has purpose in the context of appropriate conceptions of space.

How the different spatial terminologies may mesh with each other is suggested in table 10.1. The mapping is only tentative; experiential space in particular defies orderly dimensional classification. Place is like location is like point in one sense, but it is not an element of zero dimensions; in fact, the whole world is place. Experiential space defines itself with its own semantics. Viewing the variety of spaces as a linear sequence provides the insight of gradually increasing substantive content against gradually decreasing formal structure. As with other complex concepts, a different understanding emerges each time space is viewed from a different angle. As a parting thought experiment, consider mathematical, physical, socioeconomic, behavioral, and experiential space not as a linear sequence, but as a nested hierarchy (fig. 10.6). The notion of gradual progression is maintained, but now behavioral, socioeconomic, physical, and mathematical space appear as increasingly constrained domains contained within the experiential. Does this make more sense? Perhaps the answer will become clearer in some future time.

Table 10.1. Four Spaces and Their Terminology

Mathematical	***Socioeconomic***	***Behavioral***	***Experiential***
Point	*Location*	Landmark	*Place*
Line	Route	Path	Way
Area	*Region*	District	Territory
Plane	Plain	Environment	Domain
Configuration	Distribution	Spatial layout	World

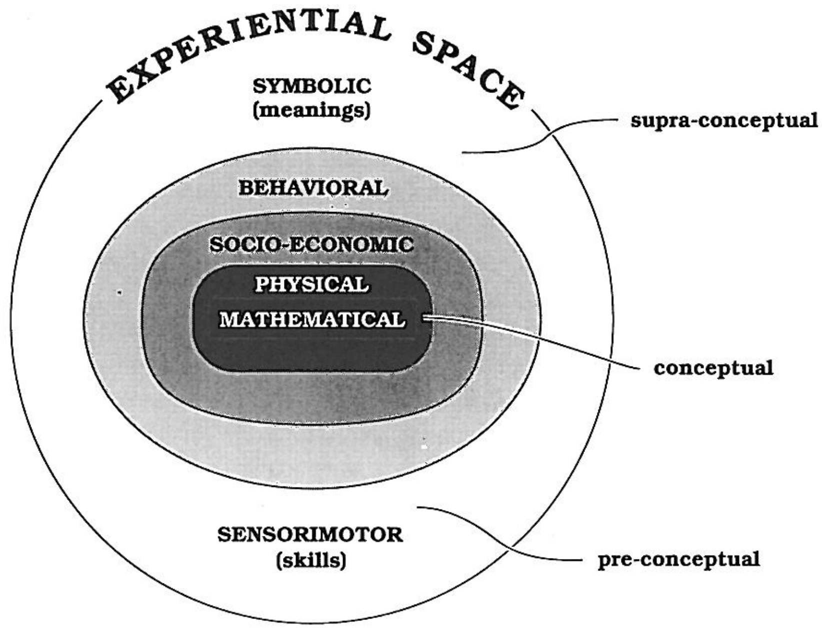


Fig. 10.6. Mathematical, Physical, Socioeconomic, Behavioral, and Experiential Space as a Nested Hierarchy.

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