LOST IN SPACE?
ON THE HISTORY, STATUS, AND FUTURE OF REGIONAL SCIENCE
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I. INTRODUCTION

Regional science is turning 40. Once the harbinger of a person's imminent death, becoming 40 now ushers in a period of apprehension and reflection–the mid-life crisis. It is a time to confront the dreams of youth, take stock of the present, ponder the path that led from there to here, and discern future possibilities. If all goes well, reflection and self-assessment lead to a renewed sense of purpose and to the self-understanding, resolve, and motivation that will shape the next 40 years.

Regional science has much to gain from a deliberate effort to assess its condition, directions, and options. I attempt to do so here, but, of course, one person and one paper cannot suffice for such a task. This paper will serve its goal if it sparks thought, discussion, and action leading to both a better understanding of regional science and a more vigorous and useful regional science.

I begin by drawing on writings from the 1950s to capture the dreams of youthful regional science. Then I offer an admittedly personal assessment of regional science at middle age. Regional science has had spectacular successes and major intellectual achievements but also noteworthy failures and lost opportunities. I attempt to link the dreams, the reality, and the future. I try to ascertain the place of regional science in academic space, intellectual space, and real world space. The future offers exciting opportunities, but it requires crucial decisions, personal commitments, and pioneering initiatives if regional science is to be lively and healthy for another 40 years.

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II. YOUTH

The Association

The Regional Science Association was born in Detroit on December 29, 1954. The minutes of what would turn out to be the first business meeting begin with Walter Isard stating, "The basic question to be considered is whether we should organize in order to hold annual meetings." William Miernyk replies that "a strong rationale for this group exists in the need for an inter-disciplinary organization for cross fertilization of ideas." He also "would like to see papers published and circulated." Isard at first demurs: "Several persons have voiced opposition to a proliferation of organizations. We should seriously consider this problem." In the end, he gives in, agreeing to "a skeleton type of organization" and pointing out that "it does not seem necessary, at this point, to have a budget." (Thirty years later, after the Regional Science Association had grown from the initial gathering of 60 people to well over 3,000 members, there still was no budget, but that is a different story.)

The purpose of the Association, according to volume one (1955) of the *Papers and Proceedings of the Regional Science Association*, is "to foster exchange of ideas and to promote studies focusing on the region and utilizing tools, methods, and theoretical frameworks specifically designed for regional analysis as well as concepts, procedures, and analytical techniques of the various social and other sciences." The Association would do so by "promoting acquaintance and discussion among its members and with scholars in related fields." It would be an "objective, scientific organization without political, social, financial, or nationalistic bias," and it would advance "the field of regional science."

This dream came true. The many meetings every year, such as this one of the Southern Regional Science Association, are its living embodiment. One aspect of the dream–without political bias–would limit the growth of the Regional Science Association in unanticipated ways. Note, too, that no mention was made of economic, social, or other problems of regions.

The Science

In his presidential address to the Southern Regional Science Association, William Miernyk (1976) quotes Charles Leven as stating that there is only one true regional scientist, Walter Isard. Isard's writings both describe the youthful dreams of regional science and shape much of what was to follow. This section focuses on Isard's dream, but, as will be discussed later, other youthful dreamers,

among them Joseph Fisher and Lloyd Rodwin, foresaw different futures for regional science.

A paper in volume two of the *Papers and Proceedings of the Regional Science Association* summarizes Isard's intellectual dream. Isard (1956b) advocates "abstract spatial theorizing." Through abstraction, "the essence of the region" will be captured. Abstraction is "essential and relevant" even though it "ignores geographic detail" and considers "space only in so far as it entails resistance to movement." Regional science will have a broad scope; it "involves the power of abstractions within pure social, political, and economic frameworks."

Abstraction, however, is not enough. Theorists become regional scientists when they test their theories. Isard points out that as soon as the pure spatial theorist

> attempted to validate his theories he would be compelled to engage in regional analysis. He would need to amass data. To do so for every point in a continuous space-economy would be an impossible task. He would be forced to compromise with ideal theoretical principles. He would be compelled to collect data for units of area. Since he would select his units of area in a way to provide the most effective test within available resources, he would be engaging by definition in regional analysis. For he would be attributing to his units of area certain aspects of homogeneity or cohesion, and thereby converting them into regions. Hence I conclude that even the most pure space theorist, if he is to be an effective theorist, must be a regional scientist.

The delineation of areal units or regions thus seems to be the necessary condition in this definition of regional science.

Walter Isard was not the first to use the term regional science. His definition is consistent with an older one. More than 20 years earlier, a report of the U.S. National Resources Committee (1935) identified "a selected group of regional scientists" and asked them, among other things, "Upon what basis would you delineate a region?" and "What, in your opinion, is the best type of region for use in regional planning and development?" The report explains that "modern students of regional science" are primarily geographers with only a few economists and sociologists and rarely historians and anthropologists. Political scientists are dismissed as being interested merely "in the question of what administrative use has been or can be made of some elementary form of the regional concept." Accordingly, the committee selected "10 eminent regional geographers and 2 outstanding regional sociologists." Among them, only the sociologist Roderick McKenzie exhibits a penchant for abstraction. He writes, for example, that "time

rather than distance seems to me the important factor in determining the radii of certain aspects of metropolitan influence."

The Discipline

Each discipline, according to Isard, has "a unique core area," which lacks something important that regional science can provide. Economics "rarely obtains depth of analysis in that area which touches upon the broad influence of space and physical environment upon man's behavior and land utilization patterns," whereas "pure spatial and regional theorizing, whether static or dynamic, has been generally excluded from the field of geography." In sociology, "the physical environment and the spatial element, as in economics, are peripheral," whereas "the core issues and problems of political science touch only incidentally upon the region as a live organism." Finally, anthropology does not "attack the interdependent economic, social, and political structures of a regional body with the depth, both in empirical and theoretical analysis, for which we strive."

The new "science distinct from existing sciences in terms of basic threads" appears to consist largely of applying the approach or mind set of economics to the problems of geography. This interpretation may be colored by hindsight, but it flows logically from Isard's blueprint and the fact that he was already a distinguished economist, trained at Harvard and on the economics faculty at Pennsylvania. In Isard's words:

> Given the dominant themes which characterize the several social sciences, what is the realm of regional science? In contrast with economics, anthropology, and political science, regional science, much like geography, finds a basic thread in positional and spatial analysis, with explicit recognition of the full variation in the surface configuration and resource endowment of the earth. In contrast with geography, anthropology, and political science, regional science, much like economics and to a lesser extent sociology, finds a basic thread in a methodology which: (1) embraces the construction of theoretical models of various degrees of abstraction, based upon intuitive hypotheses, or hypotheses suggested by the previous accumulation and processing of empirical materials; and (2) the testing of these models against statistically valid materials, the refinement and reformulation of the models in the light of the results, and, in non-ending succession the retesting and restructuring of the models.

Yet, Isard hoped for more than the application of economics to geographical questions. He points out that "the addition of elements of regional economics, regional sociology, and regional geography . . . shall fail to capture the essence of

the region" and "adhering to . . . the standard social science fields of investigation . . . may preclude the identification of the very basic interaction matrix of this live, dynamic organism, which we seek." Needed are new methods of inquiry:

> The region has its own "essence" which can be grasped in full only by tools, hypotheses, models, and data processing techniques specifically designed for regional analysis. Of course, these tools, hypotheses, models, and techniques in part can and should involve the reformulation and synthesis of existing concepts and materials in the several social sciences, though to a decreasing extent as progress is achieved.

The gravity model, described in an article by Stewart and Warntz (1958) in the first issue of the *Journal of Regional Science*, was quickly cited as the first example of "work which does not fall neatly into any one discipline and yet is not interdisciplinary" and "may clearly be termed regional science" (Alonso et al. 1958).

The Region

Walter Isard refers several times to the "essence" of a region and to the region as a "live organism." What kind of organism is the region in the dreams of regional science, and what role is to be played by the region and its essence? Isard's region appears to be primarily a tool of science. The region "disappears when we engage in pure spatial theorizing, only to reappear as a concept to be tolerated in order to validate our doctrines." Isard envisions hierarchies of both theories and regions, each becoming more general as the problem becomes more general, until "the specialized theories in each order of the hierarchy should be synthesized into one general over-all theory." The scientific problem determines the best hierarchical set of regions. For example, the region "as a live organism necessarily changes over time," but the "demarcation of meaningful regions for key years only" suffices when analysis is of the comparative static type.

In this view, the region is defined by the research problem. The region is not the object of the study; the theory is the object of study. Love of region is not part of this science dream. Isard recognizes the roles of the physical environment and "the accumulation of past influences upon cultures and institutions throughout the broad sweep of history," but, he argues, only a zealot may claim "the study of the full array of these direct and indirect implications . . . is the scope of regional analysis, or of regional science." Instead, regional science will differentiate itself by the role of abstract spatial theorizing and by limiting itself "to problems for which a spatial or regional focus is critical."

Deep concern over the amelioration of socioeconomic problems within regions also does not appear to fuel this dream. Many years later, Isard (1979), discussing the origins of regional science, wrote that "our primary concern was to find a way to attack regional problems more effectively," but that concern is not evident in his early writings. When discussing the spatial or regional problems to which regional science will restrict itself, Isard uses abstract terms and does not refer to real world social problems or substantive areas such as transportation, economic development, or resource management. He points out that "this restriction would revolve around the relative weighting of innumerable forces" that affect regions–a description that suggests a vector of problems, P1 through Pn, and a diagonal matrix of weights with many zeros on the diagonal (but progressively less zeros as regional science evolves).

Yet, the region is a live organism for Isard. Its role in his science lab suggests an analogy with laboratory rabbits. The scientist may slice away parts of the rabbit for experiments, with different parts for different experiments depending on whether the interest is the eye, the digestive track, or the spleen. The scientific problem determines the role of the rabbit. If the interest is only in some cells from the spleen, very little of the nature of the rabbit enters the analysis. The cells might be alive and be the unit of analysis, but the entire living organism and its nature are not the focus of inquiry. Similarly, only parts of the region enter regional science. Some day, theories might be sufficiently holistic or general for the whole rabbit to be of interest, but until that day, the rabbit is only bits and pieces. Isard explains:

> I like to view the region as an organic whole complexly interrelated with other regional entities and embodying internally an intricate network of interconnections. At the same time one must recognize that our regional theories and analytic frameworks fall far short of describing or even sketching this maze of relationships. There is one characteristic common to, and in a sense forced upon all forms of regional theories and analysis–the use of parts of the whole as conceptual or operating units and the lack of complete generality. Even those, who are inclined to treat the regional economy, or the regional culture, or the regional environment as the lowest common denominator for analysis and who refuse to disaggregate any further, consider only a part of the multifaceted regional complex.

Isard writes of "slicing" the region into large sectors, such as the economy or social organization, or small, fine sectors, such as the individual firm or the family. He argues that "the important point to recognize here is that each way of slicing, whatever the size of sectors, implies a theory or concept of structure, however

simple it may be" and that "each meaningful theory or conceptual framework relates to one or several sets of sectors." He points out how input-output models, industrial complex analysis, linear programming approaches, gravity models, and econometric models portray the "pertinent regional structure" in different ways, "being geared to the particular problem attacked and the theory employed." Similarly, different ways exist to present the structures of the society, the culture of the region, its political-administrative body, or its physical framework. Ultimately, according to the dream, "we may be better able to approach 'general purpose' regional structures–even dynamic ones–just as we may be able to identify 'general purpose' or the 'best' set of regions."

Early Achievements

Young regional science was precocious and quickly had numerous impressive achievements. Two landmark books, *Location and the Space Economy* (Isard 1956a) and *Methods of Regional Analysis* (Isard et al. 1960), helped define the field. The Regional Science Association grew and by 1958 had 1,100 members. It held its first European meetings in 1961 and its first Asian meeting in 1963. The *Journal of Regional Science* joined the *Papers of the Regional Science Association* in 1958.

The Department of Regional Science at the University of Pennsylvania awarded its first doctorate in regional science to William Alonso in 1959. The curriculum featured a strong emphasis on theory and methods. Prominent topics included location theory, input-output models, linear and nonlinear programming, industrial complex analysis, gravity and other spatial interaction models, and regional accounts. Rigorous training in economic theory, mathematics, and statistics was required. Notably absent was an emphasis on policy issues in regional development such as that found in the work of Jacques Boudeville (1966), Benjamin Chinitz (1961, 1966), John Cumberland (1971), John Friedmann (1955, 1966a, 1966b), Alvin Hansen and Harvey Perloff (1942), Niles Hansen (1970, 1971), Edgar Hoover (1948), and Howard Odum (1945). Also missing were the study of regions and regionalism and the intellectual history of the study of regions within geography and sociology. The curriculum was consistent with the dream. The first doctoral student, William Alonso, writing on the core and boundaries of regional science, pointed out that the region "is merely a definitional convenience, a conceptual construct" (Alonso et al. 1958).

Young regional science made significant intellectual contributions to economics, geography, and planning. With the publication of Alonso's dissertation, *Location and Land Use* (1964), regional science gave birth to the study of spatial structure in urban economics. Lest this claim seems exaggerated, note that

Mahlon Straszheim (1987), a leading urban economist writing in the *Handbook of Regional and Urban Economics*, calls Alonso's book "the forerunner of modern urban location theory." Although regional science did not create the quantitative revolution in geography, it provided crucial impetus, encouragement, ideas, forums, and publication outlets. To urban and regional planning, young regional science gave quantitative tools for economic and demographic analysis. Population projection, economic base analysis, input-output analysis, and market area analysis remain today standard parts of planning education and widely used tools in planning practice (Contant and Forkenbrock 1986). Later, agricultural economists adopted these methods to study rural areas.

In short, young regional science was a most impressive youth. Walter Isard, in part because of his own stature as an outstanding economist, was able to assemble excellent scholars for the Association's annual meetings, to recruit a talented group of students for his new doctoral program, and to receive key research support from Resources for the Future. The resulting scholarly achievements had significant effects on urban and regional economics, quantitative and theoretical geography, urban and regional planning, and agricultural economics. The strapping youth, however, was neither imbued with the collective wisdom of the study of regions nor ready in spirit to respond to the regional problems of cities and rural areas that would soon erupt into the national consciousness.

III. MIDDLE AGE

Regional science, like many middle-aged professionals, has accumulated property and wealth and has influence and good standing in its community. It, too, has missed important opportunities and has not realized all its dreams. As with most parents, perhaps the main way regional science went wrong is in the rearing of its children.

Wealth, Property, and Influence

Regional science is prosperous, wealthy, and influential. The RSA has spawned the Southern Regional Science Association, Midcontinent Regional Science Association, Western Regional Science Association, and Northeastern Regional Science Association within the United States. The Regional Science Association International now has three divisions: Europe, North America, and Pacific. New regional science associations form almost annually; recently, associations were created in China, Mexico, and Russia. Almost all the letters in the

alphabet are taken; international disputes may soon erupt over acronyms, such as between Canada and China for rights to CRSA.

Regional science has journals, book series, conferences, and activities galore. The *Annals of Regional Science* and *Indian Journal of Regional Science* commenced publication in 1968, *Review of Regional Studies* and *Regional Science Perspectives* in 1970, *Regional Science and Urban Economics* (as *Regional and Urban Economics*) and *European Papers in Regional Science* (as *London Papers in Regional Science*) in 1971, *International Regional Science Review* in 1975, *Canadian Journal of Regional Science* in 1978, *Australian Journal of Regional Studies* in 1987 (by the Australian and New Zealand association), and the *Review of Urban and Regional Development Studies* in 1989 (by the Applied Regional Science Conference in Japan). In 1990, the venerable *Papers of the Regional Science Association* became a quarterly journal, *Papers in Regional Science.* There are also many related journals, such as *Urban Studies* (1964), *Regional Studies* (1967), *Environment and Planning* (1969), *Geographical Analysis* (1969), *Growth and Change* (1970), and *Journal of Urban Economics* (1974). North-Holland, Springer Verlag, and Kluwer publish regional science book series. The North American and European meetings of the Regional Science Association International occur annually, the Pacific meeting every other year, and a world congress every five years. Countless other regional science meetings take place each year, plus summer institutes, special topic conferences, and additional events.

Several other indicators testify to the influence and acceptance of regional science. The National Science Foundation has a program for Geography and Regional Science, and the American Council of Learned Sciences through IREX had a U.S.-USSR regional science program focused on regional planning within its economics subdivision. The Social Science Citation Index shows that the *Journal of Regional Science, International Regional Science Review*, and *Regional Science and Urban Economics* have attained impact levels similar to that of the *Review of Economics and Statistics* and *International Economic Review.* Regional scientists chair numerous departments of economics, geography, and planning. Among the current chairs of major geography departments are such leading regional scientists as David Plane at Arizona, Peter Rogerson at Buffalo, Ed Malecki at Florida, Rodney Erickson at Pennsylvania State, and William Beyers at Washington (Association of American Geographers 1991). Others, among them David Boyce, Norman Glickman, and Kingsley Haynes, direct interdisciplinary research institutes. The methods of regional analysis that were part of the youthful dream are now firmly ensconced in numerous government agencies, most notably within the Bureau of Economic Analysis under the leadership of two active regional scientists, Hugh Knox and John Kort.

Identity

Just who are the regional scientists? The University of Pennsylvania still has the only regional science department within the United States, and perhaps a dozen institutions worldwide offer graduate degrees or programs in regional science. Consequently, as William Miernyk (1976) has pointed out, most regional scientists have a dual identity; their training and academic careers take place not in regional science units, but in departments of economics, geography, planning, and other fields. Rodney Jensen (1991) goes a step further: "Most regional scientists would claim a strong, if not primary, allegiance to a conventional disciplinary area." This dual identity makes it difficult to determine who the regional scientists are or what their second identities are and, therefore, in what communities they have standing. Various criteria might be used, ranging from a pedigree (holders of regional science degrees) to activity-based criteria (membership in regional science associations, participation in regional science meetings, or publication in regional science journals).

Regional scientists are identified here using a publication criterion. The sample consists of all authors and coauthors of articles published in eight regional science journals in 1988 and 1989. The journals are the *Annals of Regional Science, Canadian Journal of Regional Science, International Regional Science Review, Journal of Regional Science, Papers of the Regional Science Association, Regional Science and Urban Economics, Regional Science Perspectives,* and *Review of Regional Studies*. Economics is the most frequent disciplinary or organizational affiliation of these publishing regional scientists, accounting for 56 percent. Next comes geography at 12 percent, followed by urban studies and planning with 9 percent. Agricultural economics, business and management, engineering, and finance and real estate each have from 2 percent to 4 percent.

Geography's share may be underestimated by counting only journals with regional science in their title or their sponsoring organization's name. Geographers publish actively in several other journals with regional science content that are relatively neglected by economists, among them *Environment and Planning* (44 percent geographers, 10 percent economists), *Geographical Analysis* (56 percent geographers, 8 percent economists), and *Economic Geography* (91 percent geographers). Also, the *Annals of the Association of American Geographers* is far more likely to publish articles by regional scientists (e.g., Erickson and Hayward 1991; Ettlinger 1991; Hanson and Pratt 1991; O'hUallachain and Reid 1991; Ellis 1992; and Plane 1992) than is the *American Economic Review*. Therefore, the work of geographer regional scientists is more likely to appear in their home discipline journals and be underrepresented in regional science journals.

The disciplinary profiles of regional science journals vary sharply. Economics accounts for 70 percent of the *Journal of Regional Science* and 79 percent of *Regional Science and Urban Economics*, but less than 30 percent of the *Papers of the Regional Science Association*. Geography–approximately one-third of the *International Regional Science Review* and *Papers of the Regional Science Association*–holds only from 2 percent to 3 percent of the *Journal of Regional Science* and *Review of Regional Studies*. Urban studies and planning–9 percent overall–reaches 29 percent of the *Canadian Journal of Regional Science* and 20 percent of the *Papers of the Regional Science Association*. Agricultural economics–only 4 percent overall–reaches 18 percent of the *Review of Regional Studies* and 13 percent of *Regional Science Perspectives*. These findings suggest that regional science might be an amalgam of approaches and interests that are divided into schools and scattered among fields. The *Journal of Regional Science* still reflects the origins of regional science within economics, while the *Papers of the Regional Science Association* reflects the broader disciplinary composition of regional science meetings.

Community Standing

Having identified the major disciplinary communities within which regional scientists are found, this paper now assesses the standing of regional science and regional scientists within those communities.

Economics. The main journal of regional economics is the *Journal of Regional Science*, and most regional economists probably are regional scientists. Regional science has deeply influenced the content of regional economics, but regional economics is a fringe area within economics and economics departments. Many leading departments do not offer regional as a graduate field and do not have active regional economists or regional scientists (and their universities lack geography departments, too). The last survey article on regional economics published in the *American Economic Review* or the *Journal of Economic Literature* was Meyer (1963); the last to deal with a topic central to regional science arguably was Greenwood (1975). Regional economics topics rarely are awarded a place on the main program of the American Economic Association annual meeting or in the proceedings issue of the *American Economic Review*. When key articles dealing with regional economics do appear in the *American Economic Review* (e.g., Hulten and Schwab 1984) or *Journal of Political Economy* (e.g., Krugman 1991b), they tend to be written by scholars who do not identify with regional economics or regional science. (Michael Greenwood is a noteworthy exception.) Lest too glum a conclusion is reached, note that regional economics is not alone among the subfields of economics in all these ways and that respected

journals like the *Review of Economics and Statistics* and the *Southern Economics Journal* frequently publish papers by regional scientists.

Urban economics may be somewhat closer to the economics mainstream than regional economics, having been able to draw on a series of innovations in microeconomics, production function analysis, econometric estimation techniques, and other areas (see, e.g., Henderson 1977; Kau et al. 1986). Paul Krugman (1991a), a distinguished economics professor at M.I.T., offers an interesting explanation for the standing of regional economics and economic geography within economics:

> The neglect of spatial economics arises for the most part from one simple problem: how to think about market structure. Essentially, to say anything useful or interesting about the location of economic activity in space, it is necessary to get away from the constant-returns, perfect-competition approach that still dominates most economic analysis. As long as economists lacked the analytical tools to think rigorously about increasing returns and imperfect competition, the study of economic geography was condemned to lie outside the mainstream of the profession. Indeed, as standards of rigor in economics have risen over time, the study of location has been pushed further and further into the intellectual periphery. . . . [G]eographic concentration is clear evidence of the pervasive influence of some kind of increasing returns. And there is the problem. Increasing returns are simply harder to model than constant or diminishing returns. . . . Economics tends, understandably, to follow the line of least mathematical resistance. We like to explain the world in terms that we know how to model, not in terms of those we don't. . . . Unfortunately, the evident importance of increasing returns in economic geography is so great that this understandable impulse to focus on what we do know how to deal with has led to an avoidance of the subject as a whole.

He argues that the new tools that have transformed industrial organization and trade theory now can "resurrect economic geography as a major field within economics." Indeed, his own very visible work might well spark renewed interest in regional economics among economists.

Although unfashionable in leading economics departments, regional economics has flourished because of the demand for regional economic analysis and forecasts. No regional scientist or regional economist has ever been president of the American Economic Association, but regional economists are in demand within state and local governments, the Federal Reserve System, commercial

banks, major consulting firms, university bureaus of business research, and governmental agencies.

Geography. Regional science has become a mainstream group within geography and geography departments. Many prominent geographers, including several past presidents of the Association of American Geographers, are active regional scientists. Scholars closely associated with regional science have made important contributions to quantitative geography (e.g., Luc Anselin, Art Getis, Kingsley Haynes, Gerry Rushton), economic geography (e.g., Brian Berry, William Beyers, Rodney Erickson, Geoff Hewings, Ed Malecki, Barry Moriarty, John Rees), and population geography (e.g., Larry Brown, Richard Morrill, David Plane, Peter Rogerson). The University of Washington, Ohio State University, and the University of Illinois have particularly strong doctoral programs with regional science traditions.

Geographers are a contentious, diverse lot, and the various groups do not always appreciate each other. Geography has had a peculiar relationship to theory and generalization (see, e.g., Schaefer 1953; Entrikin and Brunn 1989; Entrikin 1991). A powerful movement formed in the 1950s and 1960s, adopting regional science and positivism as the new way (see, e.g., Berry 1980; Hart 1982). Regional science became so successful within geography that it became worthy of caricature and attack. The "cul de sac of regional science" (Holland 1976) is derided as an imaginary world of featureless plains inhabited by that grayest of Fordist unicorns, the economic man. Some see regional science as an outmoded, positivist relic and prefer structuralist, humanistic, realistic, postmodern, or other approaches. Outstanding regional scientists, or perhaps former regional scientists, have embraced other epistemologies. Gordon Clark, Michael Dear, David Harvey, Doreen Massey, Gunnar Olsson, Eric Sheppard, Alan Scott, and Alan Wilson, for instance, are influential leaders and supporters of newer directions within geography. Regional science, whether known as spatial science or scientific geography, is in a puzzling position. Swirling epistemological tides attempt to erode the positivism of its youthful dream, while towering waves of innovation in geographical information systems and spatial statistics sweep it toward new promised lands.

Two collections published in 1989 symbolize the tensions within geography, the important British role, and the complex context within which regional science finds itself. Each book in a different way claims to be the heir of the influential *Models in Geography* edited by Richard Chorley and Peter Haggett in 1967. Bill MacMillan's *Remodelling Geography* is an assessment of quantitative modeling from within the British Geographers Quantitative Methods Group. Its defensive tone leads Randall Jackson (1991) to point out that such a collection

> would be expected to leave the impression that modeling not only is alive and well, but increasingly is providing solutions to social and environmental issues at every geographical scale. Instead one perceives apology and defense to be the characteristic state of mind of modelers. . . . [N]o one dared ask the critics to intuit the effects on downstream water quality (or on the atmosphere) of a percentage increase in population or industry, or the distribution of jobs that would be lost or gained from the reduction of a trade barrier. No critic was asked where would be the most efficient location of a public service, or the safest location for a hazardous waste disposal. No one asked the critics to sense the distributional change in social welfare from a new tax, or change in interest rates, or a reduction in defense expenditures. These questions are well within the province of the modeler in geography.

The second new collection, *New Models in Geography: The Political Economy Approach*, edited by Richard Peet and Nigel Thrift, celebrates a very different British geographical tradition. The 1967 book "heralded the triumph of positivism as spatial science," whereas this one heralds "the ascendency of political economy to the intellectual core in geography" (Warf 1991). These new modelers, or social theorists, are at odds with both the regional scientists and the "old" regional geographers, who bore the onslaught of the regional scientists and scientific geography almost four decades ago (Hart 1982). In fact, the new modelers have some things in common with young regional science: both struggle to put space into theories adopted from others, and both struggle with the tension between abstraction and real regions. Yet, such communalities are rarely sought out, and regional science resides among several hostile camps within geography. To some, regional science is the old guard; to others, it is but one of the invaders. Barney Warf's plea at the conclusion of his review of *New Models* (1991) illustrates the situation:

> Given the large numbers of geographers still in the tenacious grip of empiricism, however, one important task is to force a debate with remaining advocates of empiricism and neoclassical economics rather than continuing to preach to the choir. Political economy may have become the new "core" of geography, but there are many practitioners who remain openly hostile to this approach. . . . Convincing these colleagues of the utility of historically informed, theoretically self-conscious, politically sensitive, critical, contextual work . . . is an important step on the road ahead.

In short, the regional scientist stands accused by both economist and geographer as being out-of-step and out-of-date. Once enthusiastically welcomed for bringing the tools of economics into geography, regional science is no longer in

fashion. Continuing the ardent, but uneasy and divisive, search for theoretical foundations, geographers enthusiastically seek out and embrace other approaches.

Planning. Planning educators embraced regional science early on. Robert Mitchell (1961), chair at the University of Pennsylvania, declared, "Regional Science, even in its early stages, can permit us to revolutionize planning method" and "A city planner looks at Regional Science, and what does he see? Better planning!" Louis Wetmore (1957), chair at the University of Illinois, noted that by synthesizing "the many separate contributions of the social sciences for the understanding of the region, the regional scientist promises significant contributions to the field of planning." John Friedmann argued that regional planning "derives its basic orientation from regional science" (Friedmann and Alonso 1964). Today, most leading planning departments have regional scientists, including Michael Teitz and once William Alonso and Andrei Rogers at Berkeley; Karen Polenske at M.I.T.; Britton Harris at Pennsylvania; Barclay Jones, Sid Saltzman, and once Walter Isard and Stan Czamanski at Cornell; Ed Bergman, Harvey Goldsmith, Michael Lugar, and once Stuart Chapin and Shirley Weiss at North Carolina; and Norman Glickman and Ann Markusen at Rutgers.

Regional science contributed people with more rigorous training to a field that needed and appreciated their skills. As noted, methods of regional analysis now are a core part of most practicing planners' education. Although respected, appreciated, and secure within planning, regional science is not the hot area it once was. Its approaches to location theory are seen as incomplete and focused on the wrong factors, whether from the perspective of a planner (Markusen 1986) or a geographer (Scott 1986). The pioneering methods of the 1960s now seem mechanical and incomplete. Forecasting skills are needed to complement modeling skills, and more work must be done to adapt methods to the planning process in which they are used (Isserman 1984). More generally, "the yawning chasm between the regional science professional and the local development practitioners of regionalism cannot be simply ignored" (Jensen 1991). Creating useful knowledge and methods, however, requires contact with regional problems and the planning process–proclivities that are not part of the youthful dream and not common among regional scientists today. Regional science is seen as aloof from planning practice and problems.

Agricultural economics. The theories and methods associated with regional science have been very well received within agricultural economics, primarily for the study of resource management and rural development issues. According to Kraybill (1990), more than 60 percent of the references in an important book on rural community economics (Shaffer 1989) are from "regional-science-oriented journals." Agricultural economists are particularly active in the Midcontinent, Southern, and Western Regional Science associations. Many agricultural

economists and extension agents routinely use methods of regional analysis to perform economic impact and market area studies each year. The most widely used regional input-output system within the United States, IMPLAN, was developed originally by Edward Lofting, an agricultural economist at Berkeley, and Greg Alward and Eric Siverts of the U.S. Forest Service. It is now managed by the Department of Agricultural and Applied Economics of the University of Minnesota.

Strong potential exists for a growing relationship between agricultural economics and regional science. The problems of resource development, rural economic development, and environmental protection have key spatial and regional dimensions. Joseph Fisher (1957) argued at the third Regional Science Association meeting that "the economics of natural resources . . . can be greatly enriched through the regional approach," and he specifically mentioned analysis of water, forest, agricultural, and mining investments. More recently, Mark Henry (1991) has pointed out how geographical information systems can link regional analysis and rural development issues.

Regional science and agricultural economics share a foundation in applied microeconomics, methods of regional analysis, and optimization techniques. Their shared intellectual heritage also includes lineage from von Thunen and a focus on measurement problems. They also share positivist ambitions; Harold Breimyer (1991) explains that "agricultural economists are diverse and can be disputatious, but they have one common bond. They see themselves as functioning in the realm of science and dedicated to the scientific principle." Regional scientists, particularly regional economists, might have no closer kin than agricultural economists, and the marriage of regional, resource, environmental, and rural development economics could be a very fruitful one.

Engineering and operations research. An engineering, operations research component has been part of regional science since researchers such as Isard and Stevens experimented with linear programming and systems analysis. Transportation, land use, and facility location modeling are parts of this tradition. The work by Alex Anas, David Boyce, Terry Friez, Britton Harris, Ira Lowry, Anna Nagurny, Charles Revelle, Gerard Rushton, and Alan Wilson, among others, has been noteworthy. Mathematical programming courses remain part of the regional science core curriculum at the University of Pennsylvania, but, as David Boyce (1988) points out, large-scale transportation and land use modeling "fell into disrepute among planning professionals and, to a substantial extent, among academic researchers."

Identifying a distinct regional science group with a distinct disciplinary identity–as can be done for regional economics, geography, or planning–seems difficult within this subject area. These regional scientists appear to be scattered with

only a tenuous community standing within engineering faculties. Also, regional science may not be a central place for this research. Transportation, operations research, and now locational analysis have their own journals and meetings. Boyce (1988) notes that the primary journals for advances in large-scale modeling are *Transportation Science* and *Transportation Research*. On the other hand, this systems approach to regional science appears to be doing very well in Europe, particularly in what might be termed the Swedish School of Regional Science Modeling.

Others. Regional science has had little interaction with demographers (Serow 1983) and rural sociologists. There have been significant crossovers, such as Larry Brown, David Plane, Andrei Rogers, and Peter Rogerson, but regional science has had little effect on sociology or demography and has not drawn on them. Perhaps this fact should not be surprising; regional sociology also remained outside the mainstream of sociology despite the pioneering work of Howard Odum and his school at North Carolina (Whitney 1957; Maass 1956; Hite 1985). Little interaction has occurred with political science, too, not even regular participation in the regional science meetings. Political science was an early Isard hope and interest (Isard 1957), which perhaps later found expression in peace science.

Summary. The ideas and practitioners of regional science are respected and well established in several disciplines, but the ambitious youth has become middle-aged intellectually. Economists and geographers argue that regional science is dated, but they offer contradictory arguments. Regional science lags behind economic theory in being slow to adopt advances in mathematical economics. Regional science lags behind geography for not recognizing that mathematical abstraction and positivism are discredited modes of inquiry. Thus, regional science is either too much like economics or not enough like economics, depending on the perspective. In terms of methods, both geographers and economists can enrich regional science, the first through geographical information systems and spatial analysis, the second through time series models and computable general equilibrium models. These methodological innovations are occurring without a pioneering, leadership role of any regional science program. Contrast the present situation with the decades in which the University of Pennsylvania zealously led the way in adapting and developing new methods, particularly input-output and gravity models (Harris 1985). Planners criticize regional scientists for being too theoretical and methods-oriented, as well as aloof or irrelevant to policy questions and unskilled in the new ways of planning such as negotiation and participation. In the three dimensions of theory, methods, and policy, regional science is probably closest to agricultural economics, a community in which only a small portion of regional scientists resides.

Failures

Middle-aged regional science has had failures. The University of Pennsylvania and Cornell University remain the only two universities within the United States to award a doctorate in regional science. Consequently, there is limited direct lineage among the offspring of regional science. Most regional scientists have intermarried into other disciplines, and their children and grandchildren are reared as geographers, planners, and economists, but not as regional scientists. The younger generations may know that their grandparents or great-grandparents are regional scientists, and they may even identify with regional science themselves, but they probably lack the training and knowledge that is fundamental to regional science. The analogy with interfaith marriages is apt; the children tend to be less familiar with the teachings of the church.

Regional science, thus, has become an extended clan, but does it have an intellectual core, a body of knowledge that is the intellectual inheritance of all regional scientists? Do all regional scientists know the work of Losch and Christaller or the methods of regional analysis, for instance? The answer probably is no. With no departments, no teaching programs, and virtually no texts, it is hard to maintain and replenish an intellectual core.

Yet, a field of inquiry must have an intellectual core. Is there a regional science? What are its purpose and focus? There may be no consensus on the answers to these questions, but a common response might be that regional science has at its core:

- THEORY dealing with industrial location, migration, spatial competition, regional growth and development, regional differentiation and hierarchies, and spatial interaction.
- METHODS for regional analysis, including economic and demographic models, spatial statistics, and optimization methods.
- POLICY areas with a spatial dimension, including economic development, environment, housing, labor markets, social service location, and transportation.

The need to speculate about the intellectual core of regional science reflects the failure to develop systematic teaching programs and a definitive literature that identifies and synthesizes the field. It suggests that regional science is either intellectually adrift, at a standstill, or a loose confederation.

Unless there is a core, the great-grandchildren of regional science are but an impressive coalition of scholars from numerous disciplines. They join in regional science associations, which provide them credibility, respectability, feedback, and the numbers necessary to convene and publish journals. This continuing interdisciplinary, international communication and community are outstanding achieve-

ments in their own right, but they are not substitutes for teaching programs. Regional science has failed to become a discipline, and without teaching programs it cannot become one. The definition of regional science from Longman's *Dictionary of Geography* seems accurate:

> An interdisciplinary field of study within the social sciences, linking economics, geography, and planning, concerned with economic and social phenomena in a regional setting, making use especially of mathematical models in the forming of theories.

Opportunities Lost

Regional science missed many opportunities to have greater relevance and influence and possibly to create graduate programs. These opportunities were lost because regional science did not focus on social or policy problems, was too far removed from regions, and largely ignored people.

While regional science spread to only a few universities in the United States, more than 50 policy analysis schools and programs were established (*Chronicle of Higher Education*, February 26, 1992, A20) and more than 60 new planning programs (Brooks 1988). Policy analysis, like regional science, uses economics, statistics, and optimization techniques and adopts and modifies methods from several social sciences. Policy analysis and planning, however, begin with the goal of policy relevance–a goal that regional science has not emphasized despite the potential usefulness of its concepts and methods. They focus on the applied masters level, while regional science stresses doctoral scholarship.

Regional science missed the surge of interest in economic development research and policy. Economic development applications of regional science concepts and methods could have occurred prominently within regional science, as Joseph Fisher (1957) foresaw 35 years ago. Instead, other groups, including geographers and planners, moved to the forefront. A lively new journal, *Economic Development Quarterly*, now occupies the central position that could have been assumed by one or more regional science journals. Geographers received five of eight competitive research grants from the Economic Development Administration in 1991 (*AAG Newsletter*, May 1992). Rural sociologists and agricultural economists have established strong networks focusing on rural development. They all draw on concepts from regional science, but regional science occupies no central stage itself, possibly because it focused too much on abstraction and modeling.

Regional science missed another growth area–environmental analysis–despite its spatial aspects and the early interest of John Cumberland (1966), Walter Isard et al. (1972), James Hite and Eugene Laurent (1972), and William

Miernyk and John Sears (1974), among others. Individual regional scientists do work in this area, but regional science has failed to make this subject its own and has failed to grow with it. Chapter titles in the *Handbook of Environmental Economics* demonstrate how regional science could have been a major contributor to environmental analysis. Among them are "environmental economics, industrial process models, and regional-residual management models," "spatial aspects of environmental economics," and "input-output models, national economic models, and the environment."

The loss of the region deprived regional science of another source of relevance and importance–the recent explosion in area studies and international applied research. Interregional trade relationships and the conditions of particular regions are of keen interest in a world that is seeing regions combine in Western Europe and North America and tear apart in Central Europe and the former Soviet Union. Despite the international regional science network, regional scientists do not know their regions, and they have contributed little to understanding current change and possibilities for regional development. That is a pity. Regional scientists could have played a more active role, if, like many geographers or even some economists, they were also experts on a region.

The dream of a "nonpolitical" scientific association also caused regional science to lose an opportunity. The Regional Studies Association, based in Great Britain, has many more members than regional science there and publishes *Regional Studies*, a lively journal that compares favorably with regional science journals in citation impact studies (Taylor and Johnes 1992). The organizers of the Regional Studies Association, planners and local government officials, had sought to affiliate with the Regional Science Association. They were informed that their political involvement contradicted the constitution of the Regional Science Association, so they had to form their own organization. Consequently, regional science was cut off from a large group of practitioners. It lost the vital interaction between researcher and practitioner that poses new research questions and problems and keeps a discipline young and relevant.

Women, minorities, ethnic groups, the Third World (Jensen 1991), and the poor also are missing from regional science. They define places, they create places, they experience spatial problems, they create spatial interaction patterns, and they belong in regional science. Despite the relevance of the spatial dimension, regional science again is not in the forefront of important areas of study. The almost complete absence of women on the editorial boards of regional science journals speaks volumes to another lost opportunity.

The Dreams Revisited

A science? No, regional science never became a science. Its main attempts are in two strands, symbolized by theoretical work like Isard's *Location and the Space Economy* and *General Theory* and Alonso's *Location and Land Use* and methodological work like Isard et al.'s *Methods of Regional Analysis*. These two strands, essentially mathematical abstraction and measurement, contain very little hypothesis testing–if we mean hypotheses about behavior or the effects of a policy intervention. Apparently, what Isard (1956b) had in mind when he dreamed of "the construction of theoretical models" and "the testing of these models against statistically valid materials" was to test whether, say, the gravity model fit the data well. Much of the science in regional science consists of testing methods of measurement, for instance, whether the location quotient measures exports, whether the input-output model describes sectoral changes accurately, or whether nonsurvey methods generate accurate regional purchase coefficients. Such methodological hypothesis testing abounds in regional science journals today and is generally inconclusive. It often results in conclusions akin to the famous statement: "When combined with intuition and hunch, input-output projections yield results at least as good as those based on intuition and hunch alone" (Isard et al. 1960, 294).

Thirty years ago, John Meyer (1963) argued that "regional economics has reached a stage where it could benefit from some redirection of effort away from the design of broad conceptual frameworks and accumulation of regional income accounts toward the formulation and testing of behavioral hypotheses." Douglas Brown (1979) issued a similar call, "But instead of continuously respecifying the theory, I strongly recommend that we set our sights on some empirical testing." Today, regression-based tests of hypotheses related to industrial location, migration, or regional growth are quite common, but whether this work is science is debatable.

Skeptics from several disciplines early on questioned whether regional science was or ought to be a science. The planner Lloyd Rodwin (1958) stated that he "would have hesitated to adopt such a pretentious posture if anything because the least scientific fields seem to be those with Science in the title, e.g., political science and domestic science." Rodwin "would have preferred to have the aura of science exude delicately . . . rather than rogate it to ourselves." The geographer Robert Platt (1956) objected to "limiting the methodology of regional science to constructing and testing theoretical models" and argued that "regional science should be defined more broadly to include approaches to its objective by all available methodological tools from any of the associated disciplines." The sociologist Daniel Price (1956) pointed out that "we must ask our scientific ques-

tions and state them explicitly before we can develop an adequate regional science to answer them. If we do not ask these questions explicitly, we are in the position of a man who is trying to equip himself for a hunting trip without knowing what he is hunting." The economist Joseph Fisher (1957) protested that he preferred "the term regional analysis to the more pretentious one, regional science."

Measurement, however, is an important part of science, and regional science did realize some scientific dreams. Fisher (1957) had the dream that came true: "Regional analysis is likely to continue to make its main contribution to applied economics in both business and government" and "it is in the field of methodology, or analytical tools, that I believe the most important progress is now being made by regional economists." Indeed, the methods of regional analysis have become an accepted, widely used set of tools, although their accuracy is often difficult to assess (Jensen 1980; Isserman 1980), and they seem more pragmatic than scientific.

The science dream was in its heyday after World War II when regional science was born: "The prestige of the scientist reached levels never before attained" (Czamanski 1976). Enthusiasm for science may have been the rallying cry that relevance is becoming today. The ideal of science managed to bring together under a single regional science banner people and resources that perhaps could not have been assembled to conduct regional studies or regional analysis, the terms generally used by those uneasy with the "s" word. James Hite (1985) argued that regional science, a "new discipline struggling to be born and recognized as a science might have exacerbated its problems in finding acceptance, particularly in the 1950s and 1960s, had it embraced such work [as the Southern regionalists'] that was clearly not in keeping with the requirements of logical positivism." The science dream brought zeal and dedication but also intellectual blinders and restrictions.

A discipline? No, Isard's prophecy of "wide recognition before 2000" is highly unlikely. When pressed by Lloyd Rodwin (1958, 1959) and others who questioned whether regional science would be a new discipline, Isard (1960) predicted that regional science programs would emerge from geography programs. Adding to the geography curriculum "courses in linear and nonlinear systems, space and regional and interregional theory, regional and interregional social accounting, advanced statistics, economic theory, and sociological theory, as well as advanced location theory and gravity and probability models" would be "beyond the absorptive capacity and ken of one person." Accordingly, it would be impossible "to train a student in both geography and regional science as they are now taught" within acceptable limits for a doctoral program. Therefore, departments would have to offer "two distinctly different programs." Eventually, they would split into two departments, in part because neither faction would ac-

cept a chair from the other. Progress in methods of analysis, such as the gravity model and systems analysis, also would lead regional science to emerge "as a distinct social science discipline with a unique core and combination of subject matter, intent, and approach." Isard proposed that "the social science segments [of geography] which are theoretical and involve model building, advanced statistical techniques, and comprehensive statistical frameworks oriented to general theory be viewed as one distinct field," namely regional science.

Instead, the forces played themselves out exactly as Lloyd Rodwin (1959) argued:

> The regional science issue reduces itself to the argument that the social sciences don't emphasize space as much as they should and geographers aren't sufficiently analytical, hence regional science. But suppose the social sciences do develop more systematic spatial studies and geography does become more analytical. Isn't regional science likely then to become a generic name for interdisciplinary regional studies . . . ?

The existing disciplines adopted the new tools that came from the interdisciplinary contact and the research effort centered at the University of Pennsylvania. Many analogies exist. After a small company successfully pioneers a new market, large companies quickly move into, expand, and eventually dominate the market. The small company only survives if it can maintain a stream of innovation or if it has developed a loyal brand name following.

Regional science has certainly developed a loyal following, but the claim that its innovations merited recognition as a new discipline were challenged early on. Morris Garnsey (1956) saw regional science as "a synthesis of parts of a number of the social sciences." Thomas Smith (1957) pointed out that "various geographers have applied methodology and theoretical constructs similar to those of regional science in their geographic investigations." Daniel Price (1956) argued that "regional science is not the shiny new method implied by the writers of these papers" and "important theoretical discussions of regional science [were] appearing in the writings of Vance and Odum 25 years ago." Lloyd Rodwin (1958) pointed out that the systems approach of regional science was "a methodological tendency or fashion in many sciences" and the gravity model had been "pioneered by outsiders" and applied in other fields. Regional science itself "developed no powerful ideas nor sharp cutting tools significantly influencing the social sciences" (Rodwin 1959). Later, William Miernyk (1982) charged both that "regional science has been regressing toward regional economics" and that even Isard had abandoned "the holistic approach which he and others propounded during the early days of the Regional Science Association."

In short, regional science is not a discipline. The closest embodiment of that dream might be "the geographer who may be characterized as quantitative, theoretical, or mathematical, and who therefore is often hard to distinguish from the regional scientist" (Isard et al. 1969). There simply was a limit regarding how far regional science could go on a foundation of 1950s economics, an interest in space, an enthusiasm for science, and a drive for synthesis and general theory. Instead, regional science turned out to be a productive, resourceful, international, interdisciplinary, distinguished band of borrowers, adapters, and synthesizers.

Regional? No, regional science still has not found its regions. In many cases, as the common criticism goes, the region is but a subscript. It lacks even a location. It is an unseen, maybe unsought, entity from which slices are extracted. Early regional scientists hoped for a closer link between region and science. At the second regional science association meeting, Morris Garnsey (1956) pointed out that "the work of the geographer has the advantage of starting from the region itself, so that the methods and techniques which are of particular value to regional analysis are likely to emerge." At the third meeting, Joseph Fisher (1957) noted several advantages of focusing on regions:

> Regional analysis provides a touchstone with what most people can fairly readily understand; the things it talks about lie within the direct experience of people. This means that many esoteric and seemingly remote research undertakings, if they have regional elements, can be made, not only understandable but appealing to people.

Edgar Hoover (1963) speculated that regional scientists were people with penchants for "appraising the merits of different regions as places to live, places to know, or places to work" and for using "knowledge about other regions in trying to improve conditions in his own area."

Today, little mention is made of the unrealized dream of an abstract hierarchy of theories and hierarchy of regions. Roger Bolton (1991, 1992) and Ann Markusen (1987) are strong voices for getting the region into regional science. Bolton (1991) chafes at the level of abstraction and points out that regional science seems

> too often to deal with such abstract models of places that one can't get much feel for a real place–a community–by using the tools of regional science. Places in regional science are–well, they're almost anything but a real place, a real community in a real natural and historical and cultural setting. . . . And if we do not understand places very well we don't understand spatial relationships–networks, flows, equilibrating forces–that connect places together.

His attitude would seem to qualify Bolton as one of the "zealots" against whom Isard (1956b) argued the case for abstraction! This tension is long-lasting. Preston James (1958), one of the 12 original distinguished regional scientists identified by the National Resources Committee in 1935, sounded very much like Bolton 35 years ago. He explained to the Regional Science Association that

> Geographers can perform their usual function of bringing people down to earth, by insisting that regions are real places where real people live and work in a particular kind of land and where transportation runs along real roads, not straight lines on a diagram or arrows in an algebraic formula. Do not misunderstand me. The application of the statistical method to this aspect of economic geography has tremendous possibilities and might well rescue economic geography itself from the frustration of empirical description. . . . But geographers have already been ploughing in this field for a long time, perhaps with inadequate instruments. The concepts they have formulated regarding regions and methods of regional analysis must not be disregarded or overlooked by the regional scientist.

Despite such encouragement, the study of region, other than regional economic studies, has failed to become a major component of regional science. Instead of chosing to make the subject of the science the subject of study, regional science turned away from the region.

Association? Here there has been astounding, spectacular success. The regional science associations, the meetings, and the journals are incredible cooperative efforts. Regional science is an interdisciplinary, multidisciplinary research success that can serve as a model for black studies, women's studies, and even whole universities today. Regional science has broken disciplinary and international boundaries, and several disciplines are the richer for it. Regional scientists often share more research interests with one another than with other scholars within their own discipline.

A real sense of progress emerges from comparing current journals with earlier ones, say of the *Journal of Regional Science.* A body of knowledge has come into existence. What was once the intellectual concern of a few people has become the subject of research and study for thousands of scholars and students (many more than the active members of the regional science associations). A look at the book review contents for any recent issue of the *Journal of Regional Science* reveals the great variety of approaches to regional research problems. Regional science permits the flow of knowledge across disciplines and ideologies and helps each discipline become less rigid and predictable–at least within its regional subfields.

The comments of Thomas Smith (1957) 36 years ago sum up the current situation well:

> Contemporary regional science appears to be not so much a separate discipline as a meeting ground for those whose intellectual bond is a common interest in regional and spatial problems. . . . For many of us this framework is as stimulating as it is comfortable. Here is the opportunity both for independent investigation as well as cooperative, inter-disciplinary research; and substantial progress along both lines has already developed from the formal meetings and the informal discussions of members of this Association.

Summary. Some of Isard's dreams were bad ones, and others may have been unrealistic; but he dreamed grandly and succeeded incredibly. Neither a science nor a discipline, regional science is a remarkable phenomenon in the sociology of science. It is an international, interdisciplinary association that has produced noteworthy contributions to several disciplines and offers continuing opportunities for the spread of ideas across disciplines and countries.

IV. LOST IN SPACE?

When I began this assessment, I was not pleased with the prospects of regional science. True, the association was spreading to more and more countries, but I feared that middle-aged regional science was stagnating intellectually and was in danger of premature death or, even worse, senility. Even Walter Isard (1979) had chided regional scientists for no longer being flexible and open to new ideas. I was concerned that regional science was adrift and lost–lost in academic space, lost in intellectual space, and lost in real world problem space. Some of those concerns still seem well-founded; others are misconceptions that disappear when one recognizes that regional science is an international, interdisciplinary community of scholars, not a science or a discipline.

Academic Space

Since there are only a few regional science degree programs worldwide, the argument that regional science is lost in academic space seems convincing. With only one regional science department, how can regional science be anything but lost in the competition among disciplines within universities in the United States? The situation is much as Lloyd Rodwin (1958) predicted: The existing disciplines will "take over the high yield techniques" of regional science and "in the long run

because of their better tools, ampler resources, and sharper focus, they will make a greater contribution in depth on the problems of spatial analysis." Regional science, suggests William Alonso, has become a victim of its own success; its ideas and contributions have been absorbed by the disciplines.

This absorption, however, means regional science is not lost in academic space. Regional scientists–referring now not to a discipline or a department, but to people with a shared subject interest–are very much present at universities. They are found in economics, geography, planning, agricultural economics, and several other departments and centers. They are campus leaders, as well as leaders of disciplines.

Directions. Being an interdisciplinary, scattered group, but not a department, has several implications for the well-being of regional science. Because regional science draws on approaches of different disciplines, faculty members must advise students interested in regional science to take courses in other departments. Faculty members from different departments must meet together for seminars, lunch, and other opportunities to exchange ideas and information. Where conditions permit, regional scientists should work together to cross-list courses and establish joint interdisciplinary programs, either formally or informally. The close match in outlook and orientation between regional science and agricultural economics has great promise, particularly as the latter moves its focus from farms and farm products to resource development and rural economic development. If regional science is to continue as a productive, creative fusion, faculty members must bring together the necessary elements on their campuses. Lacking a department, they must devise other organizational means. At issue is not academic turf; at stake are the spread of ideas, the open community, and the multidisciplinary training essential for the survival of a lively interdisciplinary regional science.

Interdisciplinary linkages and experiences, dual identities, and potential teaching contributions in areas of societal interest give regional scientists several advantages in universities today. For instance, applied economists, geographers, and planners, to name but three, have the opportunity to establish or join teaching initiatives that focus on regional economic development and environmental protection. Such initiatives are most likely to succeed in parts of the country with a regional identity or regional problems. This qualification once might have meant Appalachia, the South, or the Farm Belt, but today it means all places, for economic change and environmental awareness are ubiquitous. Regional scientists can build on their interdisciplinary heritage to create applied programs that focus on the "lost opportunity" areas noted previously.

The problem is not regional science's absence on a map of university departmental boundaries; it is that regional scientists must find each other and cross those academic boundaries together. The current budget cuts and university

reorganizations create opportunities for imaginative, resourceful programs–just as did the period of easy money and university growth that fostered the start of regional science. Given predictions that universities will reorganize along interdisciplinary lines, regional scientists are well positioned to show the way.

The importance for regional science of the flow of new scholars from the University of Pennsylvania and Cornell University must not be underestimated. With their multidisciplinary training and their zeal for regional science, they probably are the mortar that holds the whole complex, international structure together. Accordingly, the entire regional science community and the disciplines that draw on that community have a stake and an obligation toward the continued well-being of these two doctoral programs. There are already some warning signs, and it may be too late. Several assistant professors in regional science have not been awarded tenure at Pennsylvania, and retiring regional scientists at Cornell have not been replaced by new regional scientists. With the loss of either doctoral program and the fine, new scholars they create, the intellectual future of regional science would be at risk.

Intellectual Space

Regional science from its beginning brought together scholars with diverse goals and intellectual orientations. At the fourth regional science association meeting, Lyle Craine (1958) posited that those "engaged in regional studies appear to be motivated by one or a combination of three concepts regarding the role and scope of regional studies." *Pure regional scientists* seek to discover laws of wide applicability or "regional universals"; *regional analysts* study regional problems or aspects of a particular region; and *regional planners*, concerned with values and goals, use the findings of regional scientists and engage in regional analysis to determine the proper structure and spatial relations within a region. When discussing regional science as an intellectual endeavor, one must avoid the common error of characterizing regional science as having only one of these three motivations.

Regional science arguably is lost in intellectual space because it has neither created nor adopted new theories and methods. The whole enterprise is in danger of becoming intellectually stale if it remains centered on a research agenda framed by two books from the 1950s and based on a foundation of 1950s and 1960s economics. Even within location theory and methods of regional analysis, regional science is being eclipsed by broader approaches to location analysis and by new extensions of geographical information systems within geography. Both economics and geography have immersed themselves in theoretical work, and

regional science has fallen behind. New methods of regional analysis will eventually displace the widely used ones pioneered by regional science.

This gloomy assessment rests on faulty premises. It assumes that regional science is a fixed body of knowledge, a set of methods, a particular approach, or a specific school of thought and, as such, an entrant in a competition for intellectual space. It forgets that regional science is a borrower, winnower, adapter, and synthesizer–and has been from the beginning. It ignores that regional science is not a discipline, but a forum to spread ideas among disciplines. The important issue, consequently, is not whether regional science creates its own intellectual space, but whether regional scientists have access to new ideas and can adapt and diffuse those ideas within the regional science community. Being connected to the network along which ideas flow is essential, not whether the source of those ideas is an economics department in Cambridge, a regional science department in Pennsylvania, a geography department in Washington or Leeds, a research institute in West Virginia, an economics department in Amsterdam, or a national center in Santa Barbara. The important characteristic to cultivate is the flexibility and agility to recognize, adopt, adapt, and spread useful new ideas, whatever their source.

Regional science was once well connected to new ideas in economics and geography. Walter Isard's position in top economics departments symbolized the link to economics. A shared intellectual purpose bonded together the innovations flowing from Isard's regional science center with those of the "space cadets": geographers launched into positions at leading geography departments from William Garrison's program at the University of Washington (Berry 1980; Isard 1979).

Today, the situation is more complex. The diffusion of theoretical and methodological work is limited by its nature. Gerard Debreu, in his American Economics Association presidential address (1991), pointed out that, to follow the development of economic theory, "fifty years ago, basic undergraduate preparation in mathematics was almost always sufficient. Today graduate training in mathematics is necessary." He described "the increasing impenetrability to the overwhelming majority of our Association of the work done by its most mathematical members." This work is impenetrable to most regional scientists, too. In the meantime, geography's quest for theory has led it largely away from mathematics toward many other approaches. Although emphatically nonmathematical, this new theoretical work, whether transcendental realism, structuralist Marxism, voluntarist Marxism, cultural Marxism, humanism, phenomenology, critical theory, hermeneutics, poststructuralist, or postmodern, can be similarly impenetrable to the uninitiated. As John Pickles (1986) observed:

> The accelerated development of each of the human and social sciences in recent years has produced a proliferation of portraits and models of human behavior, such that the common center from which they allegedly proceed is no longer recognizable. Each field and subfield speaks with its own language from a particular philosophical and/or empirical foundation, producing a virtual breakdown of communication.

The regional science community as a whole, therefore, will find it difficult to keep up with the theorists in the social sciences. The disciplines and various schools of thought are moving rapidly and in several directions at once. Is this a problem? No, the disciplines, too, need time to evaluate and winnow. Four economic theory courses–the same number as 30 years ago–constitute the core curriculum at the leading economic departments. Logically then, some topics from 30 years ago must have been displaced; most frontier topics either never made it into the core or, if they did, remained there only briefly. The largely idiosyncratic content of these core courses, reflecting the tastes of the instructor (Blinder 1990), and topics' short lives within the core imply that the term "core" is being misapplied. Too often the new is being mistaken as the essential.

There is wisdom in being a bit behind in the procession, leaving it to others to rush ahead down each trail. More often than not, they will return exhausted, realizing that the trail, although difficult, led nowhere worth going. Regional scientists have ample time and opportunity to take proven trails–and to see things there that others, looking for different things, have missed. Ideas take time to diffuse. The new regional science methods of the 1960s are still being adopted and hailed as new approaches in certain places and disciplines. There is no dishonor in not being first; each scholarly enterprise and field of inquiry has its own frontier, and all disciplines thrive on borrowed ideas. Gerard Debreu (1991) notes, for example, the dependency of economic theory on mathematical discoveries; Trevor Barnes and Michael Curry (1992) note geography's debt to philosophy of science and literary studies. As Britton Harris (1968) pointed out 25 years ago, "The fact that regional science has resulted from the confluence of trends in many other disciplines is a source of strength rather than weakness."

Directions. There is need for concern over how the regional science community knows what is out there and what is worth borrowing and using. The interdisciplinary nature of regional science provides part of the answer. The meetings will continue to bring together people who will give each other new tools and perspectives, but gathering together will not suffice without a deliberate effort to promote exchange. The profusion of sessions limits the diffusion of ideas. When participants cluster into comfortable groups, intellectual tension diminishes. The Tiebout model works in intellectual space! As the numbers of organizations and

journals with regional interests proliferate, potential dissidents and critics–those with different views of the world–vote with their feet, leaving regional science intellectually poorer. Books are another part of the answer, but regional science needs more synthesizing and defining books written for its multidisciplinary audience. The Isard series of books at M.I.T. Press, including Friedmann and Alonso (1964, 1975) and Karaska and Bramhall (1969), defined the field through the 1960s. Harry Richardson's books (1969a, 1969b, 1978) cataloged and defined major parts throughout the 1970s. Today's North-Holland, Kluwer, and Springer series, including the important *Handbook of Regional and Urban Economics* (Nijkamp 1986; Mills 1987), have not served in the same manner; the books are either more advanced, more specialized, or uneven. There must be a deliberate effort to help regional scientists learn important new materials in disciplines other than their own. Association officers and publication editors should more actively foster the intellectual development of the field. Advanced short courses or pre-conference seminars for faculty members and graduate students can help bridge disciplinary gaps and spread ideas. Possible current topics include geographical information systems, computable general equilibrium models, and rural development strategies, to cite but three. Sessions on teaching and course content, such as those at the 1991 North American meetings, also help the field progress. An electronic bulletin board and a clearinghouse for reading lists might help, too. Extra efforts, organization, and zeal are needed to keep an interdiscipline lively.

An interdiscipline dependent on borrowing, adapting, and synthesizing, but lacking teaching programs, must make a special effort to reach out to new people and new ideas. James Hite (1985) notes that Howard Odum's regionalism "attracted the attention of leading scholars in the region working in history, sociology, economics, and (to a lesser degree) political science, and achieved a remarkable fusion of those disciplines in ways that still elude regional science." Lloyd Rodwin (1959) argued that "whatever regional science might be, the important thing was to attract first rate minds and to let the field grow pragmatically." Arthur Maass (1956) pointed out that it is key to attract, as Walter Isard did, the protegees of the leaders of the social science fields. The goal should remain "leading each of the social sciences to apply its most advanced and challenging methods of analysis to the region or community" (Maass 1956).

There is a strange stillness in regional science (and in economics). Both seem to have an unreflective nature, an almost total lack of concern over whether their basic premises are sound. Intellectual history is littered with wrong-headed work, the life's work of generations of earnest scholars now discredited and ignored. Yet, with the exception of presidential addresses, regional scientists pay very little attention to such fundamental questions as what it is that they are really

doing and whether they are doing what they claim to be doing or ought to be doing. Daniel Vining (1977) on "the empirical foundations that must underlie any science" and Frank Giarratani (1980) on "our ability to attribute explanatory power to theoretical structures" are refreshing, rare examples. If "particularly in young disciplines, methodological debate is a sign of health" (Schaefer 1953), then regional science is very ill.

The situation in geography is markedly different (but may reveal a different kind of disorder). Geographers debate basic premises and approaches. They discuss fundamental issues of what it means to study regions and spatial relationships in particular ways. Parts of their literature deal directly with the mindset and practices of regional science. An interesting sampler for the regional scientist includes Sayer (1982, 1992) on method and science, Hart (1982) and Pudup (1988) on region, and Entrikin and Brunn (1989), Gould (1991), Schaefer (1953), Entrikin (1991), Duncan and Ley (1982), Couclelis and Golledge (1983), and Curry (1991) on geographical thought. The possible disorder is that geography appears fickle, faddish, and belligerent. The quantitative geographers of the 1960s, the Marxist geographers of the 1970s, and the postmodern theorists of the 1980s are often the same people. One reaction is to admire the intellectual flexibility and dedication of geography as it "put itself through nearly a century of social thought in less than three decades" (Smith 1989). Another is to shake one's head upon learning that the neighbor now has a fifth spouse and has joined yet another cult. Discovery always seems to be paired with attack and revolution, "one more skirmish in the war of intellectual fashions" (Dear 1986). Quantitative geography was an attack on traditional regional geography, radical geography was an attack on capitalism and neoclassical economics, and postmodern geography is an attack on the rationality of modernism, including "those quantitative works written twenty years ago" (Curry 1991). The adoption of each approach was accompanied by sweeping claims for its ability to unite disciplines.

Regional science must find a middle ground. It needs active questioning of its basic tenets and awareness of the implications of its theories and methods, but it can spare itself the disruptive revolutions, messianic zeal, and frequent turnabouts that have characterized the changes in geographic thought. Britton Harris (1968) pointed out that it is easier to discuss "a body of knowledge and theory, rather than a body of ignorance and questions about theory." Regional science must confront its ignorance, question its theories, and put an end to the unreflective stillness.

By reputation, regional science occupies a distinct place in intellectual space. In the words of Lloyd Rodwin (1981):

> Most regional scientists place their faith in the refinement of analytical techniques as the way, or as the most important way, in which significant

> progress will occur. The essence of the regional science view is that area studies, like any other scientific field of study, must be tackled with mathematical and other rigorous quantitative methods.

Luc Anselin (1991a) reaches a similar conclusion: "The use of formal mathematical concepts and expressions, and the application of statistics, optimization, and other quantitative methods constitutes the most common characteristic of research in regional science as it has become known over the past thirty years."

In fact, regional scientists are far more eclectic than the field's reputation. Robert Kavesh (1959) speculated that the regional scientist is "rapidly becoming the general practitioner of the social sciences, borrowing a bit from economics, splicing on a principle of sociology or political science, and applying them to a classical problem of geography or planning." Today, Roger Bolton (1991) calls for the adoption of ideas and approaches from

> the softer social sciences like anthropology and sociology, and the parts of geography that have not interacted much with regional science, such as cultural geography and historical geography. Scholars in those fields are experienced in getting the feel of a real place and describing it. Their participant observation method has something to offer to regional science. Their willingness to use nonquantitative data, requiring different and no less sophisticated interpretation skills, has something to offer us.

Similarly, Mary Beth Pudup (1988) calls for reconstructing regional geography by including "traditional regional studies along with spatial science," as well as anthropology, history, and sociology.

Prominent pioneers of regional science also stress intellectual flexibility and openness. Walter Isard (1979) "cannot urge you too strongly to maintain your youth and flexibility" and "to sift through both wild and accepted ideas." Britton Harris (1992) makes the point very clearly:

> Keep a mind open to new experiences, new methods, new objectives. Try to understand disparate fields, to look for their underlying natures, and to relate one to the other. Try to find new combinations, new analogies, new metaphors which add understanding while eliminating irrelevant detail. Above all, do not let your adherence to known ideas or your use of your best methods stop you from thinking and finding new ideas and new methods.

Real World Space

Economics, or at least economics education, may be lost in real world space. As part of an American Economics Association commission study, Alan Blinder (1990) reported

> Both students and faculty find economics obsessed with technique over substance, or too theoretical, or too mathematical, or insufficiently connected with the real world, or too removed from policy and institutional context.

Is regional science likewise lost in real world space? It has that reputation, in part because of its early dreams: "The posture of regional science by its very title is scientific, and it aims for theoretical understanding and rigor" (Harris 1968). Walter Isard himself never resolved satisfactorily the tension between scholarship and policy. In Isard (1975), he claimed relevance ("we are a melting pot of numerous social scientists, natural scientists, pure scientists, and professionals who want to be hard at work on critical social problems"), but he imposed conditions and added a quixotic, detached element:

> A regional scientist is not an activist planner who sees the critical nature of today's problems and judges that he cannot wait any longer than three months to study the problem and start to attack it. The typical regional scientist wants to surround himself with research assistants and a computer for a long time in order to collect all the relevant information about the problem, analyze it carefully, try out some hypotheses, and finally reach some conclusions and perhaps recommendations. His findings are then passed on to key decision-makers. But, as with the economist and social scientist, this last stage may never be reached–because good hypotheses may not have been found which stand up under testing, and because the critical social problems may have changed while the study was being conducted.

Unimpressed, Rodney Jensen (1991) has charged that "regional science simply has not demonstrated that it understands real policy and implementation issues, and often goes through the motions of policy relevance."

Jensen's accusation holds for much, perhaps most, social science. The research system has no effective test of whether research is societally useful. Scholarly research serves many purposes other than learning, including pork barrel politics, pro forma administrative requirements, bureaucratic inertia, university revenue enhancement, and political appearances. The present system does not encourage focused scholarly research on major social problems. It encourages scholars to seek problems that fit their theories or methods. Even well-intended

funding agencies concerned with social problems allow scholars to redefine the research issue and skirt the real problems. Regional scientists, like others, squander the independence, time, and resources that they could spend studying important questions. Instead, they do whatever pays summer salaries, brings funds into the university, and fits into the academic publishing modes of the period. A self-serving, false dichotomy is allowed to persist–scholarly, profound, rigorous, theoretical, and imaginative on the one hand, and societal, applied, routine, undemanding, and boring on the other.

Directions. Regional science will not be lost if it focuses on applied regional science. The Southern Regional Science Association long has had an applied orientation. James Hite (1985) notes:

> Southern regional science stands apart, looking with some bemused skepticism at much that appears in the mainstream regional science literature and, so far, successfully resisting the temptation to concentrate on reductionist theoretical models. . . . Southern regional science has tended to seek justification for its work not solely within the community of scholars . . . but also in the use of the work by pragmatic policy-makers.

He ties this predilection to an earlier heritage:

> Conscious of the backwardness of the region, Southern regionalists felt an almost patriotically compelling need to devote their scholarship to finding remedies for the South's problems. . . . Any focus on theory was subordinated to the pragmatic need to find solutions for real and pressing social problems. That dynamic explains both the tendency toward a methodology rooted in pragmatism and empiricism, and a body of work that, while of extraordinarily high quality, lacked direct relevance to abstract questions related to regions and the space economy, precisely the sort of questions Isard desired that regional science should study.

Applied regional science? Is it something new or heretical, another Southern aberration? No, Isard subtitled the very applied *Methods of Regional Analysis* an *Introduction to Regional Science.* Many early supporters of regional science dreamed of relevance and an applied regional science, as do many current regional scientists. Joseph Fisher (1957) emphasized the potential contribution of methods of regional analysis for the study of resource development issues, urban problems, economic development of lagging regions, and regional planning issues. Lloyd Rodwin (1958) advocated not a science, but "the less glamorous role of regional analysis involving an interdisciplinary focus." Preston James (1958) saw not a discipline, but "a very promising application of statistical methods to problems that lie on the border between geography and economics." Later, Wil-

liam Miernyk (1976) argued that the growth of regional science depends "on the extent to which future consumers of education and research believe that regional science is a realistic discipline, one whose methods can be used to analyze issues of contemporary political, social, and economic concern." Brian Berry (1980) warned that "a scholarly agenda developed in isolation can quickly become scholastic, misdirected, or just plain wrong." Richard Muth (1985) argued that "we use economic phenomena as an excuse to play with mathematical tools" and "it is the real world that should receive our primary attention." Hugh Knox (1987) pointed out that "regional scientists have a comparative advantage–the ability and interest to apply to real world problems the rigorous and sophisticated methods that can address problems of structural change." Luc Anselin (1991b) concluded that "the field ought to be able to contribute more meaningfully to the solution of today's societal problems." Regional scientists in Japan have gone further; they organized the Applied Regional Science Conference in 1987 under the leadership of Noboru Sakashita and Koichi Mera to promote policy-oriented research "leading to improvements in policy decisions and operational practices."

Questions posed 25 years ago by Anthony Pascal (1967) in the first issue of *Annals of Regional Science* still merit attention:

1. What are the key characteristics of growing and non-growing local and regional economies? Why do some areas grow rapidly, others slowly, and still others decline?
2. How can resources be made available to produce changes in the characteristics that impede growth in an economy, and how can resources be used to make maximum contributions to development?
3. What tools, policies, and actions can best meet economic development objectives?
4. How can knowledge gained about development processes and tools and techniques be exchanged with people working on developmental problems at the state and local levels? How can scholarly expertise best be utilized to provide insights on local and regional development issues?

The questions are old but no less important. The last group in particular is a demanding test for any social science aspiring to relevance. Passing the test means that "the subject of the science is the subject of its practice" (Vining 1988). Closer contact with practitioners will make it more difficult to "force problems to conform to the mold of . . . known and well-understood methods" (Harris 1968). Closer contact will make it more difficult to "pretend, particularly to policy-makers, that we have the answer merely because we have some significant regression coefficients" (Mayer 1980) or other output. Most important, closer contact will make it more difficult to delude ourselves.

Applied regional science should be problem-driven, not method-driven or theory-driven. It must be more than the storehouse of analytical methods that have been regional science's main contribution to date. Preston James (1958) argued that "if there is one basic difference between geographers and regional scientists, . . . it is that geographers start with direct observation, whereas regional scientists work indoors with symbols for things they have never seen." Today regional scientists still work indoors with data for things they have never seen. In fact, they often work indoors making up data for things that they have never seen. Regional scientists need to go outdoors more. A modest, but very important, initial step is research that gets beyond the formal aspects of the analytical methods to gain a better understanding of their power and limitations within the contexts, purposes, and processes in which they are used (Isserman 1984). Such research should focus "not just on the models and methods per se, but also on their interpretation, use, and abuse in practice" (Anselin 1991a). Doing such research requires being outdoors, in contact with practice and practitioners. Only with such research can regional scientists understand what they are really doing and what they ought to be doing.

Regional scientists should do more to put the region into regional science and to seize opportunities to get closer to problems and problem solvers. Closer contact with practice will reveal what questions are being asked, the limitations of current theories and methods in answering them, and new methods and approaches that must be invented. Drawing on his own experience, James Stepp (1975) argues that "contact with regional agencies, groups, and public officials makes it possible to understand their problems sufficiently to interpret them in terms of relevant research and relevant policy issues" and that knowledge of a region's resources, people, and institutions will "provide a common sense basis for evaluating the operational validity and usefulness of analytical models" and enhance the analyst's "capacity for recognition and specification of problem areas needing to be studied." Roger Bolton (1991) urges:

> One must go to public meetings. One must do case studies, and also traditional kinds of historical research (looking at archives, interviewing people), and one must assess the significance of evidence in ways other than comparing a t-ratio to the number 1.96.

Brian Berry (1980) also stresses advantages for scholarship from closer contact with practitioners:

> The ideas now implicit at the frontiers of serious and committed practice have the potentiality for reinforcing or transforming our views of reality, changing our conceptions of what is achievable, providing us with better

working tools, an improved rationale for our actions, and a deepened commitment to our enterprise . . .

An applied, problem-oriented regional science cannot be created by presidential proclamation. Such proclamations have been issued repeatedly within the Regional Science Association at least from Benjamin Chinitz (1971) through Rodney Jensen (1991)–and, thus, they have been largely ignored for at least two decades. The *International Regional Science Review* had to abandon an early goal of being a policy-oriented journal because there was not enough good policy research being done by regional scientists. Research follows the path of least resistance, and doing good problem-oriented applied research will require reorientation. In the words of an anonymous respondent reported in Chinitz (1971), "The difficulty is that the problems are messy, and that therefore their treatment tends to be messy, and this conflicts with the scientific cast of the Association which necessarily stresses clarity and elegance."

Courage is needed to initiate research into important, "messy" problems. Such research requires persistence and resolve. It also requires the ability to resist the temptation to digress into vaguely related academic writing, to retreat into other academic pursuits, or to give up because the problem is too difficult. Perhaps some day, maybe in an applied department like agricultural economics or planning, some social scientists will have the courage and resolve to tackle major issues of regional development with perseverence. Maybe that is asking too much, but for several decades social scientists have been supported well, in part because they presumably were studying important societal problems. When the day of reckoning comes from a more sophisticated, demanding society, perhaps regional science will have more to show than its assortment of multipliers.

V. CONCLUSION

Tensions

Regional science is an extraordinary phenomenon, difficult to characterize and assess. In some respects, regional science is neither regional nor scientific. It is an active interdiscipline with almost no departments, centers, or institutes. It generates and spreads ideas through a myriad of conferences and journals and has amassed a widely accepted set of theoretical concepts and methods of regional analysis. However, it shows no eagerness for intellectual debate over its foundations, directions, and priorities. It has long attracted a variety of adherents, including many whose main goal is to find theories and methods to deal with regional

problems. However, the gaps between regional science and regional practice remain broad. Indeed, there are many tensions within regional science.

Region versus science. Regional science is arguably an oxymoron or a misnomer. In pursuit of science, regional science has largely ignored regions. Can there be regions in a regional science? Can love of regions coincide with love of science? Torn between region and science and between region and theory, geographers have coped with this question for decades (see Entrikin and Brunn 1989; Entrikin 1991; Schaefer 1953; Hart 1982; Pudup 1988). The tension is difficult to resolve: A science of regions may be as unlikely as a science of history.

Regional science versus regional studies. Regional science had its origin in abstraction and quantitative modeling. Yet, many regional scientists show an openness to qualitative methods and other approaches for studying regions. At some point, have they ceased to be regional scientists? At what point does or has regional science become an imprecise phrase for regional studies? How eclectic should regional science become? Should it have intellectual boundaries based on the science dream? Should it be restricted to its original mindset and approach? Should it encourage its unscientific, eclectic zealots to seek out other venues? If it becomes everything, will it be nothing–or will it be stronger?

Abstraction versus empiricism. The connection between theoretical work and empirical work, or between theory and data, remains weak in economics, geography, and regional science. There is a tension between beginning with the data, letting the facts speak, and beginning with the theory but perhaps "trying to force the facts into a mold of preconceived theory" (Hart 1982) or having the empirical work "lose its tether" to the theoretical work (Pudup 1988). Work with theory is generally considered better than work without theory, and deduced theory is considered better than induced theory, but the effects of these biases and the role of theory in research are still poorly understood. Does theory-envy misdirect research and cause it to lose its tether to the real world?

Scholarly versus relevant. A web of tensions surrounds the issue of who determines research agendas. Scholarly and irrelevant are often seen as synonyms, and relevant and original as antonyms. By noble tradition, the scholar and intellectual are given the role of gadfly, conscience, and monitor of society. Freedom to identify research issues is expected to lead to greater creativity, resourcefulness, and innovation; hence, scholars are allowed to determine the research agenda of the National Science Foundation. Yet, implicit in all this freedom and support is the belief that scholarly research and independence have societal benefits and that the publicly funded research is somehow relevant and important. At what point does scholarly inquiry become irrelevant and the scholarship undeserving of further public support? What leads scholars to study

the minor mind problems of their fields instead of the major problems of their societies?

National versus local. Research funding and media attention tend to focus on national policy issues. An academic status hierarchy also favors national over state over local. The scholar concerned with local issues is on the bottom of the status pole, unless the local issues are in a far away country. The scholar who advises the city council, economic development agency, county extension agent, or local group does public service, whereas the scholar who advises a federal bureaucrat does research, particularly when the latter pays via a research contract. Consequently, regional science seems divorced from local practitioners (Jensen 1991), which causes regional science to be divorced intellectually from regional issues and problems. How can the locally important become academically acceptable? How can these opportunities to learn be incorporated into regional science?

Exhortations

The future of regional science–its next 40 years–seems evident. The present scholarly infrastructure, momentum, and incentive system probably will suffice to keep the meetings and journals going, even in the absence of new ideas or directions. At stake is the quality and vigor of the enterprise. Other movements like regional science, say regional sociology or institutional economics, generally have taken a long time to trickle down within the academic hierarchy and gently fade from view. This process may have already begun for regional science. Twenty-five years ago, the papers presented at the Regional Science Association meeting were written at Harvard (3), Pennsylvania (2), Berkeley, Chicago, M.I.T., Michigan, Northwestern, Ohio State, Pittsburgh, Rand, and Toronto. Regional science was being taught and debated at universities that attract outstanding students.

The nature of regional science imposes obligations and requires commitments if regional science is to maintain its intellectual liveliness. A flow of new ideas and young scholars and a sense of direction and purpose are essential if regional science is to remain more than a convenient gathering place and publication outlet. Regional science will be stronger and more interesting if regional scientists try to fulfill the following tasks:

1. Seek out cross-departmental linkages on campus and design programs of study focusing on societal problems and policy issues. Break disciplinary boundaries. Identify new combinations and linkages. Be relevant. Recruit students. Capture the lost opportunities.
2. Make a renewed effort to identify and strengthen the field intellectually. Assess its progress and prospects. Identify the known and un-

known, the core and the tangential, the promising and the banal. Use the meetings to stimulate and focus inquiry. Emphasize what is not known and what needs to be done. Write important books.

3. Strive to do research defined by real problems of real regions. Avoid estrangement from reality. Do not let theories and methods define and restrict research activities. Get closer to problems and problem solvers. Put the region into regional science. Stress relevance, not elegance.

Self-Assessment

This paper is one person's assessment of the roots, predilections, status, and prospects of regional science. As such, it has many flaws and errors. It is U.S.-centric, but the status and orientation of regional science differ from country to country. It has the bias of an analyst-planner, but regional science has many modes. It sketches broadly, but regional science is expansive and fuzzy, so exceptions may exist for all its generalizations. Its view of regional science history and status might be myopic and distorted and suffers from omissions. In short, this paper can only be a beginning–which is the hope with which it was written.

Self-assessment and action are needed because regional science should aspire to be more than an eclectic, hospitable, open, and perhaps fading, interdisciplinary forum. Let's begin with our children:

- What are we teaching in our academic space without departments? Is there a core, or ought there to be one? How well are we teaching?
- What books need to be written? Are ideas spreading as they should within the regional science community and beyond, or do we need other structures and mechanisms to help?
- Do we have to invent or reinvent additional ways to teach and spread ideas since we are not rich in departments, degree programs, and texts? Do we need training programs and summer institutes for promising students?
- Do we have mechanisms that generate a systematic flow of important survey articles and the exchange of reading lists and other pedagogic materials? How well do we create, define, and diffuse knowledge?
- Do we have sufficient habitats into which our students can settle so that they can teach others?
- Do we have external groups that serve as sponsors, clients, and proponents of our research and employers of our students? Are there additional potential ties? Are we nurturing these relationships?

- Do we have to design ways to communicate with each other, our campuses, and our regions? Can we invent model regional science programs and activities that are widely applicable? Are we comparing experiences internationally?
- Do enough people care about regional science to assure its vitality? Do the current incentive structure and the lack of departments limit regional science to an increasingly fragmented forum for presenting and publishing papers?

It strikes me that Walter Isard concerned himself with all these questions and somehow made certain that the answers were resoundingly positive. Maybe he was wrongheaded or shortsighted in his fervor for science and general theory instead of focusing on regions and regional problems. Yet, despite clear signs of strong skepticism on this very point at early regional science meetings, Isard persisted. He had a remarkable ability to bring together people, money, and research questions. He indeed is the father of regional science.

Now that regional science is at middle age, it cannot continue to depend on father. We must ourselves assess, prod, volunteer, reflect, debate, write, and market. One illustration suffices. For many years, Walter Isard was the program committee for the annual North American regional science meeting. The papers and discussants he selected constituted the program, and their contributions were published in the *Papers of the Regional Science Association.* Now the program is open. Some of us fought for that right, and it is good, but something important has been lost. Walter Isard not only invited papers, he invited people and assigned topics. He was a system for deliberately nurturing the progress of the field. We should learn from Walter Isard once more. We must assess our field, pick our topics, and replenish our intellectual stock. We also must understand our history, our roots, our progress, and our potential. We must be alert to new, promising developments in other fields, and we must engage today's social problems. We must strive to support and create the teaching programs that provide our lifeblood. If regional science is to live long and well, we must make a deliberate effort to focus on what is truly important, regain a sense of purpose, chart some new directions, and, most importantly, pay a lot more attention to our children.

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