

# **G. William Skinner's Spatial Analysis of Complex Societies: Its Importance for Anthropology**

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This paper is limited to a discussion of G. William Skinner's spatial analysis of modernizing agrarian societies, China in particular, which began in the mid-1960s and continued throughout the remainder of his long career. The first of his publications in his new area of research was the groundbreaking series of three articles on "Marketing and Social Structure in Rural China" that appeared in the *Journal of Asian Studies* (1964, 1965a, 1965b). Therein he presented diagrammatic models for the spatial organization of the three levels of periodic marketing communities that he had identified as the basic economic, social, and cultural building blocks of traditional rural Chinese society.

A decade or so later he introduced the next phase in his spatial research on China, which he termed "Regional Systems Analysis" in his contributions to *The City in Late Imperial China* (1977). In that volume, he introduced his conceptualization and delimitation of agrarian China's physiographic macroregions, which typically occupied large river drainage systems but were structured economically, politically, and socially by seven-level hierarchies of city systems that sat on top of the three levels of rural market towns. In the late 1980s, and continuing into the new century, Skinner embraced GIS technology which allowed him to greatly expand the scope and complexity of his analysis of what he termed "Hierarchical Regional Space" based on 1990 and 2000 PRC census materials.

The paper concludes with a discussion of the scientific nature of Skinner's work on spatial analysis and its contributions to anthropology.

Keywords: periodic markets, Central Place Theory, Regional Systems Analysis, physiographic macroregions, Hierarchical Regional Space

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In this paper, I have chosen to concentrate exclusively on Bill Skinner's pioneering work on the spatial analysis of complex agrarian and modernizing Eurasian societies, including 19th Century France, Meiji Japan, and, primarily, the Qing Dynasty, Republican Period, and contemporary People's Republic of China. I have done so because this basic theme dominated his research and publications beginning in the mid-1960s, and continued to do so as his thinking and modelling evolved down to his last decade. I have also done so because I regard this work to be his major intellectual and scholarly contribution to the social sciences in general and to anthropology in particular.

Skinner was my supervisor during my first year as a graduate student at Cornell in 1964 before he moved on to Stanford. Despite that brief initial relationship, my own research career has been heavily influenced by Bill Skinner's work, beginning with my Ph.D research in the late 1960s on the influence of the evolving system of market towns on the spatial patterns of marriages on the southwestern Changhua Plain, Taiwan. I collaborated with him in one way or another on certain limited aspects of his work from the late 1980s onwards, in particular by providing much of the Geographical Information Systems spatial data he used in his Hierarchical Regional Space (HRS) modelling of PR China census materials.

One may ask why he was so interested in, or as some might even put it, 'obsessed with' the spatial aspects of Chinese society. I don't recall now whether it was he himself who told me this, or if I got the story from someone else who knew him well, but it seems that he spent hours and hours as a boy in the early 1930s drawing intricate maps of imaginary landscapes, replete with castles, towns, and villages, along with the roads that connected them. I think there are certain people who might – uncharitably – suggest that he continued to draw imaginary maps of China over the last fifty years of his academic career. However, as I will attempt to show, below, such critics betray their own ignorance of the necessity to employ deductive spatial theories and their derivative specific models if any systematic sense is to be made of the geographic diversity of China, and if any useful understanding of its economic, social, and demographic variation in space and time is to be obtained.

Another story that Skinner definitely related in public at Cornell before he moved to Stanford had to do with what first alerted him to the significance of the rural marketing hierarchy in China. He was doing anthropological fieldwork in rural Sichuan in 1949 as the Red Army was advancing through the province, and their progress was understandably of huge local concern. However, what caught his attention was that news of their progress came not from the direction of the front, but from the opposite direction, from a town larger than the one he was working in. On reflection, this was only explicable if the news were spreading from city to city, and then down to larger surrounding

towns, and then to smaller towns around the larger ones, such as the town where he was. After fifteen years, once his Ph.D. research on the Chinese in Thailand had appeared in print, he had developed his thinking and done the empirical research that culminated in his groundbreaking and abidingly important series of three articles, published as "Marketing and Social Structure in Rural China" (1964, 1965).

The most salient feature of those papers was his use of abstract spatial models for delineating the hierarchies of rural market towns (so-called "Central Places") and their surrounding villages. In the first of the articles, he presented static models of rural marketing systems generated by Walter Christaller's (1966) "market principle" (Skinner's Model B), which operated in more or less uniform and level landscapes and produced a dense array of central places. Christaller's alternative "traffic principle" (Skinner's Model A), in which the limited possibility for inter-town routes was constrained by rougher topography, produced a different, more constrained spatial hierarchy.<sup>1</sup> In his empirical research using local gazetteers, Skinner had calculated that, on average, there were eighteen villages per market town, so each was modelled as having an exclusive primary (or "standard") marketing area consisting of an inner ring of six villages and an outer ring of twelve. This was a major departure from Christaller's models, which did not distinguish between towns with markets and villages without them, since Christaller had assumed that every settlement provided at least one lowest-level "central good."

In the second article, Skinner introduced an even more novel and important departure from classic "central place theory" by modelling the intensification of Chinese marketing systems. That intensification empirically resulted from population growth and especially economic development, as new lowest-level market towns emerged in

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1 I have demonstrated, using my historical data for the evolving system of central places on the Changhua Plain, Taiwan, that Christaller's "traffic principle" model in which each lower-level center is midway between two higher-level centers along the road between them (a  $K=4$  pattern:  $6/2 + 1 = 4$ ), is actually a special case of his "market principal" model, in which each lower-level center is equidistant from three higher-level centers (the  $K=3$  pattern:  $6/3 + 1 = 3$ ). At least in Changhua Hsien, the schematic locations of the market towns at different levels follow the  $K=3$  pattern, but only incompletely producing a 2:1 ratio between the numbers in the adjacent levels, lower ones being located on the road transport routes that go directly between higher-level places that obtained rural marketing functions earlier. However, in the schematic models, the representation of the roads are not direct straight lines between the locations of the higher-level places since they detour through lower-level places located according to the  $K=3$  spatial hierarchy. However, topologically there is no difference because not all  $K=3$  towns or roads exist, empirically. Therefore, again topologically, the  $K=4$  traffic principle central place models are properly regarded as constrained, or special, instances of the  $K=3$  systems produced by rural marketing behavior in certain kinds of topography or in places with different kinds of development histories.

certain strategically located erstwhile villages and the older pre-existing towns grew and moved up a level in the local hierarchy of central places.<sup>2</sup> The third article in the series discussed the effects of modernizing (i.e., mechanizing) transport on rural marketing systems, which involved the loss of market functions at the lowest level of “standard” market towns as it became easier for rural people to travel to higher-level markets where more goods were available at better prices.

In late 1968 and early 1969, two small conferences devoted to the Chinese city resulted in three large volumes published by Stanford University Press: *The City in Communist China* (1971); *The Chinese City between Two Worlds* (1974); and *The City in Late Imperial China* (1977). It was well worth the wait for the final volume, since it contains the defining chapters written by Skinner that introduce the three parts of the book (“Urban Development in Imperial China,” “Urban and Rural in Chinese Society,” and “Urban Social Structure in Ch’ing China”) plus two additional lengthy chapters titled “Regional Urbanization in Nineteenth-Century China” and “Cities and the Hierarchy of Local Systems.” Altogether, he contributed roughly a third of that rather large book, in which he set out the results of the second phase of his research and thinking on the spatial structure of traditional China, and by extension other complex agrarian societies.

Moving on from his seminal work on rural market towns, he used empirical evidence to define and delimit the eight (nine in some versions) physiographic macroregions of agrarian China in the late Qing (Northeast China, or Manchuria, was not included for that time period). He argued that these were generated, within physiographically delimited areas, on the basis of distinct economic systems and trade linkages among the hierarchy of central and local metropolises and regional, greater, and local cities that existed on top of his basic three levels of market towns. However, unlike the latter which had overlapping and interlocking market areas, the higher-level cities and metropolises had discrete hinterlands.

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2 Parenthetically, I can relate that the last chapter in my Ph.D thesis (Crissman1973) was devoted to demonstrating that Skinner’s models of intensifying rural marketing systems were not geometrical-ly coherent, and proposed alternative models that solved that problem and also incorporated larger marketing areas with more member villages as one moved up the market hierarchy to the level of central towns (as described by the “gravity” theory of market hinterland boundaries). I presented those “improved” models in a paper at the conference Carol Smith, one of Skinner’s students, organized on “Formal Methods in the Analysis of Regional Systems” (sponsored by the Mathematical Social Sciences Board, Santa Fe, 18-20 October 1973), that resulted in her two edited volumes on *Regional Analysis* (1976a,b). After my paper session, Bill came up and told me, “Of course you are right, Larry. I know as I figured it all out myself a couple of years ago.”

These hierarchies of higher-level economic central places and their hinterlands interdigitated with the separate official bureaucratic/governmental hierarchy of district or county (hsien/xian) seats and the higher-level prefectural and provincial capitals with their respective administrative areas. His overall term for this analytic framework was Regional Systems Analysis (RSA), and it represented a huge step forward in the conceptualization of China's spatial structure and organization in terms of nine physiographic macroregions (including Manchuria, or Northeast China). He also successfully applied RSA to Meiji Japan and modernizing France, which had one macroregion each, but like China, also had subsidiary regions and subregions. The most concise summary of his RSA and best demonstration of its analytic power is provided in his "Presidential Address: The Structure of Chinese History" (1985) delivered to the Association for Asian Studies. However, his chapters in *The City in Late Imperial China* (1977) remain essential reading if one wants to fully appreciate Skinner's conceptualization of China's macroregions and the wealth of empirical scholarship that underlay his hierarchical spatial models.

A major feature of what became Skinner's Hierarchical Regional Space (HRS) framework, in contrast with his earlier work on rural periodic marketing systems and then Regional Systems Analysis, is that it was based on Geographical Information Systems (GIS) technology, which he was among the first in the China field to employ back in the late 1980s. When I first became aware of GIS technology in 1989, the software was just in the first stages of migrating down from mainframe and "micro" UNIX-based computers to the relatively recently introduced "personal computers." When I realized how potentially powerful the technology would be for managing and analyzing spatially distributed data, which for China could be dug out of certain library collections and PRC statistical publications in great volume, I contacted a number of scholars in the China field to ascertain who might be interested in establishing GIS spatial databases as a basis for collaborative research. I was not particularly surprised when Bill wrote back, saying that he had already begun to use county-level GIS data that had been produced by a postgraduate geography student at Louisiana State University. Unbeknownst to me at the time, he had already published a paper using this material: "Sichuan's Population in the Nineteenth Century: Lessons from Disaggregated Data" (1987).

By the time I received my first Australian Research Council funding for the Spatial Information Infrastructure for Asian Studies in Australia (SIIASA) in 1992, he had also sought funding (unsuccessfully) from the Joint Committee on Chinese Studies to establish a GIS-based disaggregated database (at the *xian/shi* level) for the PRC. (He used the term "disaggregated" to refer to the ability of GIS software to analyze data pertaining to large numbers of localities without aggregating the figures, as is usually done by social

scientists. Even today there are some who still use China's provinces as their units of analysis, which seems ludicrous to anyone who understands the nature of Skinner's Regional Systems Analysis for China. Perhaps if he had used somewhat less arcane terminology, he would have been successful in that first grant application.

Skinner at this time had left Stanford for UC Davis, and he told me that he had renounced his career-long focus on China (and the Chinese overseas) and was instead going to concentrate his regional analysis on Japan and France, and presumably other modernizing agrarian societies. Be that as it may, after I succeeded in obtaining Australian Research Council funding for my China GIS Project, he resumed his efforts to obtain complementary funding in the States, in which I was invited to participate. Eventually, that effort resulted in the "China in Time and Space Project" which ended up at the University of Washington, Seattle, under the direction of William Lavelly. Other participants included Robert Hartwell, who used my first efforts at creating a 1990 county-level GIS for the PRC to "co-locate" historical counties for specific dates in the Qing, Ming, Yuan, and Song dynasties. Soon after Hartwell's untimely death after retiring to Wyoming, I managed to go there and back up his computers and then alerted Peter Bol that the Harvard-Yenching Institute was to be the beneficiary of Hartwell's work on the co-location of historical counties in terms of (then) contemporary PRC administrative units. Bol quickly grasped the significance of Hartwell's work, and in conjunction with Skinner, Ge Jianxiong from Fudan University in Shanghai, myself, and others, successfully obtained Henry Luce Foundation funding for the "China Historical GIS Project" through the Harvard-Yenching Institute.<sup>3</sup> GIS databases for China's field administration from 1911 back to 221 BCE have now been created for most major regions of imperial China, with the remainder to follow. They are or will be made available to the scholarly community.

Skinner used my PR China county-level spatial data in conjunction with his own GIS data work to continue to refine his regional systems analysis for the 1990 and eventually the 2000 PRC censuses. He ended up elaborating it both conceptually and empirically, the results becoming what he called the Hierarchical Regional Space (HRS) framework. This essentially involves deriving, empirically, a Regional Systems Index comprising three co-varying dimensions for each separate macroregion: Core-Periphery Zoning, based on central-place analysis; Urban-Rural Continuum placement, based on county-level statistical data; and a Local Systems Index, based on sub-county statistical data. Since it is difficult to construct diagrams that show all three dimensions as they intersect

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3 See <http://www.fas.harvard.edu/~chgis/>.

one another, in his publications and papers he only shows two of the three together in any one table.

I have compiled a bibliography of Skinner's Regional Analysis writings, including grant applications and the odd proposal, which is appended to this paper. The best introduction to his preliminary HRS formulation appears in "Differential Development in Lingnan" (1994). He, with others, presented five papers at the panel titled "A Hierarchical Regional Space Model for Contemporary China" at the Geoinformatics '99 Conference held by the China Data Center at the University of Michigan, Ann Arbor (20 June 1999). Together, these papers presented a description of the components of HRS analysis.<sup>4</sup> I have prepared a "Roadmap for Hierarchical Regional Space" that defines and relates his HRS terminology, which is also appended.

Skinner's publications in the first half of the last decade of his life appear to be somewhat opportunistic as opposed to being part of a systematic publication program, in the sense that he seems to have taken advantage of various situations as they arose to publish papers on specific limited aspects of HRS applications to particular datasets or issues. One published paper from 2000 uses HRS to analyse gender and fertility in China (Skinner, et al. 2000), another from 2003 (Skinner 2003) analyses ethnic differences in family structure and reproductive patterns in southeastern China, and two from 2004 include one that looks at changing core-periphery relationships as Beijing rapidly expanded after 1980 (Henderson, et. al., 2004) and a second more general exposition (Skinner 2004). Using Google Scholar and other sources, I have been unable to find any other of his publications that utilize HRS. I think one major reason he didn't publish after 2004 is because he was so busy elaborating his data sets, which in the last part of the decade involved GIS spatial data and statistics for all 45,000 townships (*xiang* and *zhen*) included in the 2000 PRC census returns, whereas earlier he had only had access to the 10,000 urban townships (*zhen*) included in the published 1990 census volumes. The massive and increasingly elaborated empirical basis for his work may have become overwhelming in the end, despite the technology at his disposal. In addition, his conceptualization of HRS became more and more complex and convoluted, as can be seen in the appended "Roadmap for Hierarchical Regional Space."

With his HRS conceptualizations, Skinner had clearly gone far beyond the bounds of what can be conventionally regarded as anthropology, and indeed, beyond what even most social geographers would be comfortable with. So, how does all of his work on spa-

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4 They are available at <http://www.fas.harvard.edu/~chgis/data/skinner/>.

tial analysis relate to the perhaps more mundane professional concerns of ethnographers and social/cultural anthropologists?

Firstly, I would argue that his basic motivation for incorporating spatial variables in his research came from what he perceived as the need to put narrow ethnographic studies into larger contexts so their particularistic descriptions could be meaningfully compared to reveal underlying general patterns that vary systematically over space and through time, thus greatly enhancing the value of the specific accounts. Secondly, he used his spatial frameworks to address basic kinds of anthropological issues, such as kinship, gender, ethnicity, social organisation, and politics, as well as the demographic and economic circumstances that underpin them. However, it must also be said that Skinner's anthropology was "macro" (as in macroeconomics) and therefore unlike the "micro-anthropology" of most ethnographically oriented practitioners of the art. He of course also contributed hugely to the work of historians concerned with issues of the economic development and resulting political structures in traditional and contemporary China. However, I would insist that he was, first and foremost, an anthropologist at heart, and because he was seeking analytic, "macro" understandings of basic anthropological issues that he was led to incorporate the geographic approaches that resulted in his forms of spatial analysis, culminating in HRS. Another way of saying this, as other papers in the panel have pointed out, is that in addition to being an anthropologist, Bill Skinner was also a true social scientist.

In my opinion (and it may have been his as well), there are not all that many professional anthropologists for whom this can be genuinely said. On one occasion, I think it was back in the early 1990s, we were bemoaning the less empirical and more symbolic and interpretive directions in which anthropology seemed to be heading. What he said to me then was, "Well, Larry, you just have to keep on doing what you think is really worthwhile, and then wait for academic fad and fashion to come back around to where you started out, or where you now are" – or words to that effect. I do not say this to demean other anthropologists, or anthropology as a discipline, but only to point out that very, very few of us are truly social scientists in any strict sense of the term. That is one fundamental way in which G. W. Skinner truly stands apart.

Let me explain what I mean. Ethnography, as well as what passes for ethnology these days – which is to say most of cultural and/or social anthropology – is not really very scientific. That is because ethnography is inherently idiographic, meaning that it pertains to particular people in particular places at particular times. Another, complementary way to put it is that ethnography is a particular kind of history, a recounting of human beliefs and social behaviors in the communities observed and recorded by anthropologists in the course of their fieldwork. The existing compendium of such stories



about what human life was like under a hugely variable set of environmental, economic, and political conditions is of unparalleled value in terms of helping us understand, in non-ethnocentric ways, what it means to be human and how humans have been able to cope with, and even prosper under, circumstances that most of us modern educated folks would find unpleasant, if not appalling. So, to say that most social/cultural anthropology is actually an art and not really science in the strict sense, is to recognize its true nature and is not intended to diminish its value in any way, shape, or form.

Ethnology, on the other hand, at least back in the old days when the term was used more commonly, was supposedly a generalizing science that analyzed ethnographic literature. But what was its methodology? I was taught, though not by Bill Skinner, that ethnology primarily employed the comparative method. In other words it was fundamentally inductive, in that it produced generalizations based on identifying what selected ethnographic cases had in common. Sir Francis Bacon's old formative idea about how science should be done notwithstanding, science today is not based on induction and probably never was. To invoke a currently popular metaphor, it can be asked, using induction, "How many swans do you need to observe in order to conclude that all swans are white?" Sampling issues aside, the answer logically has to be that you must observe them all, since if you observe only some of them, how do you know that the next one you see might not be black! Indeed, if you were to go to Australia, where all native swans actually are black, then you would have to abandon your inductive generalization entirely. But you could also do this from the beginning as a matter of methodological choice, since there are ultimately no valid underlying principles that can be used to guide inductive, lowest-common-denominator generalizations or classifications.

To bring us back to the real world issues Skinner was dealing with, one might ask how many of the one million or so rural villages in China would need to be studied ethnographically to understand what social and economic life is (or was) like in the rural areas. Skinner's answer would have been "not all, and not even one in each of the 70,000 or so standard marketing areas" (which would later be the basis of the reformed post - Great Leap Forward communes and are now *xiang* and *zhen* - rural and urban townships). These he identified as the economically based, socially self-sufficient (for the peasants), and linguistically/culturally homogenous units of traditional rural Chinese society. I am also certain that he would have said that you could not understand rural China without understanding least certain aspects of urban China, in particular the city systems that produced the overall human (economic, political, social) structures of the physiographically based macroregions and their subregions, etc., down to the three levels of ubiquitous rural market towns. If you had an empirically motivated but theoretically derived model of how a hierarchy of regional systems generated the spatial differentiation

of social, economic, and political activity, and if you had sufficient empirical/historical information to infer how the general principles were manifested in actual landscapes, then you could strategically (non-randomly) select a relatively small set of spatially representative communities for intensive ethnographic study. Or alternatively, in these modern days of national censuses, copious economic statistics, and computers with GIS software, you could answer certain critical questions about how life in rural China varies systematically through Hierarchical Regional Space without any need for specific ethnographic studies at all (not that Skinner would ever have denigrated their value). This is what he was working on over the last decade or so of his life.

That alternative to training an army of ethnographers and dispatching them individually to do fieldwork in each of the nearly 50,000 or so modernizing rural and suburban townships of the PRC represents an inherently scientific approach to understanding rural China. Some have said that “science is what scientists do,” and that is true in terms of how scientists, including genuine social scientists, go about trying to understand those aspects of reality that interest them, this being their adherence to some version of the scientific method. I would argue that, in contrast to ideographic/inductive historical or humanistic enquiry, all science is fundamentally nomothetic (i.e., having theories incorporating at least clearly defined kinds of causal principles, if not “natural laws” *per se*), and that it employs deduction (not induction) to generate models of real world phenomena from abstract (and technically *a priori*) theories.

Now, it is clearly far more straightforward, although still not without difficulty in most instances, to apply scientific methodologies to certain natural phenomena than it is to understanding people’s behaviors and beliefs. I recall a conversation I once had at an AAA conference many years ago with a young female anthropologist who was a year or so into her first teaching job, which was at MIT where she was in effect supposed to “humanize” the technical nerds. She told me that her basic problem was to get them to understand that social science was not the same as hard physical science because hydrogen could not say to oxygen, “Not tonight, dear, I have a headache.” The point is that human behaviors are produced by personal decisions based on beliefs, desires, and emotions, and are not governed by deterministic natural laws. In addition, human decisions about what to do, or not to do, usually result from political interactions with other people who want someone to do, or not to do, some particular thing, and who may, or may not, be lying about their circumstances or intentions. It is not easy to theorize about, or derive scientific models for, such human interactions or the behaviors that result from them, although the larger the number of cases one is dealing with, the more individual situations and other idiosyncrasies tend to even out. Yet I think that this is precisely what Skinner the social scientist was attempting to do in identifying and operationalizing the compo-

nents of HRS. I also think he achieved considerable scientific success in invoking hierarchical spatial variation to explain varying patterns of economic, social and demographic behavior in complex traditional and modernizing agrarian societies, China in particular.

Skinner's successful solution was to abstractly contextualize the situations in which people had made certain kinds of decisions with respect to reproduction, gender, kinship organization, and economic and political activities, and then to derive models that could account for them. The variables he found most salient, as a result of testing his models against empirical evidence, were spatial or geographical ones, or the economic, social and educational factors that resulted from placement in hierarchical spatial systems (HRS). He was able to create empirically verified, but still inherently deductive models, which he then used to place statistical information about particular communities of people and their behaviors into appropriate hierarchical spatial contexts, thus providing useful explanations for them. And that is why he was a genuine social scientist.

Let me conclude by quoting from the abstract for a panel Skinner organized for the 2000 AAS Annual Meeting (Skinner 2000). It neatly sums up the accomplishments he and his students and collaborators were reporting on:

Our understanding of gender differentiation in contemporary Chinese society is hampered by the lack of comprehensive studies with a consistent framework. In consequence, findings of the few well-designed surveys in China's largest cities are routinely generalized to all of urban China, and the still fewer rural studies in scattered localities are often the basis for even more egregious overgeneralization. Quantitative analyses of gender using aggregate data have for the most part been presented as dichotomies (urban vs. rural, coastal vs. interior) or limited to provinces.

The papers in this panel move us toward a more comprehensive and discriminating picture of gender in China by placing relevant disaggregated data in a fine-grained spatial framework that reflects the actual structure of China's regional economies/societies. We apply a model of Hierarchical Regional Space (HRS) that views Chinese society as a nested hierarchy of nodal local and regional systems, each centered on a city or town at one of eight levels in the urban hierarchy.

Through the kind of work exemplified by that panel, and the teaching and leadership required to motivate others to produce it, Skinner greatly broadened the analytic horizons of anthropologists and others who made the necessary effort to understand what he was trying to accomplish, as well as showing those practicing more generalizing

disciplines the role of local particularities in shaping the overall patterns, particularly when local information could be assembled en masse and handled statistically within the rigorous analytical framework provided by GIS technology. Skinner's research results were always firmly grounded empirically, and he added enormous value by incorporating the specifics of particular localities into his theoretical models. As such, his conceptualizations encompass the large scale as well as more local spatial systems within which their inhabitants participated in economic and social activities. Anthropology, his chosen discipline, has been greatly enhanced and enriched by his social scientific work, which I think will stand the test of time.

When he retired from teaching at UC Davis at age 80 in mid-2005, he outfitted a research office at his own expense on campus and in an email to me declared, "Finally, I am at last a full-time researcher!"

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## Appendix A

### Chronological Bibliography of G. William Skinner's Publications and Papers on Regional Analysis (Compiled by Lawrence W. Crissman)

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## Appendix B

### A Road Map for Hierarchical Regional Space

#### 1. Conceptualising HRS

The Hierarchical Regional Space (**HRS**) model was developed from both Cristaller's Central Place Theory (Central Place Analysis – **CPA**) and von Thunen's Regional Systems Theory (Regional systems Analysis – **RSA**). Also Diffusion Theory (Hagerstrand 1965)

HRS also builds on the spatial autocorrelation of economic, social, and demographic variables.

HRS analysis is based on three spatial dimensions: **CPZ** - core-periphery zoning; **URC** - urban-rural continuum (county-level data for China); and **LSI** - local systems index (sub-county information).

There is, historically, a physiographic context for macroregional economic development in China, but Skinner's evolving set of macroregions for contemporary China are defined by the spatial characteristics of his 1990 data files and later information.

#### 2. Analysing the Urban Hierarchy

Skinner's Central Place Analysis (**CPA**) follows Marshall (1989), and works down the Central Place (**CP**) hierarchy, assigning Levels in the Urban Hierarchy (**LUH**) using the Index of Municipal Centrality (**IMC**) based on an index of central functions for cities (*shi*) and a Centrality Index (**CI**), essentially consisting of levels of non-agricultural population, for towns (*zhen*).

CPA needs to be done for different regional city systems separately due to core-periphery differences in CI definitions.

CPA for relatively low-level places needs, in addition to a CI, transport and physiography placement.

Weighted GIS transportation networks are critical in CP analysis, particularly in hinterland demarcations.

### 3. Constructing an Urban-Rural Continuum

**URC** draws on two categorical components, the Settlement Composition Index (**SCI**), and the Combined Centrality Score (**CCS**), constructed by tabulating LUH for the highest and configuration of LUH for all CPs in each 'MC county', respectively.

**SCI** is essentially the proportion of Urban Registered Population (**URP**).

**URC** is constructed by cross-tabulations and inter-digitations of **SCI** and **CCS**, guided by a Substantive Urban Index (**SUI**) constructed mainly from educational and occupational variables.

A Substantive Urban Index (**SUI**), constructed from variables that are sharply differentiated over the urban hierarchy, is used to establish **URC** classes.

The **URC** classes capture lower-level urban systems from Metropolises on down.

### 4. Delineating RS and CP Structures

A Regional Systems Index – (**RSI**) is constructed separately for each macroregion from strongly auto-correlated socio-economic and demographic variables which have been 'deurbanised'. Contiguity is necessary to define Core-Periphery Zones (**CPZ**); transport connections are used as measures of contiguity.

Components of **RSI** are iteratively tested with a GIS based Spatial Progression Test to select those that yield optimum **CPZs** composed of maximally contiguous counties divided into seven **CPZs**.

**CPZs** are based on physiographic features plus transport factors and economic relations, and therefore macroregional boundaries are not necessarily contiguous with physiographic features.

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# 施堅雅複雜社會的空間分析： 對人類學的重要性

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本文僅討論施堅雅教授對現代化農耕社會的空間分析（尤其是中國）。此類研究從1960年代中期開始，貫穿他長期的學術生涯。他在這片新的研究領域中首先發表的是三篇開創性的系列論文〈中國農村的市場與社會結構〉，刊載於1964-65年間《亞洲研究期刊》。文中他提出一個輪廓模型，探討週期性集市的共同體在空間上的三個層級組織，他認為這是傳統中國農村社會中根本的經濟、社會和文化基石。

約莫十年後，他帶入中國空間研究的第二階段，他在《中國帝國晚期的城市》(The City in Late Imperial China, 1977)一書中將其稱之為「區域體系分析」(Regional Systems Analysis)。於書中，他概念化和定界農村中國的幾個地形學上的宏觀區域，這些區塊典型地位於大型河流灌溉系統，但在經濟、政治和社會的面向上，在都市系統中界定出七個層級結構，底下則另有三個層級的農村市鎮。從1980年代晚期到21世紀初，施堅雅採納地理資訊系統(GIS)技術，更能擴展其分析範圍與複雜性，他稱這階段的分析為「階序性區域空間」(Hierarchical Regional Space)，主要根據中華人民共和國在1990到2000年間的人口統計資料。

本文的總結討論施堅雅作品在空間分析方面的科學本質，以及其對人類學的貢獻。

關鍵詞：週期性市場，中地理論，區域體系分析，宏觀區域，階序性區域空間

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