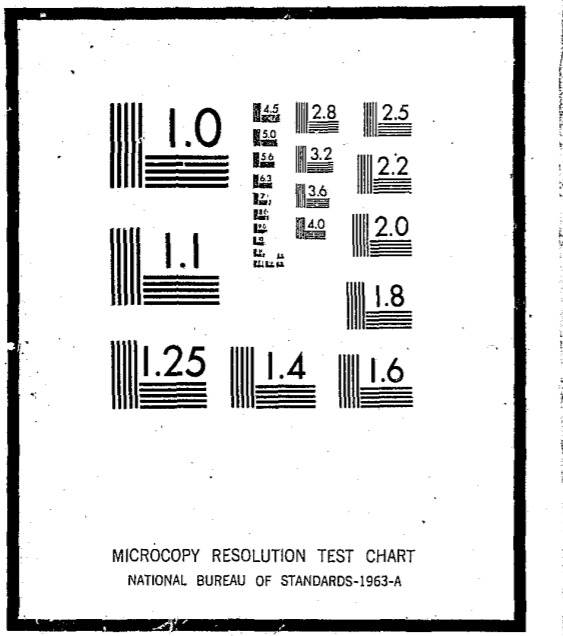


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PROBLEMS IN URBAN MODELING: A REVIEW OF  
THE POLITICIAN, THE BUREAUCRAT, AND THE CONSULTANT

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PROBLEMS IN URBAN MODELING: A REVIEW OF  
THE POLITICIAN, THE BUREAUCRAT, AND THE CONSULTANT\*

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Garry D. Brewer, *The Politician, The Bureaucrat, and The Consultant: A Critique of Urban Problem Solving*, New York: Basic Books, 1973, 284 pages.

Let me not cavil--*The Politician, The Bureaucrat, and The Consultant* (henceforth, for brevity's sake, PBC) is a first rate book. It should be of interest not only to those professionals referenced in its title, but to academics, students and persons concerned with the complexities of urban problems; to model and simulation builders; and to those interested in the more abstract questions of natural ordering.<sup>1</sup> This is not to say that PBC is without its faults; these will be pointed out in due time. But these shortcomings should not detract from the value, worth, and even the importance of this book.

PBC is predicated upon two assertions: first, that urban systems are very complex and, second, "that one of the most promising techniques for meeting the challenge of complexity is the computer simulation."<sup>2</sup> [p. 3] Brewer expands:

In principle, a computer simulation and our understanding of a represented context can be enhanced by systematically partitioning the context into subproblems, separate relationships, and individual elements; by measuring important individual elements; by reconfiguring these into a complete set of functional relationships; by experimenting with the whole model that results to appraise and adjust it; and finally, by using the model for projective or other purposes.

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\*This review has been prepared for *Policy Sciences*.

<sup>1</sup>Although Brewer devotes a full chapter to problems of epistemology and "organized complexity," this review will focus upon those sections of PBC dealing directly with urban simulation.

<sup>2</sup>Brewer is obviously not alone in these assertions; Forrester defines a city as a "complex system" and then ascribes to it a number of

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But Brewer concludes by noting "In practice, only much less has been possible." [p. 4] The purpose of this book is to explain this short-coming in the framework of urban modeling. This is done in three stages: first, the mechanics of model building are carefully detailed; second, a set of theoretical, technical, ethical, and pragmatic appraisal techniques are offered; and third, these elements are examined in the context of case studies of urban simulation models which were prepared for San Francisco and Pittsburgh. These case studies are particularly oriented towards the roles (both accepted and neglected) of the politicians, bureaucrats, and consultants responsible for these models.

In the early 1960s, the Federal Government's Community Renewal Program (CRP) decided to fund two relatively large (over a million dollars apiece) and short-term (about two years each) computer simulation projects in San Francisco and Pittsburgh. Brewer poses his first hard questions at this juncture: specifically, why were these models constructed? The answers in both cases are embarrassing: neither was built so much for reasons dealing with the urban crisis or decision-making. The models were more the result of salesmanship on the part of consultants, city agencies and officials looking for new levers in bureaucratic politics, the U.S. Department of Housing and Urban Development (HUD) wanting to experiment with simulation models with only the vaguest objectives in mind, and sometimes just inertia. Consider the following examples: both cities were approached by consultant firms that needed new contracts. The Director of Planning in Pittsburgh had been hired as an "innovator" and was searching for a way to validate his reputation. HUD's funding arrangement was that the city would pay its one-third of the cost by in-kind services, which meant it was basically a free good to the cities, they had nothing to lose; as one participant commented, "The only reasons that we were sold on this is because it was free." [p. 115] Ultimately, as another participant put it, "We just got swept along." [p. 105]

behavioral characteristics; to cite a few, the system is "counterintuitive," "stubbornly resists policy changes," and "tends towards low performance." He then utilizes the computer to assist in understanding the urban system. Jay Forrester, *Urban Dynamics* (Cambridge: The M.I.T. Press, 1969), p. 109.

Given these series of coincidents, it was scarcely surprising that the program's objectives were unclear, hardly a desirable situation for million dollar contracts. Brewer points out, however, that this was just the beginning of the cities' and their simulation models' troubles. What was critically lacking on both the clients' and the consultants' side was an appreciation of the difficulty of model building. Brewer terms this an "appraisal gap" and his documentation comprises most of the book. The cities were offered a great deal. Arthur D. Little's prospectus to San Francisco promised a model that "is comprehensive, in that it will deal in an integrated fashion with all public and private actions which must be taken to provide continuous and sound maintenance and development to the City's land and building." [p. 106] The University of Pittsburgh's Center for Regional Economic Studies proposed a model that would develop programs and criteria for: "schedules of cost and anticipated benefit for those redevelopment areas where alternative land uses and densities are under consideration ... differential property tax upon different types of land ... the effects of such governmental actions as code enforcement [and] community facility improvements ... [and] optimiz[ing] the marginal return to the city on its urban renewal investments." [p. 111] Although, in retrospect, these claims seem outlandish and impossible, Brewer's contention that there were no formal appraisal techniques or even skilled technicians that would (or could) make the necessary judgments on these projects is depressingly accurate; he writes "that no more-or-less acceptable standards exist by which the technical merits of a computer simulation may be appraised." [p. 13]

Brewer examines both the San Francisco and Pittsburgh models from the theoretical, technical, ethical, and pragmatic appraisal perspectives and finds both simulations sadly deficient. A few examples serve to illustrate these shortcomings:

Theoretical. In San Francisco, housing construction costs were read into the model as a constant value. This ignored a large body of theory relating to the cycles in the housing construction industry.<sup>1</sup> A. D.

<sup>1</sup>Brewer documents this carefully; if anything, here and elsewhere throughout the book, he is too liberal with his footnoting.

Little's analysts compared rental prices as they fluctuated with demand to the physical phenomenon of hysteresis (which relates magnetic field intensity in a vacuum with the induction density of magnetic force in a medium), a dubious analogy at best. Brewer cynically comments: "If a model-builder has never been sensitized to the details of a specific empirical context, one should not find fault with his great inferential leaps ... from expanding and collapsing magnetic fields to expanding and collapsing rentals." [p. 143]<sup>1</sup>

Technical. The recurring theme in the technical appraisals is the inadequacy of the data.<sup>2</sup> In neither case was there sufficient data to run the full simulation; in some cases, data were generated by nothing more sophisticated than a "windshield survey." Data problems should be foremost in the construction of any policy-oriented model; that they were not is justifiably criticized.

Ethical. Computer simulations designed for policy purposes must contain, to a great many people's surprise, a certain number of ethical considerations. These should be the domain of the elected official or, at the very least, the civil servant. But in Pittsburgh and San Francisco, these inputs were largely abdicated. These two simulations were thus lacking the ethical considerations of the policy-makers who were to use them. What values were substituted? "In the absence of clearly specified information about the preference lists of policy-makers or segments of the population, a model-building analyst will, in the interests of technical efficiency and tractability, substitute his own simplified, explicit and orderly preferences into his formulation." [p. 51] For example, the San Francisco model did not consider such vital questions as ethnic group differentiations and changing preference

<sup>1</sup>Too often one finds people trained in the physical sciences trying to explain social phenomena with physical sciences analogues; the "gravity model" of industrial-residential location is another example. These analogies are generally misleading, and could be damaging. Expertise in the quantitative or physical sciences disciplines should not be regarded, ipso facto, as sufficient credentials for urban problems solving.

<sup>2</sup>If anything, Brewer's emphasis on data inadequacies understates the problem. Even if the data exist (no small assumption), the political and geographical units are so different as to make aggregation and comparison very difficult; e.g., census tracts do not correspond with school districts do not correspond with traffic zones do not correspond with zip codes.

patterns. In such cases, it is not surprising that the "model increasingly diverges from its reference system and loses both predictive and policy utility." [p. 51]

Pragmatic. PBC lists five possible applications of computer models: data manipulation; measurement; theoretical; educational; and policy-making. Both the San Francisco and Pittsburgh simulation models were designed for the last mentioned and, as appraised by Brewer, neither was useable in policy formulation; his judgment is supported by a number of interviews he conducted with the personnel who dealt with the CRP simulation programs. At best, a few programs in the Pittsburgh model can be viewed as having worthwhile data manipulation and education applications; these are not insignificant in themselves, but they fall far short of their advertised goals.

In sum, PBC argues that these two simulation models had no hope of implementation or completion. The author makes no case for malfeasance or corruption undermining these models; only rarely does blatant incompetence enter into the picture. Rather, one finds that repeated examples of naivete, time constraints, limited state of the art, and over-expectation were the real culprits. Brewer offers a general reason for all of these: the computer and its applications have many powerful uses but they have simply been oversold. He cites Fred Masaarik's observation that the "magic of mathematics," taken in conjunction with the computer, "seem[s] to lend significance even to the trivial and credibility to the doubtful." [p. 23]

PBC is too solid to leave the model user without a place to turn. Thus, the last section is devoted to suggestions as to how to bring the computer, simulation models, and their capabilities closer in line with the city's needs. He recommends that models be more limited in their scope and purpose,<sup>1</sup> that their objectives be more clearly defined, that documentation be made imperative, that data sources be attended to, and --perhaps most important--that appraisal techniques be designed and

<sup>1</sup>Brewer comments elsewhere that "There is not now and there probably never will be a general urban simulation model." Garry D. Brewer and Owen P. Hall, Jr., *Policy Analysis by Computer Simulation: The Need for Appraisal*, The Rand Corporation, P-4893, August 1972.

adopted. All of these, he grants, will cost money and are experimental in nature, but, he concludes, without them, the challenge of urban complexity cannot be met.

For all its strengths, PBC is not without its faults. To turn one of its basic questions around on itself, what is the purpose of the book and who is the audience? PBC was originally prepared as a doctoral dissertation so its immediate intended audience was a Ph.D. Committee, but that Brewer saw fit to publish his thesis suggests that he now has a wider audience in mind. But exactly who that audience is, is less than certain. If it is the model builder (either professional or potential), then much of the book is elementary; the modeler already knows what a mathematical equation is and that there are many computer languages. If it is the politician or bureaucrat (who are both in particular need of the lessons the book offers), then Brewer's technical explanations and lapses into jargon will be very difficult for them to follow and understand. Both of these potential audiences have a great deal to learn from PBC and one fears that Brewer's hewing a middle road could turn either or both away from the book. I hope not.

Brewer's "Ethical Appraisal" function is, I suspect, misnamed. As he initially describes it, this function is related to the person (roughly, either the technician or the public official) selecting the variables that are included in and define the model. But in reading the ethical appraisals of the various models, one finds that the simulations are criticized for being "static," "bounded," and overly "rational." These are not ethical considerations. The question, then, is not so much one of ethics (and its teleological implications) as of normative values. Although it is an important distinction, Brewer never explicitly distinguishes between the ethical "ought," the normative "should," and the factual "is."<sup>1</sup> His points that the relevant public officials never supplied the model builders with the normative considerations of their constituencies and that the technicians produced static, constricted

<sup>1</sup>See Herbert A. Simon, *Administrative Behavior*, 2nd Edition (New York: The Free Press, 1957), Chapter III, "Fact and Value in Decision-Making," pp. 45-60.

models are cogent and well directed but these criticisms are not, in the strict sense of the word, ethical matters.

Brewer rightly criticizes both the San Francisco and Pittsburgh models on a great many points but he is unduly harsh when he criticizes them for bounding the models by their respective city limits. [San Francisco, p. 153; Pittsburgh, p. 182] His point--that the city cannot be modeled in isolation from its environs--is well taken; but, as Brewer certainly knows, these models required spatial bounding and, had they been even grosser in their geographical magnitude, they would have been found even more inadequate than they were. Furthermore, the CRP regulations explicitly constrained them to these boundaries, an admission Brewer makes in reference to Pittsburgh. One suspects that neither project ever really considered the extra-city impacts upon its models. If this is the crux of Brewer's criticism, then it is too important to be left unstated.

As critical as PBC is, I suspect that it underestimates the problems found in the interactions between politicians, bureaucrats, and consultants. For example, Brewer lists a number of reasons why a city agency might choose to utilize computer operations but he overlooks the most basic feature of bureaucratic life--existence. A bureau might well decide to use the computer not so much for reasons of efficiency, but simply as a means to validate its existence. This bureau might not possess the attendant technical or theoretical skills and find itself dependent upon a consultant whose primary skill is retaining his contract. In all probability, the agency will lack the necessary normative inputs. In sum, its work almost certainly will fall short of PBC's appraisal functions.<sup>1</sup> Conceivably, this could be an even more dangerous situation than the CRP models because such an agency would be an integral part of the city's bureaucracy; for this reason its recommendations would be less prone to the politician's skepticism than those generated by an outside consultant group.

<sup>1</sup>For an example see *A Strategy for City Survival, 1970: Synthesis or Social Disintegration*, The Community Analysis Bureau, City of Los Angeles, 1971. The Community Analysis Bureau is a particularly relevant illustration because, like the two models, it is funded by a Federal grant from HUD under Title 1 of the Housing Act of 1949.

A final question that is implicit in PBC is the application of computer technology to urban problems. The failures of the War on Poverty alerted the Federal and local governments that money alone would not solve their mutual problems but faith in technology appears to be strong. Such faith may be damagingly deceptive. The belief that the aerospace engineering that took man to the moon could solve urban engineering problems is otiose, and techniques that worked for the Department of Defense<sup>1</sup> have been less than impressive on the urban scale.<sup>2</sup> Sophisticated computers that go blink in the night will not solve the nation's urban crises by themselves. The expanded computational capabilities should not be permitted to mask methodological, theoretical, and data deficiencies. PBC's histories of the CRP simulations vividly document these deficiencies and their impact on the utility of the models.

*The Politician, The Bureaucrat, and The Consultant* may have indistinct objectives akin to the computer simulations it studies and criticizes. But unlike them, it never strays from the fact that simulation models, data collection, and even consultants should never be permitted to lose sight of the proper objectives, and that the politicians and civil servants should never fail to define and provide those objectives. This is less a counsel of perfection and more a proposition that the participants in urban modeling should understand both the modeling process and their respective roles in that process. If this lesson can be brought home to the politicians, bureaucrats, and consultants referenced in the title, then the importance I ascribed to the book will have been fulfilled.

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<sup>1</sup>See Alain C. Enthoven and K. Wayne Smith, *How Much is Enough?: Shaping the Defense Program, 1961-1969* (New York: Harper & Row, 1971).

<sup>2</sup>PPBS lessons from the DOD offered initial promise but by 1966 PPBS was being viewed in more humble perspective. See Aaron Wildavsky, "The Political Economy of Efficiency: Cost-Benefit Analysis, Systems Analyses, and Program Budgeting." Yet, in 1970, one finds a PPB managerial system with a "Weapon System Development Flow" used to design an "Urban System Development Flow"; *Project Management Manual*, The Community Analysis Bureau, City of Los Angeles, May 1970, p. 1.7.

**END**