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**ARCHITECTURE - DESIGN METHODS - INCA STRUCTURES**

Festschrift for Jean-Pierre Protzen

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Jean-Pierre Protzen



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## PREFACE

This *Festschrift* is a collection of essays in honor of Jean-Pierre Protzen on the occasion of his 75<sup>th</sup> birthday. Born in 1934 in Switzerland, J.P. Protzen served as a Professor at the Department of Architecture at the University of California, Berkeley for more than 40 years. He was initially trained as an Architect and worked on several major architectural projects. His interest to explore the fundamental questions of design eventually led him to become an internationally well-known expert in the field of Design Theories and Methods. In addition, he resolved the major questions surrounding Inca stonemasonry through thorough studies and experiments. As a Professor, J.P. Protzen was known for his wit and humor, and for his sharp eye and probing questions. He was an excellent teacher, an influential advisor to numerous students, and a respected researcher.

We heartily congratulate J.P. Protzen on this anniversary!

For this *Festschrift* we have asked academic friends, close collaborators, and colleagues of J.P. Protzen – many of them are his former doctoral students – for a scholarly paper on a subject of their choice. All essays are contributions to one of the three fields that constitute J.P. Protzen’s lifelong interest, *viz.*, Architecture, Design Theories and Methods, and Inca Structures. Some authors have chosen to link their contribution directly to academic collaboration with J.P. Protzen, while others have chosen their contribution to closely mirror the work they are currently engaged in.

We would like to express our sincere thanks to all the authors who have contributed. We apologize to all potential authors who we could not reach and who may have been as willing and as enthusiastic to contribute. We especially like to thank Lois H. Ito Koch from the College of Environmental Design, Berkeley, and Elsbeth Protzen, wife of J.P. Protzen, for their invaluable help in tracking down the addresses of the authors. Elsbeth Protzen also provided the photograph of J.P. Protzen. We also express our gratitude to Homann, Güner and Blum – Graphic Designers in Hannover, Germany who designed the visual appearance of the *Festschrift*. All three founders are former students of Hans Dehlinger at the University of Kassel, and indirect beneficiaries of the teachings of J.P. Protzen. Our publisher, University Press Kassel, has been very helpful and accommodating of our tight deadline. The *Festschrift* will be published both as hard-copy and as a permanent open-access online version.

The publication of a *Festschrift* is also a great honor for us. We have tried our best, and hope that not too many errors have crept in.

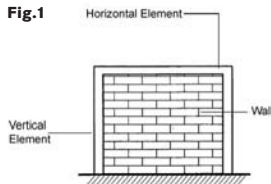
*Alameda, California / Kassel, Germany*  
*June 2009*

Johanna Dehlinger

Hans Dehlinger

# DEVELOPMENT OF A CONFINED MASONRY STRUCTURAL WALL TECHNIQUE FOR LOW-COST HOUSING IN VENEZUELA

Domingo Acosta



## Abstract

*In this paper we present an experimental development of a confined masonry structural wall technique for the mass construction of low-cost housing in Venezuela. Emphasis is placed on key aspects such as construction efficiency, the system's earthquake proficiency and its response to environmental factors. Eight walls were tested at natural scale, and were subjected to incremental lateral and alternating loads. It was concluded that the proposed technique showed an adequate earthquake-resistant response. A prototype was built which showed the constructive viability of the system. The technique is widely applied today by construction companies in Venezuela.*



## Introduction

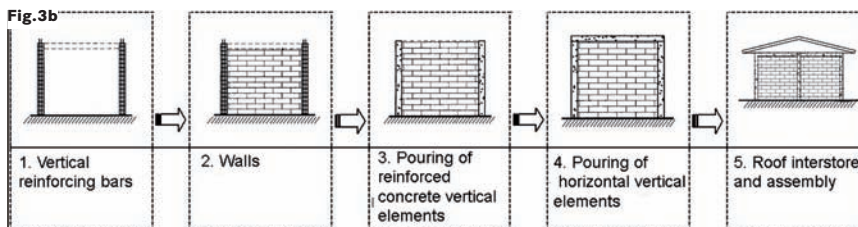
In areas of important seismic risks, masonry is the most widely-spread housing construction technique in Venezuela and Latin America. However, there is great concern in Venezuela with respect to the earthquake-resistant capacity of

masonry buildings due to the absence of a structural masonry code and to bad construction practices.

These factors are known to affect the vulnerability of large urban settlements.



In Venezuela, the conventional masonry practice consists in building walls with hollow blocks of clay or concrete, bounded by a reinforced concrete frame made of slender horizontal and vertical elements, called the confining frame (Fig. 1). The



resistant system depends to a great degree on such a frame. Moreover,



it is difficult to build them correctly due to their small sections (10 x 10 cm to 15 x 15 cm). Since the reinforcing bars occupy much of the available space, a “0” aggregate concrete should be used, however, this is difficult to produce adequately. In fact, the great majority of informal constructions (Fig. 2) use a conventional concrete mix, which results in non-homogeneous pours for such small sections. In addition, the technique is not suitable for mass production due to its slow execution time line: walls are built in the first place in open skies, and later on the confining frame is poured (Fig. 3).

The absence of a masonry code in Venezuela, as well as the difficulties for executing this technique adequately, prompted us to ask ourselves the following question: How can we produce at a big scale a safe masonry structure with better quality and an efficient production system? To answer this question, we conducted a technical



Fig.4a

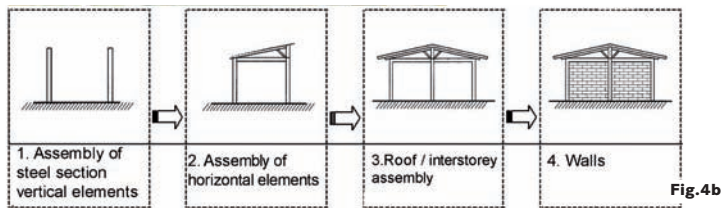


Fig.4b

experimental study [1] in order to develop a steel section confined masonry structure wall system that responded appropriately to building earthquake resistance norms and with improved efficiency and sustainability [2].

### The Proposed Technique: Key Aspects in the Development of the System

The first aspect considered in this research was the increase of the building efficiency of the masonry construction [3]. For this purpose, a steel section frame then replaced the conventional reinforced concrete confining frame [4]. This allowed for the installing of the roof and the intermediate storey in advance so that the construction of walls can be carried out under the roof, increasing, in this manner, building work’s productivity (Fig. 4).

The second aspect was the most central for this study: the structural capacity of the system. Considering that the main factor of seismic reserve of the conventional technique is the reinforced concrete confining frame, the proposal to build the

- Fig.1**  
Confined structural masonry wall.
- Fig.2**  
Masonry in informal construction.
- Fig.3a, Fig.3b**  
Conventional construction process.
- Fig.4a, Fig.4b**  
Proposed technique for construction.

confining frame out of steel sections provide additional safety to masonry due to the reliability of the quality control of these elements. We proposed a technique according to which the walls will work along with the steel frames, thus generating an integrated structural set.

The objective then was to develop a wall masonry system confined with steel sections that, through a technical experimental qualification test, complies with earthquake-resistant

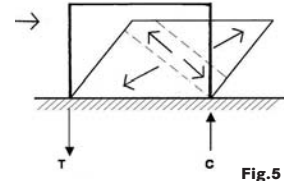


Fig.5

safety criteria for buildings. With this purpose, eight steel-section-confined masonry walls were lab-tested at natural scale [5]. The proposed technique proved to be as reliable or even more reliable than previously tested walls [6] built with strict quality control within the conventional techniques.

Fig.6a

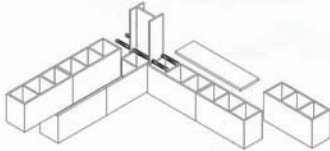


Fig.6b

A third aspect considered was the system's response to environmental factors in order to favor a sustainable construction [7]. Among such factors are: the saving of resources by reducing material employed per square meter built; the reduction of energy consumption by incorporating passive environmental control systems and low energy production and maintenance methods; the building using correct procedures from the beginning for a long life cycle and in a progressive manner, and the reutilization of materials and

components; the building procedure aiming at "zero waste" avoiding by all means to generate wastes during the life cycle of a masonry building; and finally, the encouraging of flexible and local scale constructions, allowing mass production through multiple small interventions, promoting employment and the use of local resources.

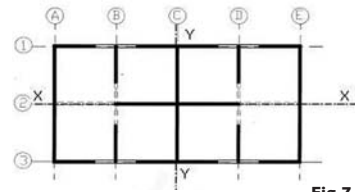


Fig.7

### Structural System Development: Conceptual Aspects of the Structural System

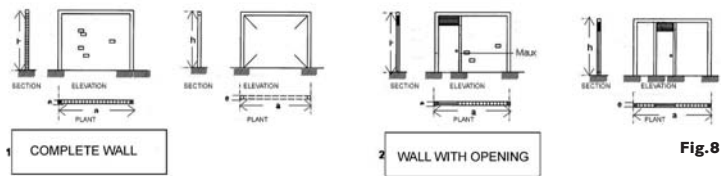
Seismic forces generate lateral actions in masonry wall buildings producing important tensile stresses that cause rapid diagonal cracking of structural walls; this may compromise their stability and, as a consequence, that of the building as a whole. In confined masonry wall systems, the walls and the confining frame work together controlling cracking and delaying loss of strength capacity of the walls,

by allowing significant alternating lateral displacements [8]. In addition, the confining vertical elements absorb induced stresses produced by overturning moments. (Fig. 5).

The building process of the reinforced concrete confined walls achieves an effective bonding between the wall and the confining frame. At first glance, the proposed steel-confining frame seems to be at a disadvantage because its smooth surface would not bond to the wall. To achieve this bonding, steel shear connectors were designed to assure an integrated wall-confining frame interface (Fig. 6). It is also a “dry” connection, that is, one that does not require pouring or the use of mortars, a characteristic that allows for the recovery of the steel sections during the structure’s life cycle. In addition, since they are made of ductile steel, the connectors can dissipate inelastic energy. An experiment is still pending to demonstrate that such connectors would not be needed for one-storey housing.

### Structural System Components

Structural masonry works in such a way that wall layout is evenly distributed over the two principal axes of the building; the walls are linked through horizontal structural elements and rigid diaphragms to achieve an earthquake-



resistant system that forms a complete structural unit with the required stiffness and strength to assure adequate seismic safety (Fig. 7).

Several building materials available in the market were considered for the study of the structural system walls: hollow blocks of clay or concrete; different types of structural steel sections; and different connection options for the walls, the confining frame, foundations, etc.

The *walls* are thus the bearing elements of the system. They are in charge of transferring loads and structural demands to the ground. There are complete walls (mostly responsible for the earthquake-resistant capacity of the system), walls with openings (doors and windows), and complete openings (Fig. 8). The walls’ aspect ratio, i.e. the ratio between the wall’s length and width, should be close to 1.

The *confining frame* is made of structural steel sections, whose size must allow for the fitting and interlocking

**Fig.5**  
Lateral stress structural behavior.  
**Fig.6a, Fig.6b**  
Shear connector.  
**Fig.7**  
Wall layout over axis x and y.  
**Fig.8**  
Types of walls.

**Fig.9a**

Wall ready for testing.

**Fig.9b**

Wall after testing is cracked, but keeps its integrity.

**Fig.10**

Prototype house.

**Fig.11a**

Application to housing projects.

**Fig.11b**

Application to housing projects.

of the 10 and 15 cm walls. One-storey houses use lightweight sheet metal *roofs*. Two or higher storey houses should employ rigid diaphragm *inter storey slabs*.

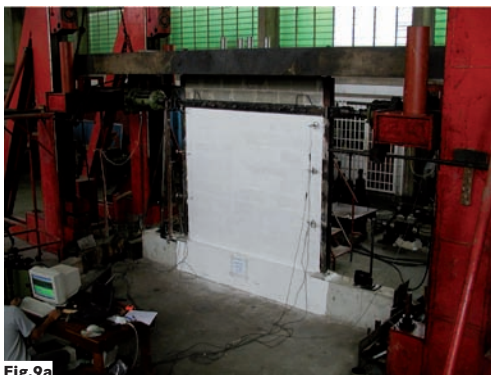
*Joint detailing* is crucial to the integrity of the earthquake-resistant structural behavior. Particular attention was paid to: The confining frame joints, that is, those between the vertical and horizontal elements; the joints between the vertical elements and the foundations; those of the confining frame to the wall through shear connectors; and those of the system's horizontal elements to the slabs to be sure that they work as a rigid diaphragm.

## Experiment: Tests

As an essential part of this research project a structural evaluation of the proposed masonry technique was undertaken [9]. In the absence of a structural masonry national code, the technique had to be compared to other previously tested structural systems shown to have an adequate earthquake-resistant response.

To assure a thorough control of the experimental procedure, blocks and block-piles were tested in order to determine their axial compression resistance. Small walls were also tested to typify diagonal compression to determine shear resistance.

Eight natural-scale walls were tested (Fig. 9a, Fig. 9b) in order to verify technically if the system was earthquake-resistant [10]. The walls were subjected to constant gravitational loads and to increasing lateral alternating loads. It was concluded that with respect to the earthquake-resistant properties of the system, the steel section confined masonry structural wall technique proposed proved to be as reliable or even more reliable than previously tested walls built with strict quality control with the conventional reinforced concrete confining frame techniques.



**Fig.9a**



**Fig.9b**

## Prototype

The building of a prototypical house (Fig. 10) allowed us to test several aspects of the production system in the workshop as well as in the construction site. In this manner, the building procedures were evaluated and the necessary adjustments were adopted for the production in the construction site.



## Application to Housing Projects

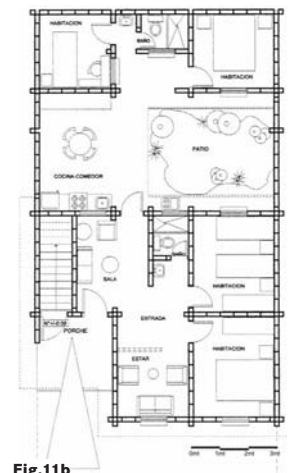
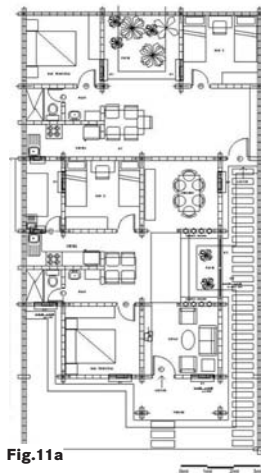
Applications for the building of low-cost housing projects with emphasis on the possibility of building by stages are being planned. Examples (Fig. 11a, Fig.11b) show some typical applications of the masonry system proposed. In addition, these models emphasize the manner in which the system responds to the requirements of progressive development or growth in stages.



Fig.10

## Conclusions

It was proven experimentally that confined masonry with steel sections is capable of responding appropriately to seismic structural requirements. The advantage of masonry is its widespread use in the population. Its application is economical because it permits for important reductions in the sections of the confining frame since it integrates walls to the structure as a whole, something that is not accomplished with frame structures. Moreover, the use of steel sections in the confining frame adds reliability to the masonry due to the quality control of these elements and increases the building efficiency.



## **Personal Remark**

Jean-Pierre Protzen's enthusiastic and rigorous research on Inca masonry and his experimental approach to archaeology were highly admired by his students. In my case, he encouraged me to direct my work towards the development of construction technology by testing hypothesis experimentally. In this paper, I have presented the results of my research on masonry housing in Venezuela.



## Notes and References

1. Conducted under an agreement between National Housing Institute (INAVI), Universidad Central de Venezuela (UCV) and National Endowment for Science and Technology (FONACIT). For the UCV, members of the Instituto de Desarrollo Experimental de la Construcción (IDEC) and Instituto de Materiales y Modelos Estructurales (IMME) took part. Arq. Domingo Acosta, Ph.D.; Ing. Dr. Enrique Castilla; Arq. MSc. Christian Vivas; Ing. MSc. Norberto Fernández were responsible for the research.
2. Acosta, D., Castilla, E., Fernandes, N., Vivas, C., et al. (2005). Sistema de muros de mampostería estructural confinada con perfiles de acero para la vivienda de bajo costo. *Tecnología y Construcción*, 21 (II), 55-81.
3. Acosta, D. (2000a). La Mampostería de Bloques de Suelo-Cemento: ¿Tecnología Apropriada para la Producción Masiva de Viviendas de Interés Social?. *Tecnología y Construcción*, 16(I), 19-30.  
Acosta, D. (2000b). Sistema mixto de esqueleto metálico y mampostería para la vivienda progresiva de interés social. *Entre Rayas*, 34 (Octubre), 30-35.
4. Steel is a relatively low-cost, widely available building material in Venezuela, a steel producing country.
5. A search on experimental work worldwide showed that there are no complete studies that proved, from the seismic-resistant point of view, advantages of using steel confined masonry walls. To our knowledge, this would be the first of such experiments.
6. At the Instituto de Materiales y Modelos Estructurales of Universidad Central de Venezuela research work on confined masonry walls has been conducted by Castilla and reported in:  
Castilla, E. (2000), Recent Experiments with Confined Concrete Block Masonry Walls. *12th International Brick/Block Masonry Conference*. Madrid-Spain, 25-28 June 2000.  
Castilla, E. (1997). Recomendaciones para el Diseño Sismorresistente de Edificaciones de Mampostería Estructural. *Diseño Sismorresistente Especificaciones y Criterios Empleados en Venezuela*. Caracas: Edición conmemorativa del terremoto del 29 de julio de 1967. José Grases G. (Coordinador). Academia de Ciencias Físicas Matemáticas y Naturales.  
Castilla, E. (1995). Evaluación del comportamiento de muros de mampostería de bloques de concreto ante carga horizontal. *Boletín Técnico IMME*, (33- 1).
7. Cilento, A. (1999). *Cambio de Paradigma del Hábitat*. Caracas: Universidad Central de Venezuela, Consejo de Desarrollo Científico y Humanístico, Instituto de Desarrollo Experimental de la Construcción, IDEC.  
Acosta, D. (2003). Hacia una arquitectura y construcción sostenibles: el proyecto para el edificio sede de SINCOR (Barcelona, Edo. Anzoátegui), *Tecnología y Construcción*, 19(II), 09-22.  
Acosta, D. (2002). Reducción y gestión de residuos de construcción y demolición (RCD), *Tecnología y Construcción*, 18(II), 49-68.  
Acosta, D. (2000a), op.cit.
8. Such structural behavior has been proven worldwide experimentally at natural scale on walls subjected to severe and alternant lateral forces.
9. Technical report No. 209790. Evaluación de muros portantes del proyecto de investigación Desarrollo de sistema de muros de mampostería confinada de rápido montaje para la vivienda de bajo costo. (IMME 2004).
10. Technical testing would allow to apply the proposed system and would provide the design of buildings within the range, limits, and execution quality conditions resulting from this study.

# **PLANNING LESSONS OF THE AMERICAN DREAM: HISTORICAL LIMITATIONS AND DEMOCRATIZING POTENTIAL**

*Nezar AlSayyad*

## **Abstract**

*Images of the American landscape, and of its prosperity, have been transmitted all over the world through various media. At the heart of these images is the “American Dream” of a happy, productive household living in a detached single-family dwelling unit. This mythical ideal of domesticity has been articulated and pursued in the context of a political system and planning ideology that have evolved in unique ways.*

## **Introduction**

In reviewing the history of planning around the world, the importance of the American planning paradigm is readily apparent. In the postwar period, American aid and policy advice was widely dispensed to developing countries. The “project of development” had a distinctively American, and even imperial, flavor. Many countries in the developing world continue to look at the American model, often in idealized ways, in search of solutions and precedents that may help them deal with the complexity of their urban fabric. American planning, however, has a very unique history, one that is firmly rooted in specific political and social circumstances, and whose lessons cannot be deciphered independent of this historical background. In this paper, I will highlight the distinctive contours of the American landscape and explore the battles that continue to shape it.

## **Grid and House: The Context of American Urbanism**

An observer of the American landscape, viewing the landscape from the air, would be struck by the pervasiveness of the gridiron plan. Whether it is the densely developed island of Manhattan, the rolling hills of San Francisco, or the suburbanized sprawl of Los Angeles, the grid is present in all American cities, large and small. Some have argued that the grid was the easiest way to conquer land and residentially colonize wilderness, and indeed the American grid may be good proof of this argument (Kostof, 1987: 292).

The grid is the quintessential form of American urbanism. It owes its genesis to the Land Ordinance and National Survey of 1785, when it was set upon



two-thirds of the United States. The National Survey was one of the most thorough and extensive cadastral surveys in history, and it had a profound impact on every aspect of the socio-spatial structure of the country.

The survey was Thomas Jefferson's, the third U.S. President's, idea. Immediately following the Declaration of Independence, the original states holding western land claims like New York, Connecticut, Massachusetts, and Virginia, began to cede them to the U.S. Congress. The federal government extended these vast territorial holdings with purchases of its own from Indian tribes, and from the French. Jefferson wanted the occupation and settlement of these newly opened stretches of the continent to be orderly and equitable. His alternative to a feudalistic "Old World" sharply stratified between large landowners and multitudes of landless peasants was a "New World" with land neatly and equally divided among freeholders (Kostof, 1987: 16). Jefferson's proposal for a survey was authorized by Congress in 1785.

The National Survey was adopted to prevent the continuation of the arbitrary colonial ways of parceling and occupying land. The Ordinance provided that all prior claims be eliminated before the land could be surveyed. It specified square "townships" of thirty-six square miles each, further subdivided into 640-acre lots. These were to be put up for sale, except one, designated for schools. The law was later revised to allow for parcels smaller than a section to be sold; and finally, the quarter-section became the standard unit, viewed as the ideal size for the family farm.

The promise of the Ordinance was that all people, mainly the newly arrived European immigrants, would be able to share in the land bounty. Almost a hundred years later, the Homestead Act of 1862 formalized this ideology. It offered to give away 160 acres of land to any individual who would claim it and pay a nominal registration fee. One only needed to live on the land for five years, cultivate and improve it, before being granted its title.

In many ways, the Homestead Act made into law what was already a prevalent American ideology: the virtues of property ownership. Jeffersonian republicanism envisioned the ownership of property as a civil right of the highest order. What was at stake here was the formulation of a cultural identity, one that would be irrevocably linked to the American house.

But the house of the American dream came into existence only after another layer of historical developments. The most

dramatic of these was suburbanization – a steady outflow of population from central cities into residential communities, starting in the nineteenth century and then gaining momentum in the twentieth century. The early suburbs were exclusionary communities intended to escape the poor and unkempt masses of the feared cities (Kostof, 1987: 10). In the postwar period, fueled by the automobile, massive state spending on highways, and almost assembly-like production of housing developments, suburban settlements began to proliferate. The street scheme of these developed parcels was almost always a rectilinear grid. Even when housing markets started favoring curvilinear adaptations of the grid, with loops and cul-de-sacs designed for the exclusive use of residents, the basic constituent unit remained the detached single-family house, sitting on a standard lot.

This ideal suburban house is an essential element of the American Dream. It has come to signify the ownership of land, participation in the lush and ordered security of suburbs, and a sense of financial well-being bolstered through the mortgage system of an elaborate banking system.

“So the American house is much more than a house. It is a home, a sacred hearth. It is the American dream. And even though its promises and reality have come into question lately, for many, many people it remains the American dream. If they have not yet attained it, it will be the reward of hard work, proof of one’s social worthiness, the promise of security. If they have, they will struggle to hold on to it, or go it one better” (Kostof, 1987: 10).

But the real meaning of the house may require us to go deeper. Cooper Marcus reminds us that in America, the house is a mirror of self, endowed with the symbolic meanings of entrepreneurship and success. She argues that this ideology may partly explain why state interventions in housing have always been such a contentious issue: “America is the home of the self-made man, and if the house is seen (even unconsciously) as the symbol of self, then it is small wonder that there is a resistance to subsidized housing or the state providing houses for people. The frontier image of the man clearing the land and building a cabin for himself and his family is not far behind us. To a culture inbred with this image, the house-self identity is particularly strong. Little wonder then that in some barely conscious way, society has decided to penalize those who, through no fault of their own, cannot build, buy or rent their own housing. They are not self-made men” (Cooper, 1971).

Today, the freestanding, detached house and yard continues to be an integral part of the American cultural landscape. It is difficult to disentangle the attachment to this form from the fact that it subsumes territorial rights over a portion of land.

There is a formidable cluster of forces – from real estate firms to the building industry – that advertise and sell the house as home, the repository of the good and desirable life.

The commodification and consumption of housing is clearly not unique to America. What is distinctive are the specific cultural meanings that have come to be associated with the home and house form. The ownership and protection of property is an almost universal phenomenon. What is striking about the American context is how far homeowners are willing to go to protect their environments. Repeated incidents where encroachers are shot, and even killed, bear testimony to the specificity of a cultural environment where acts of trespassing are seen as violations of the self and a political environment where the means to act, in this case through violence, are readily available.

### **Laws and Regulations: The Evolution of American Planning**

It would be almost impossible to understand the development of American planning and its effect on American urbanism without grounding it in the historic context of individual rights and the evolution of legal regulations within the American political system.

Indeed, invoking the United States Constitution to decipher this relationship would not be farfetched. The Constitution, which calls for clear separation of the three branches of government into Executive, Legislative, and Judiciary, is strictly observed and often elevated by conservatives to a Quran-like or Bible-like status in American political decisions. Indeed, throughout its history, the U.S. Constitution has only been amended twenty-six times, the last one occurring more than twenty-five years ago. The U.S. Constitution guarantees specific rights like the right to privacy, under which abortion was first legally allowed in the United States; the right to free speech and expression, which allows the American press and media to ridicule public figures and elected officials, perhaps as in no other society; and the right to maintain a citizen militia, which allows individuals the right to bear arms and carry guns. In fact, the first planning initiative is contained in a right guaranteed by the Fifth Amendment to the Constitution: “no private property shall be taken for public use without just compensation.”

The struggle between public and private interests is a persistent theme in the history of American planning. As discussed earlier, the Land Ordinance of 1785 facilitated the rapid settlement of the American West through unprecedented land speculation. This marked the beginning of a period of private initiative barely fettered by a minimalist government. But there was trouble brewing in paradise. By the mid-

nineteenth century, industrial towns had mushroomed along railroad lines. In these settlements, worker housing was typically the railroad apartment, a privately built urban complex, 5 to 7 stories high, 7.6 meters wide, and 24 meters long, with little or no sanitary facilities. The deplorable state of this housing, and the lack of governmental interventions, led reformers to demand public control of housing conditions. In 1867, the first Tenement House Law was passed in New York City. While it legitimated the railroad apartment including the provision of sanitation, it precluded the development of anything worse (So, 1978; 22).

The first real change however came with a “New Law” written by social reformer, Lawrence Veiller, in 1901. A permanent tenement house department was created to administer the law, mandating wide air and light shafts between structures, and a toilet with running water in each apartment. At the national level, important changes were also starting to occur. The passage of the Federal Income Tax Act of 1906 was an important landmark in the Federal government’s ability to assert its right in collection taxes to generate funds for national purposes as well as the delivery of federal services. In the court case of *Welch v. Swasey* in 1909, the Supreme Court established nationwide the authority of communities to regulate development of private property through limitation of building heights. At the state level, Wisconsin’s Planning Enabling Act of 1909 granted municipalities the right to engage in city planning within its borders. At the city level, in Los Angeles, the Land Use Zoning Ordinance of 1909 created use zones applicable to areas of undeveloped land, a precursor to the zoning concept that would regulate future development. With the court case of *Eubank v. City of Richmond*, 1912, the Supreme Court declared constitutional the municipal control of the horizontal location of buildings on private property via set-back legislation. The New York City Zoning Code of 1916 was the first American comprehensive zoning ordinance that combined height control by zone, building setback control, and land use control. In the court case *Village of Euclid v. Ambler Realty Co.* of 1926, the constitutionality of comprehensive planning zoning came under challenge. The Supreme Court found in favor of *Euclid*, establishing the constitutionality of the comprehensive zoning. The ruling was to become the basic constitutional building block of American city planning (So, 1978: 36-39).

In many ways, this string of cases sets the regulatory mood for the initiatives of the Roosevelt presidency. In 1932, Roosevelt launched his “New Deal” program to focus on alleviating the depression through major public works projects. One of the key sectors to benefit from the program

was housing. The Federal Housing Act of 1934 created the Public Works Administration (PWA) and the Federal Housing Administration (FHA). The latter was granted the power of eminent domain to acquire housing sites, to engage in the construction of the projects, and to make grants and low interest loans to local housing authorities. Extended loan periods and reduced down payments made possible home ownership for the millions, significantly expanding housing construction. The FHA also established the first federal minimum housing standards in the US, focusing on single family detached owner-occupied houses. These initiatives formed the institutional context for the viability and popularity of the single-family suburban home, spawning tremendous suburban growth in the postwar period and limiting other housing possibilities.

### **Politics and Process: Democracy and Paralysis in Planning**

In the latter half of the twentieth century, American planning evolved into what is essentially a regulatory profession, mediating and balancing private rights vis-à-vis the public good through federal laws, state regulations, and city ordinances.

This mediation takes place within specific institutional conditions. With the exception of some environmental laws that regulate state and local actions, the U.S. does not have national legislation prescribing land use and management. In the 1930s, the National Resources Planning Board, a federal agency, was severely challenged and eventually abolished in 1943. The abolition went so far as to stipulate that the Board's functions could not be transferred to any other agency, in effect nullifying federal planning controls (Scott, 1969: 407-409). Today, while some federal environmental laws impact state and local actions, they do not provide the legal basis for planning. Instead, it is the federal and state constitutions, along with legislative precedents, that provide the legal basis at the local level. While state governments have the right to regulate urban land uses, these are most often delegated to city governments.

At the city level, there are three key institutions in the planning process: the legislative body, the planning commission, and the planning department. The local legislative body usually activates the planning commission, finances it, approves its members, and supports its activities. Upon recommendation of the commission, the legislative body translates the plans into action. Where there are charges of violation of state or federal law, the courts intervene

in the planning process. Their decisions are often final, unless a higher court appeal is rendered. The planning department is a governmental agency with the technical staff needed to prepare comprehensive plans, formulate zoning ordinances and subdivision regulations, and coordinate with other departments, functions like transportation, education, health, recreation, and construction.

The planning commission is the legal institution of the city that performs the bulk of planning functions, including comprehensive planning, zoning ordinances, and subdivision codes. It is composed of a group of private citizens often appointed by the mayor or the city council. In some cases its members or commissioners are elected. These citizens are business leaders, notable people in different professions, or community leaders. They usually do not have professional planning experience, training, or education. All city departments are required to submit their plans for review and approval to the planning commission. If the planning commission's responsibilities become too complex, a zoning and appeal boards is often created.

Since the planning commission lacks legislative power and has only limited administrative authority, its value has been questioned by some experts. Others, however, argue that it plays an important role as a forum for the discussion of the diverse interests and perspectives involved in a planning process, therefore constructing a solid democratic foundation for the policy decisions of the legislative body (Gallion, 1980: 194). Indeed, the provision for mandatory reviews by the planning commission must be seen as part of a gradual shift from planning as a rigid end-state to an incrementalist decision making process (Scott, 1969: 245).

Interestingly enough, the planning commission as an institution has roots in turn of the century reform movements, which sought to weed out corruption and ineptitude in local government. Reform advocates distrusted old style politics, and strove to separate community matters from political control. A planning commission citizen board suited these purposes. In this way, public utilities, school boards and other major community issues were removed from the control of mayors or city councils and placed in separate commissions. The insertion of a lay citizen board between professional planners and elected officials was perceived as a welcome alternative (So, 1979: 65). The notion of an independent planning commission was also fostered by the Standard City Planning Enabling Act of 1928, and has since then been the most basic planning organization in the U.S. The intent of the Act was to make planning

commissions “the guardian of the plan and the nonpolitical champion of the people’s interests” (Scott, 1969: 245).

There have been two major problems with the commission model. First, as at other levels of the American political system, special interest politics often shape agendas, with commissioners failing to represent the interests of the broader community. In this regard, the attempt to make the planning commission a nonpolitical institution has rather predictably failed. Second, the absence of professional expertise can impede planning decisions and result in a lack of vision.

Planning at the local level has become increasingly important in present-day America. Since the 1970s, this arena has been shaped by two striking developments that are changing how planning mediates between public and private interests. One trend is an increase in federal, state, and local interventions for environmental and consumer protection, and the needs of special groups, like the disabled. The second is a strong ideological trend against regulation. The deregulations that have occurred as consequence of this political climate have taken two paths: attempts to change the legislative regulatory basis at the federal and state levels, and disputes in the courts. In recent years, a series of rulings by the Supreme Court have challenged the way in which local government regulate land use, establishing tighter limits to regulation (Teitz, 1996).

The two trends represent the simultaneous engagement and disengagement of federal, state, and local governments in different spheres of action. In the shadow of these public battles, there has been a steady campaign that is inextricably shaping the American landscape. “Not in my Backyard” attitudes or NIMBY have become the rallying cries for residents who, through their local governments, employ zoning and subdivision ordinances, building codes and permitting procedures to prevent development of special land uses in their neighborhoods. Land uses that are often resisted include low income housing. These attitudes usually stem from fear that such housing for low income people and other such uses will lower land values, create demand for new infrastructure, and decrease the quality of life through augmented density and traffic.<sup>14</sup> NIMBY-induced conflicts seem to be on the rise in most American cities (Dear, 1992: 297).

NIMBYISM is not the only phenomenon on the American planning scene. NIMTOOISM or “Not In My Term Of Office” attitudes have also emerged among politicians and representatives who resist taking any unpopular



action during their term of office (Kean and Ashley, 1991). These elected officials are increasingly having a hard time confronting their constituencies, as they perceive that the political cost is too high, including risking their careers or at least the possibility of reelection.

Although NIMBY and NIMTOO attitudes may be found elsewhere, in America they have been particularly nurtured by the system of laws and regulations within which planning takes place. For example, because zoning processes require that neighbors be informed about proposed land use variations, strategies of opposition have been mainly focused on zoning hearings. These information and public hearings have thus been transformed into sites of community conflict, with citizens wielding the power to stall growth. In such contexts, planners have become managers of conflicts who have to use legal strategies to perform their basic duties (Teitz, 1996: 650). Indeed, as Dear predicts, if the NIMBY (and NIMTOO) trends persist, the United States could “regress into a new feudalism ... marching backwards towards the imaginary safety of feudal fiefdoms defended by NIMBY walls” (Dear, 1992: 288).

In many ways, such local wars over territory signal a shift – even a crisis – in American planning ideology and politics. As states and localities develop their own practices, there is a growing institutional complexity with increasing numbers of decision-makers. This new context has fostered novel planning approaches, such as negotiation, consensus building, and other conflict management strategies intended to circumvent conventional political and judicial processes. Also propelling the crisis has been a conservative agenda wherein votes are increasingly rejecting government commitments and regulation and protesting increased taxation. As Teitz concludes: “Bizarre as some of those manifestations may appear, they are, in many respects, only the extreme of a very broad tendency, that we may call planning without planners or governing without government” (Teitz, 1996: 651).

### **The American Dream and the Market: Concluding Thought on the New Urbanism**

This brief overview of American planning underscores its uniqueness and complexity, as well as the great challenges that confront the profession at the end of the century. The challenges have become the grist for a mill of furious philosophical debate and practical experimentation.



One of the recent experiments to emerge on the American planning scene has been a design movement called New Urbanism, which claims to be the panacea for American social ills. This declared anti-suburban movement has captured the attention of a growing professional and academic audience. New Urbanists propose to correct social and economic segregation and foster a sense of community by the creation of dense developments with a broad mix of housing prices and land uses.

New Urbanists claim that their vision is an alternative to the segregated, sterile and alienating postwar suburbs produced by the rational planning paradigm. In contrast, they seek to create neo-traditional communities, rich in social diversity and held together through neighborly bonds. The key mechanism of change is to be physical design: a planned, controlled and zoned environment where everything from the layout of streets to the form of porches will ensure the building of community. Critics have pointed out that such forms of environmental determinism are not only doomed to failure, but also are insidious in their social engineering aspirations (Landecker, 1996. Pollan, 1997). If turf battles in American localities have created an incrementalist, and often stalled, planning process, New Urbanism seeks to impose a dictatorial solution with decision-making vested in the hands of an exclusionary triad of real-estate developers, design professionals, and large corporations. Conspicuous by its absence is the public.

Perhaps the most striking demonstration of these trends is Celebration, a master planned community by Disney in the state of Florida. Celebration is distinguished by its elaborate zoning and design New Urbanist codes, a tome of "Covenants, Codes and Restrictions." But more important is the fact that the town is designed, planned, and operated by a private corporation, Disney Inc. If its controlled "cutescape" is reminiscent of Disney theme parks, its political structure is ominously different from other American localities. Here, governmental powers rest in the Disney Corporation and the town hall is essentially a "one-stop shopping center" staffed by Disney executives (Pollan, 1997). Surprisingly, Celebration is not all that different from the master planned communities that are springing up all across America. Managed by homeowner associations and marked by the privatization of municipal services, these enclaves pose a challenge to the American planning system.

New Urbanist communities then are in effect privatized developments, as exclusionary as the suburbs they seek to replace. The invocation of “community” is at best a marketing catchword intended to draw a specific group of consumers; at worst, its narrow definition, is a willful disengagement with issues of class and race (Hall, 1998). The promise of “community” has however turned out to be seductive. Recently, the federal Department of Housing and Urban Development adopted New Urbanism design guidelines to promote development in previous public housing sites.

Does New Urbanism portend the end of American planning? Does it signify the outright privatization of the decisions that shape the American landscape? I see New Urbanism as a manifestation – albeit extreme – of the ideologies and practices that lie at the core of the American planning paradigm. The New Urbanist promise of a sanitized but vibrant community is a resurrection of the American Dream, altered to fit the consumerism of the 1990s. The bypassing of local governments and the cozy alliance with private corporations hearkens back to frontier days and touches on what has always been a touchy topic in the American political culture: governmental power and its limits.

But the experience of New Urbanism also has continuities with the possibilities of American planning. Despite Disney’s efforts to engineer a post-political community, politics eventually moved in (Pollan, 1997). Residents became terribly frustrated with the inability to participate in decision-making processes. When conflicts erupted over school curricula, some of them realized that they lacked the means to articulate and effect change, eventually moving out. The ideal of a utopian community had been disturbed but the dialogic reality of American planning was restored. This more modest ideal is one of democratic participation and citizen initiatives. It is not as seductive and comforting as the American Dream but is nevertheless central to the endeavor of creating a livable American landscape.

In 1997, a journalist from the New York Times visited the town of Celebration. As he walked through the streets lined with cottage-like houses and carefully manicured front yards, he noticed a Victorian with bright red curtains in the window. He remembered a notice he had read in the newsletter of the homeowner association: “Please refrain from using brightly colored or patterned curtains. It looks icky from the street.” “Icky?” he thought, pondering on this rather ridiculous word, “This was Big Brother in the 1990s, Big Brother with a smiley face” (Pollan, 1997).

But those red curtains made a statement. Defiant red curtains in the window of a Victorian home in a near-simulated suburban environment in warm Florida. This is the essence of American Planning. And the lesson here is that its democratizing promise is but a product of a unique ideology and practice. It is both impossible and impractical to attempt to replicate this planning model elsewhere.

## Note

This chapter is based on several research projects by the author. A different version of this work was published as a paper in the journal *Prostor*, Vol 6, 1998.

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## **ETHICS AND THE GRAPHIC PROBLEMS OF HYPERMODERNITY**

Leslie Becker

### **Abstract**

*Graphic designers are responsible for many of the images seen in contemporary popular culture. Many of these images constitute perhaps less than honest representations, particularly once they circulate across media where they are reinforced by other similar images and, in most cases, primarily serve consumption. This piece is a brief look at the current conditions of the image and image-generating pedagogy and introduces a hybrid method of ethics intended for use inside design studio practice to make the process of creating images a more conscious, conscientious, and connected one. Ultimately, the method is intended to be valuable, inclusive, and pragmatic. In order to be effective over the life of the practitioner, the method needs to be introduced within the context of design pedagogy so that it can be embedded in the design process and become a routine activity of design practice. This focus is on developing designers who will practice with knowledge about what it means to make a responsible image.*

### **Introduction**

Graphic designers make goods and services visible to a general public through intentionally constructed images that produce consumer desire, obliterate the ability to distinguish between want and need, often seduce the viewer into making an unnecessary purchase, and influence the identity of the consumer. It is argued here that although the recent environmental crisis is a crisis of excess in goods, it also a crisis in excess of images that announce and promote these goods. The practice of making images that are seen across multiple media brings with it a demand for some rigorous reflection about the integrity of those images, particularly for what and how content is represented in commercial imagery. This responsibility rests largely upon the shoulders of the graphic design practitioner. Despite the general impermanence of graphic imagery and a rather widespread tendency to trivialize or dismiss its significance, the work of graphic design needs to be viewed as having both social and economic impact because its material manifestations are quantitatively substantial, qualitatively influential, and omnipresent in popular culture. My focus shifts here from end concerns about adverse environmental impact that result from the work of print and electronic graphics that, although important, are not seen here as the real culprit, to the often-coercive image that encourages less-than-conscious spending and produces waste far greater than the papers upon which the images may have been printed.

The products of graphic design typically are categorized by an orchestrated combination of words and images with images. The images, frequently photographic in nature, often convey an aura of credibility and fact. Insistent/persistent graphic images in popular culture – designed artifacts and design(ed) ideologies – are largely unavoidable, insinuating themselves on the broader culture. Contemporary graphic design may be in a more productive tension with social disciplines [1] than the traditional discipline of art history because its artifacts live in popular culture and simultaneously engage the audience linguistically and visually, relying heavily upon the orchestrated synergy of word and image. What, then, ought graphic designers anticipate about how social and economic behaviors are altered by images in popular circulation as they develop images in the relative isolation of the studio? While design has understood its ethical responsibility mostly as a material problem in terms of sustainability, the role of the image itself can be queried as a significant contributor to the creation of that excess. This work attempts to situate graphic design work within an ethical framework by recommending an ethical framework that can be situated within graphic design.

### **Images and Image-making Pedagogy**

Current design pedagogy seems relatively complex when compared with the bounded pedagogies of early-to-middle twentieth century and the seeming certainties that accompanied the rise of Modernism and post-Bauhaus curricula. Skill-based, professional knowledge, allowing one to create an image with typography and graphics and then to reproduce it in multiples, remained a knowledge set unavailable to the general public, residing primarily in institutions that prepared designers and artisans for graphic design and related professions (such as the printing trades). Current design students continue to master formal design skills that have been valued since the Bauhaus curriculum began to dominate European-influenced design pedagogies. However, the decline in constraints resulting from vast technological changes in the means of image production and distribution has fostered a somewhat artificial sense of autonomy, a tendency to dismiss historical precedent, and a general disinterest in understanding an individual image as one among a broader context of images.

An initial question concerns whether or not particular image genres are inherently problematic and, therefore, worthy of interrogation. Obvious candidates might include blatant claims of social justice and philanthropy embedded in commercial images: claims of environmental responsibility wrapped into a marketing message; highly retouched

images (especially of women); and even certain types of critical graphic information (emergency signage, medical labels, nutrition labels) that may result in life-threatening consequences if inadequately designed and user-tested. Awareness of the ability to blatantly alter (falsify) a photographic image has produced a rather broad acceptance of the act of deceiving. Consciousness seems to evaporate at the site of reception where the photograph retains its “documentary” or factual quality. Additionally, the following behaviors might be worth scrutinizing, even prior to isolating a method of ethics, because they are blatantly known: deliberate manipulation of images (visual lying), knowingly using design expertise to questionable ends, using tokenism in representations of varying gender identifications or ethnicities, failing to understand the influence of multiple images as a result of mimesis and repetition, and employing styles that may obscure or hamper the delivery of critical information.

As new technologies deliver an increasing availability of surfaces that deliver images, a concomitant increase in mimesis is noticeable. A recent and growing genre of commercial images depict responsible corporations (especially socially, environmentally, or philanthropically) and create a public notion of what corporate responsibility *looks* like. Marketing concepts hidden inside images of corporate social responsibility (CSR) often mask less than desirable corporate behaviors. In order to create responsible representations, designers will need the knowledge to vet the images they develop so that they can decipher, prior to publication, the integrity of those images. This will require that designers refuse to produce images that misrepresent those questionable corporate behaviors that are knowable. Images that portray a responsible corporation tend to manage public perceptions of either that in which the corporation is most invested, or where the corporation most needs to perform damage control of its brand. The best way to instill a sense of responsible representation, or what I term corporate *visual* responsibility, is to embed as routine within design pedagogy the practice of vetting the image to decipher what constitutes ethical imagery. After evaluating several methods of ethics, a method is recommended that is a hybrid of recent iterations of communicative ethics and casuistry, a case-based method. The broader goal is to integrate into design practice enquiry about the justness of representations in popular culture as these images are being developed and to have designers understand that their ethical responsibility is intrinsic to the images they produce.

The current generation of undergraduate design students appears to behave in much like a helicopter does as it lands: they are a perpendicular generation. Often resistant to externally imposed conditions, they zoom in and make connections in a nonlinear way, skating across surfaces, parachuting into web sites, and apparently aggregating what they see. Staying online in the classroom may allow those who are primarily visual learners to *share seeing*, creating a visual learning space that is productive, inclusive, and spontaneous. As a pedagogical practice it sets up the possibility for a discursive space that facilitates understanding of dense, assigned readings while maintaining a fluidity that current learners seem to require. This generation, even in the face of the constraints of school-based projects, has acquired an entitlement of technology-granted autonomy that bestows upon them the ability to make, receive, and edit images. Although images produced by designers are mostly intended for a broad and external audience, over-isolation and speedy covering of surfaces by design students can be re-focused within an ethics investigation. Interest will be implicit because the discussion is centered on the work of the students and the work of other designers in whom they display an interest.

### **Engaging Ethical Enquiry**

Introducing ethics into design pedagogy serves multiple purposes: it teaches the current student to slow down and investigate some thing in depth; it brings into studio pedagogy and makes relevant those humanities that are so often seen as perfunctory requirements of those who attend school with a singular focus on becoming practitioners. Most importantly, it offers a means to ethical behavior to a profession that is increasingly being subsumed by the profit motive driving commerce. It should be noted that most design schools in the United States offer two very discrete curricula, humanities/sciences and studio practice, in order to meet the varying accreditation standards of the major accrediting bodies [2].

Additionally, among the current population of students who heavily value action over reflection, shifting this emphasis may be difficult at the outset for a generation that is accustomed to ease of access to changing sensory input, but is, I argue, a valuable and necessary component of a high-quality education [3]. The pedagogy that prepares the student for practice has a particularly long-lasting effect not only upon the knowledge with which one begins working life but, perhaps more importantly, upon one's ability to continue to be receptive to new ideas, to be challenged,

rather than threatened, by the unfamiliar, and to be capable of deciphering the ethical value of what is, today, still unknown. Therefore, it is reasonable to assume that worthwhile education results in evaluative abilities, self-reflection, and assessment of that which is new, and how what is new might be incorporated into (and, potentially, restructure) existing knowledge sets. Embedding a method of ethics within design pedagogy has the potential to provide the student with lifelong skills: the abilities to reflect and evaluate, as long as the method is functional within studio practice. Much of design education remains discrete from the humanities and, therefore, assumes only a secondary importance both to the design student and the design faculty. Ethical enquiry in the studio narrows this gap.

Developing a reasonable degree of personal autonomy ought to be another of the outcomes of undergraduate pedagogy. This requires acquisition of knowledge inside and outside of a design discipline. Autonomy (an individual and internal condition) will allow the designer to navigate in situations that provide varying degrees of freedom (an externally granted condition). What is implied by autonomy is the ability to self-govern, to decipher what merits priority in any design project, and to develop a modicum of certainty about the limits of one's knowledge, at a given point in one's personal development. Autonomy, an attribute of maturity, may work with comfort with the loss of privacy experienced by the social network generation, opening a pedagogical space characterized by a lack of embarrassment that may extend to a lack of embarrassment in *not* knowing, and receptivity to operating in the uncharted waters of ethics.

After evaluating the practicality of various methods of ethics (in previous work that contains far greater details and exceeds the scope of this writing), a hybrid method based upon communicative ethics and casuistry may be most productive in the design studio. A regular segment of studio time should be devoted to ethics discussions regarding student work and follow assigned readings in communicative ethics and casuistry. Students would be granted a good deal of freedom to make decisions in concert with faculty: for example, to determine which projects should be considered for review and who should be sitting at the table when a project is reviewed [4]. Pedagogy can institute a way of interrogating the image so that it becomes a process integral to practice in much the same way that formal design skills are carried from pedagogy into practice. The proposed method of interrogating an image is intended to infuse the site of image production with a form of reflection about how the image might be received. Although anticipatory,



this reflection is based upon an accretion of knowledge from having vetted not only the conditions surrounding a current design project, but other antecedent and concurrent images and how they have behaved in circulation.

Communicative ethics offers a functional approach that could be used in the studio environment in which students produce graphic images. Derived from Kant's categorical imperative (and grossly oversimplified here, to that which is rational is moral), Frankfurt School philosopher Jürgen Habermas argued for discourse as a means to resolve complex issues. Interested in the development of competency in communication that would allow individuals to engage in rational discourse, Habermas claimed that it was "real argument (that) makes moral insight possible." [5]. His conditions were based upon motivating the other actors to rational speech, rather than to influence. Contemporary feminist philosopher Seyla Benhabib further refines communicative ethics and rejects ethical formalism by asking more postmodern questions about authority and who gets to decide who should be heard. Benhabib, therefore, by providing a discursive space for those typically marginalized by (the traditions of) analytic philosophy, also situates argumentation as a replacement for Kantian universalizability [6]. Benhabib focuses on the question, "Instead of asking what I as a single rational moral agent can intend or will to be a universal maxim for all without contradiction, the communicative ethicist asks: what principles of action can we all recognize or agree to as being valid if we engage in practical discourse of a mutual search for justification?" [7]. Her break with Habermas is a partial one, but is most distinctive in her understanding of who meets the criteria to have a voice. Benhabib's philosophical critique of what he proposes tends towards circularity, meaning, as she describes it, that the "normative content precedes the moral argument itself" [8]. Of course every deliberation must be seeded by something to which a group can begin to respond, something that can be construed as normative.

Casuistry is an old Christian theological method that fell out of favor hundreds of years ago because it was seen, during the Counter-Reformation, as manipulative. It has enjoyed a resurgence among professional ethicists (biomedical ethics, for example) because it has a pragmatic quality to it and recognizes ambiguities in any case that concerns moral right actions [9]. It is, at its root, a case-based method that establishes paradigmatic cases to guide professional casuists in making determinations, in concert with those affected by and involved with an ethical question under review, what the case at hand is

like. If, in fact, those trained in casuist methods do not see a likeness to existing cases (which actually help decipher thinking and resolution – because in casuistry resolving an ethical question is a moral requirement), a new paradigm is established. For design, this would require, probably for each design discipline, the development of a set of paradigmatic cases. As a method it would also guide enquiry, discussion, and resolution, and provide each discipline, through the recording of cases, with its own ethical history.

Over time, a new body of knowledge would emerge that becomes paradigmatic for casuistry as it is applied to design. Eventually, numerous case studies would be recorded for future reference, and design faculty who have developed an expertise in this method would become proficient in helping to constitute relevant groups to examine ethical questions and guide a process, part of which would involve comparing a problem under investigation with prior cases. Several important ethical questions arise. Who may determine that an image is problematic and worthy of investigation? Who should participate in the investigation? To what is this case similar and how was that one resolved? The first two questions are derived from recent iterations of communicative ethics and the last question is derived from casuistry. An assumption must be made from the beginning of the investigation that some form of rational language is shared among participants despite potentially discrepant points of view about the nature of a problem and how to resolve it, both of which should be deciphered during the process of investigation.

One of the most critical aspects of this hybrid method is derived from casuist experience. The question that propels an investigation must shift from one of action to one of rightness. Asking an assembled group to consider “What do we have here?” provides a relatively safe space for voicing multiple and varying perceptions of a condition. However, if the investigation begins with “What should we do?” it favors a quick solution and fosters a climate unfavorable to a deliberative, reflective process. It has the effect of causing each individual to dig in her or his heels and argue for an action that *a priori* is held as right action before coming to the table to investigate. Such a suspension of action is a difficult shift for a culture that equates success or rightness with action/efficiency and values it above reflection/right action. “What should we do?” causes a premature alignment of a position and tends to close options. “What do we have here?” allows each person at the table to instigate discussion about respective perspectives. Additionally useful is philosopher Jacob Needleman’s requirement that those involved in an exchange learn how to listen. This means suspending

judgment and resisting the commonplace tendency to formulate a rebuttal to what is being said *while* it is being said. Needleman views learning to listen in this way as a supremely moral act [10]. It also further stalls the tendency to rush to judgment that, in most instances, becomes a rush to action as *solution*, but perhaps not as *resolution*.

In a discussion with Professor of Social Ethics, William R. O'Neill, SJ [11], he suggested that a study of ethics could start by considering those cases found most interesting in one's personal history. He offered the following questions as relevant ones (and, I would suggest, also normative starting points): why are these cases interesting, what is happening in novel practices such as medicine, biology, religion, business (and now design), what are the problematic cases, what are the cases that are not fully elaborated, and what is new or novel. These are good initial questions to introduce ethical reflection to a group that is unfamiliar with formal methods of ethics. O'Neill then suggested a set of questions that, although they would require a degree of philosophical familiarity to decipher, still have relevance in the design classroom because they make evident the amount of rigor necessary to think critically about the issues, and they imply a methodological rigor. These questions include: what doesn't count as an answer, what does count as an answer, and how has the question changed (over time or in different cultures). O'Neill also asked about what counts as social good and justice, what constitutes human flourishing, and what are images of virtue (virtue ethics being a favored method in Christian theology). Among his most important points was the belief that there is no common measure of goodness that will be made evident, but also that this is the reason for selecting a discursive method. For designers, and in the context of understanding graphic imagery, his questions, "What is coercive?" and "How can we see justice in the context of the role of images?" are particularly relevant and in need of definition as cases are negotiated and paradigms established. When asking about the usefulness of rules, for example, invoking rules may be helpful in establishing procedures for interrogation of images, but not for issues of exclusion or inclusion of particular genres of content. No one answer is satisfactory because image production is so varied, personal, public, private, and changing. What O'Neill proposed with these questions, when used in addition to the combined and more specific use of casuist and communicative ethics, provides a good introduction to the kinds of issues with which analytic philosophers wrestle. They help to put a designer in a more engaged and receptive state because they are understandable as questions, although many of the questions involve complex.

Ultimately, can a method of ethics be useful in a practice that typically equates time spent with money earned? Hopefully a method for practices that are so preoccupied with how time is used can begin to make ethical assessments about the effects of its works and make these explicit within what has been the relative isolation of designing. Embedded within what becomes design knowledge and process inside pedagogy, the intention is that it has the same lifelong effect as the studio education and instills in the student the belief that designing well is designing responsibly. Rigorous and investigative as a method, it needs to ask and answer the question of what constitutes eudaimonia - flourishing. In this case it means flourishing for more than the designer and the client.

## Notes and References

1. Disciplines such as sociology, psychology, anthropology, and cultural geography are particularly related to design because design produces artifacts with which humans interact and to which they respond in some manner.
2. The two bodies that grant accreditation to schools and colleges have different assessment emphases. NASAD (National Association of Schools of Art and Design) is mostly concerned with learning goals and objectives in studio-based undergraduate education. The regional Associations of Schools and Colleges are focused on academic quality.
3. One could diagram the typical degree of patience required for various design disciplines as follows: the greatest patience is required by landscape architects and the least by graphic and fashion designers. The latter two typically are engaged with novelty, seduction, and impermanence – all relatively short-term commitments. However, the landscape designer rarely lives sufficiently long to see the soft-scape results of her or his work.
4. Those at the table might include classmates, studio faculty, philosophy faculty, and content mentors, for example.
5. Habermas, J. (1995). Discourse Ethics: Notes on a Program of Philosophical Justification. In S. Benhabib and F. Dallmayr (ed.), *The Communicative Ethics Controversy*. (p. 62). Cambridge, MA and London: MIT Press. This text would be particularly useful within a design curriculum because Habermas offers explicit and understandable “rules” for participating in the discourse. Some parts, however, may provide to be difficult reading, and others may provoke questions about what constitutes the “competence to speak.”
6. Benhabib, S. (1995). Communicative Ethics and Current Controversies in Practical Philosophy. In S. Benhabib and F. Dallmayr (ed.), *The Communicative Ethics Controversy*. (p. 331). Cambridge, MA and London: MIT Press.
7. Ibid., 336.
8. Ibid., 338.
9. Preston, R. (1991). *Christian Ethics*. In P. Singer (ed.), *A Companion to Ethics*. (p. 94). Oxford, UK: Blackwell Publishers Ltd.
10. Philosopher Jacob Needleman talked about moral behaviors in a radio discussion. 14. March 2007, (National Public Radio, San Francisco Bay Area, 88.5 FM).
11. These questions are the result of my meeting on Monday 23 June 2003, with Professor William R. O’Neill, SJ, Associate Professor of Social Ethics at the Jesuit School of Theology in Berkeley as I began to think about ethics and images.

## **CALIPHS, INTENTIONALITIES, AND THE DESIGN PROCESS**

*Humberto Cavallin*

*“Great Caliph,” he sentenced, “does the new formulation appear to you to be subversive?”*

*“Maybe it is.” The Caliph replied, “But I admire that you have formulated a rule that everyone can observe, a rule that the Caliph who enacts it must be the first one to follow.”*

*Gonseth, in: Protzen, J.P. (1981, p. 19)*

### **Introduction**

Non-analytical forms of knowledge have been a precious asset for architectural designers. As Lang (1983) poses it, many processes in environmental design occur subconsciously based on powerful internal systems of logic that we do not understand. However, many architects and academics are not willing to openly accept that their rationale is not purely based on analytical modes of thinking and decision-making.

It is, however, understandable why non-analytical thinking has been so consistently illfated throughout architectural history, particularly during the last century. Architectural Education has traditionally operated within the domain of academia. Thus, there is a tacit consensus that analytic ways of thinking and decision-making are not just better, but the right way to proceed. A large part of the educational process in academia involves teaching people to think analytically, under the conviction that this type of knowledge is susceptible to being transmitted and evaluated in an objective manner, and will, in turn, lead to successful design solutions.

This style of education and practice builds upon the principle that Schön calls technical rationality; a style that rests on an objectivist view of the relationship between the knowing practitioner and the reality they know. According to Schön, “facts are what they are, and the truth of beliefs is strictly testable by reference to them. All the meaningful disagreements are resolvable, at least in principle, by reference to the facts” (Schön, 1987, p. 36).

However, as Schön points out, there is more to professional knowledge than just objective knowledge. Nowadays, both practitioners and professional societies have started to develop concern about the nature of practice, and the role non-analytical knowledge plays in it.

In order to discuss about these intangibles of the design process, this paper will follow on a discussion initiated on an article that I coauthored with Ann Heylighen and Mateo Bianchin, entitled “Design in mind” (Heylighen, Cavallin, and Bianchin, 2009). In that article, we made use of John Searle’s notion of intentionality in order to explore the distinctions between design and research, by deconstructing the different mental acts associated to the actions that designers and researchers establish with the objects in the world.

With the purpose of discussing the implications of those findings for the analytical/non-analytical debate in design, I will revisit methodological approach to the design process used in that article, emphasizing this time on the role that designers’ subjectivities, as beliefs, desires, and intentions, play in the design process. This paper will conclude with some reflections on the necessity to revisit the discussions initiated more than three decades ago in the Design Theory and Methods arena regarding this important issue.

## **Intentionality and the DOF**

Intentionality is a concept coming from the philosophy of mind. I will use the definition of intentionality developed by John Searle who states that intentionality is a property of individual mental states and events by which they are directed at or about or of objects and states of affairs in the world (Searle, 1983). These mental states are ones that direct to objects or processes in the world, resulting in beliefs, hopes, and desire that are *about* the world.

According to Searle’s definition, intentional states can have two possible *directions of fit* (DOF), according to how propositions relate to the world:

The different types of intentional states relate the propositional content to the real world with, so to speak, different obligations of fitting. Beliefs and hypothesis are said to be true or false depending on whether the word really is the way the belief represents it as being. For this reason, I say that beliefs that have the mind-to-world defection of fit. It is the responsibility, so to speak, of the belief to match an independently existing world. Desires and intentions, on the other hand, do not have the mind-to-world direction of fit, because if a desire or intention is not satisfied it is the responsibility, so to speak, not of the desire or intention, but of the world, that it fails to match the content of the desire or intention (Searle, 1998, pp. 100-101).

There are mental states associated to each DOF. Cognitive states, such as belief, take place when a proposition is grasped as patterned after the world. To satisfy cognitive states, they must fit the world as it is. This fit can be qualified as either true or false, depending on how the cognition fits reality.

Conative states, such as desire, take place when the proposition is grasped as a pattern for the world to follow. To satisfy conative states, the world must adapt to fit them. In other words, whenever you discover you have a false belief, you may want to change your belief in order to make the representation fit how the world is; but whenever a desire is unfulfilled, you rather may want to change the world (Heylighen et al., 2009). Satisfaction of conative states cannot be truly or falsely satisfied if the world-to-mind direction, nor the state of affair represented need to actually exist.

### **DOF and the Design Process**

The activity of designing is a complex one, and many models have been produced in order to capture the different actions designers perform, and the progression they follow. The first major attempt to reunite individuals interested on the systematic studying of this activity was the Conference on Design Methods organized in London in 1962 by J. C. Jones, Peter Slann, and D. G. Thornley (Bayazit, 2004; Cross, 1993). According to Bayazit (Bayazit, 2004), the methods proposed at the conference were simplistic in character. Everyone was systematizing his or her own approach to design, and externalizing it as design method. The purpose of the Design Methods groups during this period was to examine

rational methods of incorporating scientific techniques and knowledge into the design process to make rational decisions to adapt to the prevailing values, something that was not always easy to achieve. They were attempting to work out the rational criteria of decision-making, and trying to optimize decisions (Bayazit, 2004, p. 19).

Classic texts in design methods by Asimow (1962), Alexander (1964), Archer (1965), Jones (1970), and Broadbent (1973) were published during the decade that followed the conference. In general, the approaches supported by the theories developed during this period shared the view of a design process based on rational/analytical approaches. These approaches described the activity of designing as a series of steps or stages in which the designers: First, define a solution space and its constraints; second, generate a solution; and third, evaluate its effectiveness.



The analytic point of view towards the design process can be inferred from the scientific aura that impregnated the models. Asimow was a chemical engineer, and his book was oriented towards engineering design. Archer, who was a teacher at the Hochschule für Gestaltung (HfG) and the head at the Design Research Unit in the Royal College of Art in 1964, based his method on critical path analysis. Alexander was trained as a mathematician.

It would be beyond the scope of this article to exhaustively analyze all the different models that have been produced so far to describe the design process. We are selecting two approaches to design: design as a staged process, and design as a transformation process, and use them to provide an idea of how DOF vary towards the inside of a design process.

Starting with the work by Morris Asimow (Asimow, 1962), several models represent the design process as a sequence of stages that can be summarized into the steps of *analysis-synthesis-evaluation* previously mentioned (Broadbent, 1973). Asimow described the design process as being composed of two structures: a vertical one that involves a sequential phasing of activities – from the definition of needs, feasibility study, and preliminary design over detailed design and production planning to actual production – and a horizontal one in the form of an analysis-synthesis-evaluation-communication cycle, common to all phases.

A more contemporary version of this type of models, the one developed by Gero and Kannengiesser, considers the staged process from an information process perspective (Gero, 1990; Gero and Kannengiesser, 2002), by assuming the existence of three classes of variables: *functions*, *behavior*, and *structure*. These variables are transformed one into another through design. According to this model, the purpose of designing would be to transform the function into a design description in such a manner in which the structure of the artifact being designed is capable of producing the function expected from it.

The transformations included in the model extend the *analysis-synthesis-evaluation* sequence of previous models by adding three extra steps: *formulation*, *reformulation*, and *documentation*. The *formulation* step is the first one in the sequence and transforms the function into behaviors of the structure that are expected to enable this function. However, when structures are being produced and evaluated, other behaviors might arise that can lead to a *reformulation* of the structure and/or the expected behavior. Finally, the *documentation* stage transforms the structure into a series of

Fig.1

<i>stage</i>	<i>DOF</i>
formulation or specification	↑
analysis	↓
synthesis	↑
evaluation	↑ ↓
reformulation	↑
documentation	↑

instructions intended to be implemented in the world.

When analyzing this formalization of the design process in the light of Searle’s theories of intentionality (see Fig. 1), the **analysis** stage may be characterized by a mind-to-world DOF: designers collect information that enables them to know more

about the design situation at hand. Subsequently, designers transform this information through a process of **synthesis**, which switches the DOF. The ultimate goal of this stage is to come up with a design proposal that, when realized, changes the world such that the needs defined are addressed. Once a proposal has been produced, the **evaluation** stage tries to assess to what extent the needs will indeed be addressed. Because what is evaluated does not exist yet, but has to be actively imagined/modeled by the designer, this stage may be considered to have both a world-to-mind (imagination/ modeled) and a mind-to-world (evaluation) DOF.

Finally, the **documentation** process is characterized by a world-to-mind DOF. Documents produced in this stage do not intend to represent the world as is, but to communicate to other actors how to change it. In the documentation stage, designers produce drawings intended to support the communication of their ideas to others, who eventually should enable them to change the world such that these ideas are materialized and the conditions set by the designer satisfied.

When we evaluate these selected processes/stages as a whole, we can observe that in these descriptions designer’s mental activities seem to be dominated by a world-to-mind DOF. This manifests designers’ concern not only with what it is in the world, but with what that world should be. The DOF in these cases, as it was mentioned before, is concerned with how things are expected to be in the world and the conative states that trigger those expectations. Regarding the role of cognition and rationality, as it was posed in Heylighen et al.,

Fig.1

Directions of fit (DOF) for the transformational model of the design process. The mind-to-world direction is expressed with the arrow pointing down (↓), and the world-to-mind direction is expressed with the arrow pointing up(↑), following the original convention by Searle [based on 11].

the way in which cognitive states are recruited in the design process is coherent with this distinction: they all are means to an end, which is not cognitive but productive in nature. It is a desire rather than a belief that prompts designing, although cognition is involved in the representation of the state of affairs to be produced in order to satisfy the desire and of the way to make it real [...] the fact that cognitive acts are involved in every activity of design should not tempt us to see design as a kind of cognition or as a way to produce beliefs and knowledge. Cognition is rather presupposed by design in two important ways: as providing the means to navigate the world in order to reach a goal, and as providing the conceptual tools, the knowledge, and the vision necessary to represent the goal.

The analytical/rational approach to the design process suffered a major crisis at the beginning of the 1970's triggered by the inability of the members of the Design Methods to cope with the modeling of the design process from a purely analytical and rational point of view. This approach, and the understanding coming out of it, was not insufficient to deal with the explanation of a process that we have seen implies a big deal of mental acts that are mostly based on subjective values, beliefs, and preferences (Cross, Dorst, and Roozenburg, 1992; Jones, 1977). As Rittel expressed it:

[I]f one tries to be rational [...] there is no beginning and no end to reasoning.[...] the more one tries to anticipate and to justify one's actions the more difficult it becomes to act. [...] For all these reasons there cannot exist anything like "the" design method which smoothly and automatically resolves all those difficulties (1971, p. 23).

A very surprising advancement was presented as part of the fifth anniversary report of the Design Methods Group at Berkeley. On what Cross (1993) considered a brilliant move to save the field of Design Methods, Rittel, Protzen, and Grant (1973) presented a proposal for reinterpreting Design Methods based on what they formalized as a generational approach. After asserting that the ongoing research program on design process was insufficient to account for its complexities, they proposed a generational separation in order to distinguish two different approaches in the field. They referred to the First Generation as those approaches of design theories developed up to that point and based on rational/analytical approaches, and proposed the development of a Second Generation of Design Methods that would follow the failed First Generation.

Rittel defined design as an activity that aims to produce a plan, which if implemented is intended to produce a desired situation without undesired side or after effects, and in the description of the design/planning process, Rittel noted that due to its nature, design problems belong to a category of their own. He named this type of problems *wicked*. Among other characteristics, *wicked problems* have solutions that are one-shot operations in which the definition of the solution is dependent on those subjective decisions made by the designer/planner in the process of designing.

According to Rittel, when formulating a design problem, designers and/or their clients dissect the world according to their values and necessities, thus defining what is considered a problematic situation. Such situations do not present themselves in the world. Therefore, designers must make sense of them by imposing their viewpoints and values.

Because of the value-driven nature of the process, designers exercise what Rittel calls their *epistemic freedom*. This consists of the situation produced by the lack of either logical or epistemological constraints or rules to prescribe the decision making that the designer has to make. It is up to the designer how to proceed, and there is no logical or other necessity to want or to do something particular in response to an issue (Rittel, 1987, p. 5).

Finally, the solutions designers produce cannot be either true or false because of the same reason that world-to-mind direction of fit cannot be: designers act by imposing conditions of satisfaction in a DOF that goes from their minds to the world, splitting and grouping objects to define the problematic situation that can satisfy their conative states.

### **The Caliph and the Education of the Designers**

From the previous analyzed models of the design process we can see that an important part of it relies on mental activities characterized by world-to-mind DOF, and therefore mostly fitting a non-analytical way of thinking. Designers dissect and organize the world according to their thoughts, and produce plans that ultimately pursue to produce the changes in the world that will make it fit to the conditions stated by their minds:

[W]hat the designer knows, believes, fears, desires enters his reasoning at every step of the process, affects his use of epistemic freedom. He will-of course-commit himself to those positions which matches his beliefs, convictions, preferences, and

values, unless he is persuaded or convinced by someone else or his own insight (Rittel, 1987).

As we have seen so far, the limitations to cope with this important aspect by the First Generation of theoreticians of the design process caused them a major crisis and became afterwards one of the central topics to be discussed by those interested in the design process.

However, what has happened since then is that the analytical/rational approaches have regained terrain in spite of the limitations of its theoretical scope having been criticized. A major reason, pointed out by Coyne (2005) for this prevalence of the analytical approach is that it seems to be easier to operationalize. On the other hand, and because of the nature of the design process that is described through the theories of the Second Generation, it is less obvious how those theories can be turned into plans of action, sometimes because the theories are hard to operationalize, sometimes because of the political consequences/opposition and even subversive actions that those theories entail.

But past experiences have shown that it is not an impossible task. An example of the operationalization of theories of the Second Generation into concrete actions has been provided by Protzen in his already classic essay "Reflections of the Caliph, the ten architects, and the philosopher" (Protzen, 1981). In this essay, Protzen discusses the problem of choice and choice evaluation that designers and planners have to face in the design process.

Through his discussion, and using Gonseth's story on a Caliph as a theme for his argument, Protzen exposed in his article a series of issues related to the continued stream of decision making that designers and planners are subject to. In this article he concluded that, in order to deal with situations involving the evaluation of plans/designs, the best alternative is to adhere to what he defines as the *principle of idoneity*. According to this principle the idoneous means the solutions that are *proper and appropriate to the intentions*, an assertion that clearly complies with the connotative properties we have pointed out so far regarding the mental acts in the design process.

After laying out this principle, Protzen describes ways for operationalizing the theory into concrete actions. In order to better prepare designers/planners for the challenge of properly evaluating their ideas, and also for their evaluation by others in a fair manner, the background/references against which we operate do not suffice. What designers need to learn

include[s] but not be limited to methods of identifying conflicting ends and intentions held by various population groups, procedures for eliciting arguments in favor of and against proposed solutions, techniques of conflict resolution, methods of analytic thinking and dialectic research techniques (1981, p. 8).

Protzen also acknowledged that “to propose that designers and planners make their choice and decision by the principle of idoneity is also to challenge them, the way they are trained and educated, as well as their respective professional organizations” (1981, p. 7). This political caveat on the implementation – recognized also by Rittel regarding his own positions about designers’ education – is with no doubt a very good reason why, almost three decades after his article, an important conceptual shift like this one still awaits to be implemented in designers’ education and practice.

However, and as Rittel (1987) himself expressed it once, “even if such remedies cannot be found easily, can we afford not to keep searching?”

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## **HOG FAT AND OTHER THEORIES: A REFUTATION OF MAGICAL THINKING**

*Mary C. Comerio*

A review of the distinguished academic career of Jean-Pierre Protzen suggests that there were two careers: first, as a philosopher of design, and second, as an archaeologist. The link between his eloquent writing on “Design Theories and Methods” and his research on Inca construction can be found in his inherent pragmatism – a deeply rooted passion for rational analysis, careful documentation, and scholarly precision. Protzen has little tolerance for the magical thinkers in any field, but the evidence is particularly clear in the discipline in which he was trained, in architecture, as well as his adopted discipline of archaeology. This paper will use Protzen’s famous debate with Christopher Alexander in 1977 together with his early analysis of Inca construction to demonstrate the continuity of thinking that has dominated his research and writing.

As background, Jean-Pierre Protzen completed his diploma in architecture at the University of Lausanne in Switzerland, and worked in LeCorbusier’s office, among others. He came to teach at UC Berkeley in 1968, a time when the study of “design methods” was taking shape. In an article on the history of design methods, Protzen traces the history of the modern discipline to World War II era operations research but focuses on a conference in 1962 on “Systematic and Intuitive Methods in Engineering, Industrial Design, Architecture and Communication” [1]. UC Berkeley was represented at the conference by Joseph Eskerick who met Horst Rittel (one of the directors of an avant-garde design school in Germany) and Christopher Alexander, recently out of Harvard.

Esherick brought both to Berkeley, and in 1966 a newly established curriculum included an option in Design Theories and Methods. Protzen considers the publication of Horst Rittel and Melvin Webber’s seminal article “Dilemmas in a General Theory of Planning” [2] to be a defining moment for design theories and methods. The article created a paradigm shift, to use a Kuhnian notion, postulating that design problems were not simply technical problems, but political problems in the sense that they dealt with the allocation of resources and affected many people in many ways. Design was defined as a “wicked” problem requiring multiple inputs and implying that individual design genius was a myth.

While the Rittel and Webber article challenged the foundations of design thinking and argued for a deliberative



process, there were other important challenges to design thinking which were discussed and debated in articles in the DMG-DRS Journal, which Protzen founded and edited. In the late 1960's, it was a radical notion to write about design processes and design thinking. Jean-Pierre Protzen was known in architecture schools across the United States, where graduate students read and discussed every issue of the journal. Through the journal, he created a national dialogue about what design was, how we thought about it, and how we did it. The journal, together with the research and publications of both Rittel and Protzen, created the foundations of a research agenda that shaped two generations of architects and scholars.

However, there was one other small but influential publication – the Berkeley student journal, *Concrete*, which carried a famous debate between Jean-Pierre Protzen and Christopher Alexander in 1977. Alexander had just published the book *A Pattern Language* [3], and Protzen wrote a review, titled “The Poverty of Pattern Language” in *Concrete* [4]. In this article, Protzen takes on the magical thinking espoused in Alexander’s theory of “the timeless way of building.” Protzen argues that Alexander’s sourcebook of patterns necessary to make towns and buildings become “alive...whole...and human again” is inherently flawed and that the books claims of universality are invalid. For example, Protzen writes:

About the nature of these patterns the authors make two major claims, neither of which, I will contend, is valid. First, it is asserted that in any pattern the solution to a problem is described “*in such a way that you can use this solution a million times over, without ever doing it the same way twice.*” [Emphasis here and in following quotes are the author’s.] The solution merely “gives the essential field of relationships needed to solve the problem, but in a very general and abstract way – so that you *can solve the problem for yourself, in your own way, by adapting it to your preferences, and local condition at the place where you are making it.*” Thus, the solution “*imposes nothing on you.*”

Secondly, although they believe that for some patterns they have succeeded in stating “a *property common to all possible ways of solving the stated problem,*” the authors assert that “The patterns are ... hypotheses, all 253 of them, and therefore tentative, all *free to evolve under the impact of new experience and observation.* And just as the hypotheses of science, the patterns are subject to testing, to ascertain if the “empirical questions center

on the problem – does it occur and is it felt the way we have described it? – and the solution – does the arrangement we propose in fact resolve the problem?”

As to the first claim, it is simply not true that the patterns allow you to solve problems according to your preferences. The patterns, if applied, do indeed impose very specific and detailed solutions, and they leave no *significant* choices to the users of the patterns. (The etymology of the word “pattern” is the ME patron from the Latin *patronus*, meaning protector.) In each pattern, the solution to the problem dealt with is presented in the form of an instruction “so that you know exactly what to do, to build a pattern.” Furthermore, patterns are not isolated entities. Each pattern is connected to other patterns “above,” “beside,” and “below” it. That “means in practical terms that, if you want to lay out” a particular pattern, “you must follow not only the instructions which describe the pattern itself, but must try to embed” this pattern in those connected to it [5].

The article continued to debunk the specifics of the patterns in concept and application, and ultimately to describe the weaknesses in the evidence supporting the concept. Protzen concludes:

After having read *A Pattern Language* and having reviewed its supporting argument, I could not help but be reminded of Feyerabend’s assessment of a much more powerful construct, the quantum theory in Physics: its “appearance of success *cannot in the least be regarded as a sign of truth and correspondence with nature.*” [Emphasis here and in the remainder are in the original.] Quite the contrary, the suspicion arises that the absence of major difficulties is a result of the decrease of empirical content brought about by the elimination of alternatives, and of facts that can be discovered with their help. In other words, “... *the suspicion arises that this alleged success is due to the fact that the theory, when extended beyond its starting point (in the case of the pattern language “what makes people comfortable?”) was turned into rigid ideology.* Such ideology is ‘successful’ not because it agrees with the facts: It is successful because no facts have been specified that could

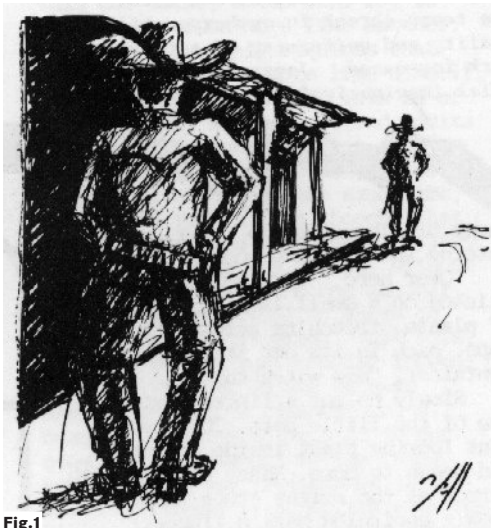


Fig.1

constitute a test, and because some facts have been removed. Its 'success' is entirely *man-made*. It was decided to stick to some ideas, come what may, and the result was, quite naturally, the survival of these ideas ... This is how empirical 'evidence' may be *created* by a procedure which quotes as its justification the very same evidence it has produced [6].

Two weeks later, Alexander responds to Protzen with his own *Concrete* article, arguing that Protzen's views are mechanistic, science-based, and without "values" [7]. Alexander writes:

My own view is entirely different. I believe that differences in values, can be resolved by appealing to one central value (note the singular). I believe, indeed, that this central value lies behind all things, which we may call the one, the void, the great Self. I believe that every person is connected to this value, and is capable of making contact with it, to a greater or lesser degree, by awakening his own consciousness, and that connection with this one value, provides us all, with the ultimate basis for our actions, and for our actions as creators, artists, architects.

... All [Protzen's] criticisms, in one way or another, cry out for pluralism, argue that there are many values, that it is impossible to find one value, and that any body of knowledge which draws its strength from an appeal to one value, must, ipso facto, be wrong, and "poverty-stricken."

I believe the very opposite. Namely, that if we hope to make progress in any thing, which has a value component, we will only be able to do so to the extent that we believe in this central value, however dim or distant it is, and that naïve pluralism, or neo-positivism, is incapable of making any useful progress in almost anything that concerns design, or creation, precisely because of the position it takes [8].

Alexander concludes his rebuttal by arguing that the need to get better, more humane buildings and towns requires a theory that appeals to intuition and feeling. "I have gradually come to espouse the view which I have explained here, not because I am a religious person, or because I have a predisposition to think religious thoughts, but because I find, speaking as a scientist, and as a mathematician, that this is the only kind of theory which actually gets us anywhere" [9].

**Fig.1:**

Illustration in *Concrete*,  
Vol. 1, No. 8, Nov. 15 1977  
(artist not attributed)

This remarkable debate, carried on in a student journal, had a profound influence on students and educators, who clearly took sides in defense of either the pragmatist or the magical thinker. The debate as well as the ongoing work of both Protzen and Alexander cemented their opposing philosophical positions and approaches to design.

In the early 1980's Protzen took his first trip to Peru. Like many tourists he was enchanted by construction at Cuzco and Machu Pichu. But unlike most tourists, he continued to think about the process the Incas used to build their cities. He discussed his thoughts with a noted scholar in archaeology at UC Berkeley and was encouraged to write a research proposal. It seems that archaeologists traditionally look at the artifacts of ancient cultures, but they rarely consider the buildings as artifacts. Protzen made his first research trip in 1982 - 83, to measure the stones, to study the construction methods, to find the quarries, and the means used to transport materials, which led ultimately to a theory about how the Incas built.

Along the way, however, Protzen had to contend with other magical thinkers, those who theorized that the Andean stone-works were built by aliens or gods who visited the earth long ago, bringing civilization to primitive man, or those who simply did not believe the massive blocks could have been assembled with manual labor. In *America's Ancient Civilizations*, A. Hyatt and Ruth Verrill wrote:

How were such titanic blocks of stone brought to the top of the mountain from the quarries many miles away? How were they cut and fitted? How were they raised and put in place? Now one knows, no one can even guess. There are archaeologists, scientists, who would have us believe that the dense, hard andesite rock was cut, surfaced and faced by means of stone or bronze tools. Such an explanation is so utterly preposterous that it is not even worthy of serious consideration. No one ever has found anywhere any stone tool or implement that would cut or chip the andesite, and no bronze ever made will make any impression upon it [10].

For archaeologists, it was a mystery how the Incas, who did not have iron tools or knowledge of the wheel, mined and transported stones and dressed and fitted them in remarkable structures. On his first research trip, in 1982 - 3, Protzen began a decade of investigating the quarrying and stonecutting techniques of the Incas, and problems of Inca construction practices. His work was based principally on observation, careful measurements

of structures, and experiments using stones and tools the Inca stonemasons would have used. Early in the research, I spent six weeks with the Protzen family, in the quarries, on the trails, observing the construction sites and patterns. Every evening, we tried to make sense of it all. “Hog fat” was one of our favorite humorous theories – perhaps the Incas used animal fat to slide the stones into place.

Ultimately, Protzen’s research proved that the Verrills were wrong. His work in Cuzco showed how river rocks could be used as hammers to pound stones into the desired shape.

It appears that the Inca technique of fitting the blocks together was based largely on trial and error. It is a laborious method, particularly if one considers the size of some of the huge stones at Sacsahuaman or Ollantaytambo. What should be kept in mind, however, is that time and labor-power were probably of little concern to the Incas, who did not have a European notion of time and had plenty of tribute labor from conquered peoples at their disposal [11].

Jean-Pierre Protzen spent a decade at Ollantaytambo, probably the best-preserved Inca town, to refine his understanding of Inca construction. Ollantaytambo offered an ideal laboratory with its well-thought-out site plans, its intimate integration of the built form with the natural environment, the unity of its architecture, and the sheer perfection of its cut-stone masonry. In his book on Ollantaytambo, Protzen provides an extensive analysis of Inca construction practices, and describes the planning and design criteria that governed its layout and architecture.

The work on Inca construction changed his life and his career. He returned to Peru annually to study “the rocks”. His work and his publications on this topic have changed archaeology, and opened new insights into the life and culture of the Inca people. Once again, he set an international standard in scholarship. This time, it was in the field of archaeology, but in fact the work bears a striking resemblance to his debate with Christopher Alexander and his foundational research in design theories and methods. In both areas, he relied on empirical science and rigorous methods to ground his thinking. Quasi-religious values, aliens, or even hog fat could not deter his intellectual pursuits.



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## ON THE ENDS AND INTENTIONS OF DESIGN

*C. Greig Crysler*

For most of his academic life at Berkeley, Jean-Pierre Protzen pursued three different but interrelated interests: his internationally recognized archaeological research based in Peru; his research and teaching connected to the Design Theories and Methods study area in the Department of Architecture; and his work as an administrator, through which he held various roles, including Department Chair (not once but three times), and Chair of the Ph.D. committee, amongst others. It should be noted that unlike many academics, his level of service and productivity as a teacher did not ebb slowly downwards as he became more established and better known as a researcher: quite the reverse. If anything, all three increased in intensity as he passed his 40<sup>th</sup> year of teaching in 2008, when he also returned to the position of Chair for a semester. The energy and commitment involved in this level of academic production is quite extraordinary. But it is all the more remarkable because of the organic relationship that developed over time between his core intellectual positions and the way he conducted his day-to-day life as an academic. This was not simply a case of putting theory into practice; it was a question of constantly testing and revising an evolving critical position in the varied context of the academic workplace.

I've been fortunate to work alongside Protzen in a number of his roles: as a teacher (we co-taught Architecture 130, Berkeley's longstanding undergraduate lecture course in design theories and methods, for a number of years); as a member of the Ph.D. committee which Protzen chaired, and as a faculty member in the Department of Architecture. What follows is my (partial and somewhat biased) attempt to characterize what I regard as his institutional *modus operandi*, one that is fueled by a disarming mixture of laconic observation and pointed wit, along with significant amounts of caffeine from Strada, our local coffee bar. He is well known amongst his students and colleagues as a perpetually open-minded thinker and interlocutor; he easily draws underlying assumptions out into the open (without appearing to do so – one of his greatest skills), and is steadfast in his reluctance to proffer fixed guidelines or prescriptive directions. When teaching with him, I quickly discovered his willingness to encourage the expression of discordant opinions and the arguments that followed.



One can regard Protzen's contribution to the curriculum at Berkeley as a standing invitation to debate: with their emphasis on the procedural aspects of design, Architecture 130 and the other classes he taught focused on patterns of design thinking, and their intersection with larger social processes such as the economy, the state and education. As such, Protzen's teaching offers a powerful counter-model to the object-centered (and technologically dominated) discourses of contemporary design education. His erudite lectures in Architecture 130 spanned from the rise of cybernetics through operations research and cost benefit analyses to more recent concerns with ethnographies of practice in the global present. One of the most powerful contributions of his teaching has been to show how design is not limited to those whom we conventionally think of as designers; thus everything from large scale policy initiatives (and their failures) to simple domestic activities falls within the rubric of this expanded field. This breadth of focus demands a similarly expansive intellectual basis, which over the years extended from disciplines such as city planning, cognitive and information sciences to mathematics and philosophy. For many students, to learn with Protzen was to see the world from an entirely different standpoint, and his capacity to convey his positions without a hint of dogmatism made him enduringly popular. When taken as a whole, his way of doing things might be characterized in more elevated terms as an evolving and open-ended theory of academic practice.

It is by now commonplace for academics to say that they seek to foster critical thinking amongst their students. This is certainly true of Protzen, who translated abstract ideas of critical thinking into concrete processes of argumentation and debate through his methods of teaching and research. He is a trouble-maker, but one who does so tactically, and always at the level of ideas. I am reminded of the picture of the late Horst Rittel that Protzen would sometimes show in Architecture 130 during his lectures on Rittel's ideas. There was an obvious twinkle in Rittel's eyes, something that I have come to associate with the intellectual mischief that both he and Protzen have sown in relation to the presumed benefits of expertise and what is referred to in the literature as "technical rationality": those forms of "top down," instrumental reason that continue to characterize much of the planning that shapes our lives, from the design of buildings to the bureaucratic administration of nation-states. (Schon 1983)

Unsettling the apparently secure grounds of reason can be funny in the absurdist sense, as in this passage from Rittel's famous article "On the Planning Crisis," often assigned by Protzen to students in Architecture 130. Rittel is explaining one of the paradoxes of rationality. Rational behavior, notes Rittel, means trying to anticipate the consequences of contemplated actions. (Rittel, 1972, 391) But he continues,

[B]efore I begin to trace the consequences of my actions, I should trace the consequences of tracing the consequences of my actions. This is of course consequential, because I invest time and money in tracing the consequences of tracing the consequences; therefore, before tracing the consequences of tracing the consequences, I should trace the consequences of tracing the consequences of tracing the consequences. And each next step is not necessarily easier or simpler than the previous one (1972, 391-392)

Despite the humor that results from this staging of infinite regression, (and the ultimate claim that there is no way to begin to be rational), such analyses have serious motivations. The process of chipping away at the easy assurances of linear thought was not undertaken for its own sake. In their arguments, both Protzen and Rittel mark a shift away from the familiar practices of unpacking normative assumptions in order to show their status as such, and towards something more genuinely transgressive, where truth claims are connected to existing power relations and their varied social effects. The result is to stress the value of conflict, both as a means to critical understanding and as an intrinsic part of social life. Argumentation and debate thus become positive resources that contain insights about how, and upon what basis, people make their decisions; conflict is embraced as the vehicle and outcome of decision-making.

One of Protzen's best-known discussions of the politics of decision-making is his now-classic article entitled "Reflections on the Fable of the Caliph, the Ten Architects and the Philosopher." (Protzen 1981) Here he outlines an ideal of judgment based on "dialectical techniques." (1981, 6) Though written almost thirty years ago, the argument is as original and fresh today as it was when it was first published. It is pertinent to anyone who makes expert decisions for a living, but is particularly relevant to design educators and their students, where the question of how aims and intentions are defined and achieved is central to the educational process and the different, sometimes highly antagonist positions it supports.

The article begins with a fable, not from the realm of children's literature, but by Ferdinand Gonseth, a Swiss philosopher of science. (1981, 2) In Gonseth's tale, a Caliph requests ten architects to produce a proposal for a new palace. When the Caliph asks them to justify their designs, he discovers that they fall into three categories: truth, indifference, and idoneity. It is the latter of the three categories that is the preferred option for Protzen and the real subject of the article. But before arriving at this approach, indifference (or random decision making) and truth are examined in turn. The example of the German parliamentarian who declares "Although I know better, I will vote against the proposed measure" is employed to illustrate the complex mixture of risk and calculation that defines indifference. (1981, 3) In the longer and more intricate part of the argument, Protzen moves much closer to home, illustrating the foibles of decisions based on absolute truth, through the work of Christopher Alexander, as outlined in his book, *A Pattern Language* (Alexander et al. 1977). Alexander and Protzen were colleagues in the Department of Architecture at the time the article was written. Making Alexander's work the centerpiece of the argument transforms the text from a philosophical meditation on reasoning to a powerful intervention in contemporary design culture. The tone remains measured but becomes more pointed as Protzen confronts the power derived from positions that cannot be argued with:

The timeless way of building presupposes, as Plato's philosophy does, not only the existence of an objective quality – an idea – but also the existence of a philosopher king who has seen (felt) the truth of what is beautiful, just and good, and who can bring it down from heaven to earth. Could the philosopher King ever be wrong? Heaven forbid! (1981, 4)

The article had the effect, intended or otherwise, of breaking the boundaries of what had undoubtedly become a fierce, if largely internalized departmental debate, and in doing so raised the stakes to a national level. But the real focus is less a stringent critique of either absolute truth or indifference than the hopeful space of potential defined by idoneity. In his turn to the processes of decision-making that he associates with this rather archaic and little-known term, Protzen not only signals his commitment to what might be termed the politics of the open end; he also sketches out an alternative model of design education to meet the philosophical challenges of idoneous judgment. Idoneity, Protzen states simply, is "that which is proper

to, and conforms with the ends and intentions of those involved.” (1981, 6) But how can those ends and intentions be determined? The answer is based on the acceptance of the proposition that all those involved in any decision-making process are equally knowledgeable, but in different ways. Or to put it in Rittel’s terms, there is “a symmetry of ignorance because nobody knows better by virtue of his degrees or his status.” (1972, 394) Thus the beliefs that arise from such encounters cannot be automatically generalized to everyone else, without first being put to a test. As Protzen notes,

I cannot claim that my convictions, however deeply I feel about them, are valid for everybody else. And although I cannot accept that they are completely arbitrary, I cannot make them the basis for decisions about the propriety to, and the conformity with, the ends and intentions of others, without submitting my thinking and feelings to a severe test. (1981, 6)

The “test” is to be realized through methods of intellectual inquiry organized around dialogue, or dialectical critique as defined in the etymological sense of the term. (1981, 6) In this formulation, it is differences that count and must be learned from.

Though the proposal for dialogue sounds modest in the abstract, when it is extended to structure of design education, its implications are radical, perhaps moreso now than when the article was first written. What would be taught in a curriculum organized around dialectical techniques of reasoning? Protzen hints at the answer when he states that the

Subjects for instruction should include but not be limited to methods of identifying conflicting ends and intentions held by various population groups, procedures of eliciting arguments in favor of and against proposed solutions, techniques of conflict resolution, methods of analytic thinking and dialectic techniques (1981, 8)

The concrete impact of such an approach on architectural education would be dramatic: rather than imparting a fixed body of inherited knowledge (precedents, technical standards, received structures of professional practice, given standards of aesthetic judgment, amongst others), the curriculum would be organized around what Protzen refers to as the issues of the polis. (1981, 8) Design problems would be recognized as political problems, because they always intersect with formal political processes, but

also because (in the built environments disciplines) they involve giving spatial form to social relations of power.

Asking who decides, by what means, and according to what terms recasts the educational process as one which foregrounds the informed agency of the student as citizen. It also requires us to reconceptualize the role of the design instructor, who must become, according to Protzen's model, less a globally legible authority (the "starchitect") and more an equal participant in a shared space of debate. Considered in broader terms, the idoneous model of decision making, if applied to the organization of the university, not only challenges the accrued authority of individuals and their disciplines; it also raises a larger question about the very purpose of the university as a public institution – one that is of immense importance today, as universities attempt to deal with the severe implications of the global economic crisis. Should we as academics carry on our research and teaching as if nothing has happened? If we choose not to follow our routines, on what basis do we decide to have different ends and intentions? The principle of idoneity, while not providing answers, continues to offer unsettling ways to ask questions.

There will always be those who argue that such principles are impractical, that they constitute too much of a departure from the system as it stands, and thus can never be realistically implemented. But idoneity can operate on a number of levels at the same time: as a philosophical challenge, as a pointed reminder of the civic ideals of argumentative debate, and as a pragmatic plan of action that contends with rationalizing ends and intentions through dialectical techniques. Protzen's distinguished career has engaged with all these levels of possibility, using the insights gained to inform an academic practice of open-ended potential. There is no doubt, however, that if taken to its logical conclusion, idoneity implies the continuous dismantlement and reinvention of the academic system as a whole – a creative maelstrom of permanent instability. To this, Protzen would probably laugh and say "that might be a good idea."

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## DELIBERATIONS ABOUT PRIVACY AND PUBLICITY IN THE SECURITY CITY

Dana Cuff

*When the deliberative planning models of Jean-Pierre Protzen and Horst Rittel were developed, the internet had yet to make its mark on politics or design. It is relevant to reconsider some of the key elements of deliberative planning in light of the internet's radical redistribution of information, as well as its evolving participatory potential. In turn, issues of privacy and publicity are raised.*



Deliberative planning, and design as a whole, depends upon information since design is characterized by quests for information that in turn alter the definition of the problem at hand. Information, as process and event rather than fact, is that which transforms someone's knowledge. The notion that deliberation would be productive in the design context was inherent to Rittel and

Protzen's ideas about resolving problems. They foretold the wickedness of the web when, with Mel Webber, design and planning problems were described as having no definitive formulation (Rittel and Webber, 1973). The information useful to thinking through the problem is infinite, and the designer stops working when the time or budget runs out. Usually, this kept inordinate amounts of information at bay; not so any longer now that relevant information is cheap, fast, and accessible [1]. Moreover, the inherent complexities of a design problem engender large teams of collaborating experts from different fields. Their collective process is increasingly enabled via digital technologies, and in the ethereal space of the web, new forms of collectivity emerge.

There is a way in which the web-as-commons has unleashed an entirely new dimension of the public sphere, and with it, new concerns about privacy [2]. This issue is the subject of the present investigation. In particular, Web 2.0 holds implications for collaborative participation in all fields.

Of interest here are the discussions of new technologies that are overwhelmingly dominated by concerns about security and privacy. These two issues are generally pitted against one another in a zero-sum game, polarizing and narrowing debate. This essay complicates that binary model by demonstrating new types of agency that emerging technologies enable. In particular, the essence of Web 2.0 extends into the interface between computing and the physical environment, sometimes termed the internet of things, but more aptly called urban sensing. As pervasive computing moves from the laboratory into the city, public access to the data commons is crucial to citizen participation with scientists, artists, policy makers, and designers in our increasingly activated urban context.

In 1961, MAD magazine published the first Spy Versus Spy comic, created by a Cuban refugee in the US named Antonio Prohias. A spy dressed in white holds a firecracker, contemplating the demise of his enemy, an exact double dressed in black holding a bomb. So the cold war threat was pictured, with each side countering the other's best moves with its own, even more outlandish tactic.

Now, in 2008, we have a new collective preoccupation with security and danger. No longer do we imagine one secret agent pitted against another, but a complex, amorphous state operating invisibly, or better – opaquely, against an unseen enemy itself amorphous. In the United States, the Patriot Act, the Department of Homeland Security's "virtual fence" on the Mexican border [3], the military development of "smart dust", and the Joint Operations Command Center in Washington DC are evidence enough that we are not imagining things. New technologies are small enough to be invisible, ubiquitous enough to be everywhere and always on. Coupled with fears of an enemy that might be anywhere among us, we leave the Cold War and enter the Surveillance Society. In the Surveillance Society, the desire for accurate information in order to manage risk within increasingly uncertain circumstances leads to a plethora of data gathering, junk data, and noise. It also produces perverse political effects of social segregation, classification, and identification [4].

Surveillance Society, or the security city, implies an agent surveilling an object of interest, – an active component and a passive one. The active agent is generally an institution like the state or a corporation with intent, either to control, monitor, or manipulate. The passive member of this relationship is the surveilled: one or more parties being watched. The observed is unwitting, possibly unaware of the surveillance or its purpose, the institution



behind it, its function, distribution, and retention. The hierarchy suggests that resources, expertise, and power are concentrated in agents best able to gather information, and by implication, those agents are privileged in deliberations.

In the Spy vs. Spy model of “negotiations”, a symmetry of ignorance is coupled with a mutual desire to annihilate. We can imagine that some planning commission meetings follow this basic recipe (e.g. planning commissioner vs. angry citizen). In the surveillance model, the term negotiation is even less applicable. Ignorance is imbalanced, with one party having knowledge of the other, who is potentially unaware of the information disparity and power imbalance. This model plays out in public space, for example, when individuals from the Super Bowl audience are arrested after the game based on facial scans cross-checked with criminal records [5].

But new forms of web activity have upset this basic imbalance in both productive and problematic ways. Web 2.0, P2P (Peer-to-Peer), and public access data bases like Google Earth, – all are forms of bottom-up or bottom-only networked data sharing that demonstrate the vast opportunities new technologies offer. Rather than consider privacy and public interest as a zero-sum balancing act (which is the common model; that is, if we make public access to data possible we will infringe on personal privacy; so, if an elementary school places a webcam in its classrooms, it will compromise the privacy of the students and teachers), we should aim to increase public access without compromising personal privacy. Any number of examples demonstrate that what I call “publicity” is enabled by new technologies. Just consider the mobile phone, which we use intermittently for our own purposes but which is also a passive sensor that can collect, process, and exchange information all the time. Presently equipped with sight, sound, web links, and geo-location, cell phones will readily adapt to other types of cheap sensors like ones that monitor CO<sub>2</sub> emissions. This “distributed citizen sensing” turns targets into active agents and creates an environment replete with sensors, processors, and actuators.

Let’s take the most widely accessible surveillance system today: Google Earth. While Google Earth technically does not track personal information, an important distinction in the privacy debates, it alerts us again to the difficulty of anonymizing practices [6]. Flying over Santa Monica, you won’t see me individually, but you can learn a lot about my property including those qualities considered private, including what is in my backyard, for example, where you are not allowed to bodily enter without my permission. The research I’m currently undertaking depends on “spying” with Google Earth. To determine possible backyard sites where



additional affordable housing units might be sited in various parts of the city, we have identified all the lots that had no accessory buildings (all illegal) at the time of the last aerial survey. With those lots mapped, a field survey corroborates Google Earth wherever we can get past the yard fence.

The aerial photograph, in spite of all our Photoshop experience to the contrary, is taken as unmediated truth, as an illusion of authenticity. There is enough information in Google Earth and its photos in Street View that the American military has banned its bases from the database, and protesters in England have used the information strategically [7]. Google Earth in particular gives one a sense of control over the globe. This “world at my fingertips” sensibility has led to an unimaginable number of interpretive maps, or mashups. New geocoded, multimedia databases like Wikimedia Commons offer the views and sounds of millions of places. In some ways, these shared sites are the opposite of a surveillance society; rather than control, hierarchy, and clandestine action we have chaotic, non-hierarchical access. It is also possible that instead of junk data, we are vulnerable to junk analysis.

Perhaps the most provocative development within urban sensing is a new agency that the environment itself is beginning to embody, enabled by interactive computing. There are cars that use GPS systems to restrict their drivers from going faster than the speed limit, and others with ignitions linked to alcohol breath analysis. Just as some parking garages direct cars toward available spaces, streets can block traffic when overloaded, like gates that open to pre-approved guests. But unlike a standard door lock, systems with agency can “learn” or change with accumulated data, can be immediately reprogrammed, and can network to other systems.

While intelligent environments do not deliberate any more than they can independently regulate, they are readily coded to do the latter. From bioscans for criminal identification to operable louvers that regulate building temperature, our surroundings gather data, process the information, and actuate environmental systems. Safety concerns have motivated a number of intelligent systems that infringe on personal privacy. The largest force driving the rapid increase in closed circuit television cameras and myriad spatial surveillance systems is anxiety about perceived risks. Terrorism, potential attacks, and security breaches have mobilized the science of pervasive computing to detect, analyze, and respond to threat. A large proportion of Type I errors (false positives) is acceptable given the perceived risks. Consider central London’s “Ring

of Steel,” a network of thousands of cameras (license plates, facial identifiers) and roadblocks that together intend to protect against terrorist threats like the IRA bombings that instigated the system in the early 1990s.

Surveillance cameras seem almost historical, compared to new forms of tracking like “smart dust” or z-tiles, both of which self-organize to form ad hoc networks [8]. The code that governs the gathering, processing, and actuating can be deeply enough buried to be obscure, and quite frequently (and in many cases, ominously), it is regulated by private interests. Consider, for example, one of the domains where spatial agency is being tested: residential facilities for the independent elderly. Through sensors, it is possible that remotely-located children could learn that their aged mother has not made tea yet this morning, and thus may be ill. A doctor could determine whether she took her medications as scheduled, or could remotely analyze a urine sample. In the best of worlds, a deliberative process between mother, doctor, and children would set the balance between paternalism and independence. The environmental agent would be coded to accommodate that deliberation, and for instance, make opting out simple for the mother when she is in good health. Internet legal scholar, Lawrence Lessig, argues that cyberspace’s code is a form of law that must be created in order to permit individual freedom [9]. In this sense, Lessig sets the terms for deliberative planning, which is at a more basic level, nested within democratic processes.

While debates take place about cases like the one presented above, the real-world testing of environmental agency is occurring elsewhere, for environmental systems or aesthetic effect rather than social benefit. In smart buildings, heating and cooling can be self-regulated. Jean Nouvel’s Agbar Tower in Barcelona has temperature sensors to regulate the opening and closing of the building skin’s louvers (along with a programmed light show using 4500 LEDs). Lars Spuybroek/NOX has created a number of interactive projects, most notably Doetinchem’s D-Tower that reflects the “mood” of the city based on citizens’ responses to a web-based questionnaire. Hong Kong is full of facades that perform electronically, some pre-programmed, others responsive to sensors. In Hong Kong, we can begin to see what it might mean for the city’s streets and facades – the physical environment – to be imbued with agency.

The arts applications of pervasive computing extracts questions of privacy from the equation. By contrast, in the example of the elderly parent, strong paternalism produces a form of surveillance: children and doctor observe the mother

in a manner that is simultaneously remote and invasive. A surveillance model of spatial computing represents an imbalance of information that produces a hunting metaphor for privacy, with a stalker and a target. But it is important to complicate this model in a number of ways. Since our primary concern tends to be personal privacy (and thus personal data), we ignore the important elements of publicity and the related collective effects. In addition, our concerns about the *state's* interference in the city and in personal privacy distract us from a broader use of the technologies by corporations as well as by ordinary citizens. Distinct separations between the state and corporate interests are themselves misleading. If we are to complicate matters productively, the notion of a target must be problematized.

Consider one of the most innocuous forms of observation qua data collection: the preferred customer card. At my grocers, to get weekly discounts I must sign up for a "Vons Card." I shop, I swipe my card, and voilà – the bill is lowered before my eyes. Over a year, "they" "know" (both euphemisms), better than I do myself, my eating habits: what products I purchase in what quantities, how often I buy them, how much I spend, and so on. Combined with other marketing data and my address, they can construct a body of information worth selling to others. I don't know anything about Vons' personal data collection and retention policies, nor about those of Adidas, WalMart, United Airlines, or Mastercard – all of which gather data that is linked to my personal information. As it turns out, even banks in the U.S. collect and sell personal data. Sometimes, these policies are described in the so-called fine print, but there is as yet no well-defined disclosure law that specifies what corporations and institutions must tell us about their data collection, tracking, retention, distribution, or privacy policies. They may not even have policies to disclose. Entities as large and enlightened as the University of California have no clear policy on personal data collection and retention, nor could a simple policy exist since needs vary widely across the institution [10]. To take another example, when the music industry wants to stop illegal file downloaders on campus, it pressures the university to track and discourage file sharing of all large data packets. Such a policy might have the desired effect of stopping illegal music file sharing activity, but it would also have a chilling effect on network sharing of similar files in a music composition class. The complex interrelation between privacy and an open, shared digital commons is revealed by such examples. At the University of California, we are exploring the implications of not looking at individual computer traffic, not saving information that might be temporarily collected for other purposes, not linking

collected data to personal information unless absolutely necessary, and not creating technological fixes to data privacy problems. The latter is particularly interesting, and adds a dimension to new forms of deliberative planning. When technology becomes part of a system to monitor human activity, no matter what the purpose (illegal file sharing, eldercare, security surveillance) there are inherent negative opportunities that can be achieved through technological (rather than political) means: functional creep, hacking, and bite-back (the proclivity of technology to be used in exactly the opposite manner to its intention, as recent action movies about bank robberies have demonstrated), to name but three.

These examples illustrate some important points about targeted publics in the security city. Going back to a hunting metaphor, we hardly know which end of the gun to point with, and there are more blind shooters than snipers. Security systems do not exist that are foolproof, but moreover, each one by its design can be used in reverse so that the target becomes the agent. In the Spy vs. Spy model, our agents are carpet bombing rather than lighting sticks of carefully-placed dynamite. While we worry that we are being watched, those doing the surveillance may not know what they're looking for, whether they've hit it, or what it might be good for. They operate within a state of ignorance, hoping for a positive match within a remarkably wide range of potential objects of interest. For instance, when should a traffic cam alert the police that an accident has occurred in a monitored intersection? When two large objects rapidly stop their forward movement? When a crowd gathers? The carpet bombing approach clearly has its downside from a privacy perspective: we're all being surveilled a lot. But there also can be positive effects from a privacy perspective, since there is enough noise in the system to drown out the content we wish to protect. For example, the checkers at Vons have yet to suggest I buy fewer carbohydrates or increase my Vitamin B intake although they have the relevant information.

This leads to my second point: I regularly give myself up as a target either because opting out is too difficult, there are opt-in advantages, or I don't really care. Though much has been written about decreasing privacy concerns particularly among younger cohorts, one explanation is the increasing realization that surveillance is highly fragmented and my privacy concern threshold is tied to a certain level of integration. Once Vons sells their information to my medical insurer, then I'll begin to worry. Similarly, archiving procedures are unsophisticated, which gives me a sense of security. The local municipality could check Google Earth to see that I've built an illegal addition at the back of my house, but Google

Earth doesn't make historical changes easy to track, and the city is too understaffed for such a phishing expedition.

So, I submit myself to observations because the observers and their data repositories are not very threatening. This casual attitude is more problematic in nation states that are centralized and relatively wealthy (Japan, Russia, China), or in social welfare states (Sweden, Germany, Canada). In the former, policing functions can be quite sophisticated, whereas in the latter, caretaking functions can be overbearing. And if integrated records exist, whether or not gathered for acceptable purposes, they can be misused [11]. The frighteningly large net cast by terrorism fears in the US has dominated discourse about new technologies. Facial scans of crowds, RFID tags in passports, increasingly invasive security checks at the airport – these are state-based incursions with the possibility of geo-location tagging. Such practices transform the publicness of our cities and our movement within and among them.

The third point to complicate the hunting model of surveillance is one that every hunter in fact acknowledges: an agency on the part of not only the target, but its environment. The wind direction, the swarming behavior, the alertness of the individual – each plays a part to complicate the simple hunter/hunted dichotomy. In the case of emerging technologies like embedded networked sensing, interactive computing, responsive environments, and surveillance systems, the target has literally become an active agent.

## **Conclusions**

Information – what is gathered, how it is collected and how it is analyzed – is fundamental to deliberative planning and therefore to design. Contemporary architects, planners, and urbanists are challenged to imagine what it will mean to add a significant new party to the deliberations: the intelligent environment. While its agency is far from human, it shares important qualities such as the fact that it can learn, self-organise, and actuate.

Our nascent understanding of responsive environments is dominated, and side-tracked by, security concerns. Tacit assumptions about technology that naturally stem from security's dominance have oversimplified our discourse about privacy and publicity, and about new forms of agency that are greatly expanding the capabilities of the public and, in even more compelling ways, the city. The city, always described metaphorically as a living, dynamic entity, is in fact gaining genuine agency.

Designers, including architects and planners, now need to operate efficiently and creatively in this new medium.

In the security city, what Glendon has termed “rights discourse” prevails, both the right to privacy and the right to observe. Though rights language is limiting, we should also add the rights to share and to deliberate. These rights are often juxtaposed because the actors are opposed (those who seek the right to observe, versus those protecting their right to privacy). Glendon inflects rights discourse with a discourse about responsibility, duty, and obligation, which links directly to this conversation about a more active civic agency on all sides. What deliberative planning can add to that discourse are dimensions of negotiation, constraint or regulation, and transparent issue-based information systems. It is a new charge for the next generation of design methods scholars.

## **Appendix: Making Urban Sense**

*(from Cuff, Communications of the ACM, p 27.)*

A number of applications can be viewed on-line to grasp a snapshot of the state of urban sensing today. These range from provocative public art to mapping mashups to real-time traffic tracking. At present, the remote, spatial sensor networks that have been developed within the sciences and the military share virtually no overlap with the “experience design” innovations coming from artists, though both families of experiments utilize similar strategies. These include geo-coded data collection, mobile and fixed sensors that are spatially distributed, sensing networked with processing and actuating capabilities, and time-sequenced data, to name a few. In general, these projects seek to make something previously invisible visible. Most work with the spatial distribution of information, but some take spatial behavior as their object of interest. Representations of urban sensing data vary widely in terms of their sophistication, both in terms of clarity and aesthetics. While some operate in the physical environment itself, others interpret the data, translating it into maps.

*The list below samples a range of interesting urban sensing experiments.*

- *D-Tower.* A public sculpture in the Netherlands city of Doetinchem that displays the emotions of residents based on their responses to web surveys.  
<http://www.d-toren.nl/site/>
- *White Noise White Light.* Meejin Yoon’s installation of a responsive sound and light field at the Athens Olympics.

- See this and other projects at <http://www.mystudio.us/>
- *Living City*. Projects in which buildings' sensors monitor environmental conditions that the buildings can responsively adapt to or improve. <http://www.thelivingcity.net/>
  - *Fade to Black*. In various cities, Natalie Jerimijenko's upturned web-cams collect particulate matter on their lenses to literally show pollution. <http://www.bureauit.org/ftb/>
  - *Feral Robotic Dog*. Jerimijenko repurposes robotic toys into toxin-sniffing dogs deployed in packs to converge on detected hazardous waste. <http://www.bureauit.org/feral/>
  - *The Great Backyard Bird Count*. Maps the cumulative counts of birdwatchers from across the U.S. over a four-day period. <http://www.birdsource.org/gbbc/>
  - *Did You Feel It?* A USGS site that maps data from individuals about their experience of an earthquake. <http://earthquake.usgs.gov/eqcenter/dyfi.php>
  - *Moveable Type*. For the New York Times headquarters, the lobby installation by Ben Rubin and Mark Hansen spatially displays a dynamic portrait of the day's news and news browsing. [http://www.earstudio.com/projects/moveable\\_type.html](http://www.earstudio.com/projects/moveable_type.html)
  - *Walk Score*. A mashup that assesses any neighborhood for its "walkability," particularly for browsers determining where to buy or rent housing. <http://www.walkscore.com/>
  - Urban gaming, like *PacManhattan* or Minneapolis's *Big Urban Game* are examples of an interactive, playful use of urban sensing.
  - *[murmur]*. Signs in the city give a phone number for anyone with a cell phone to listen to stories about that particular location. See especially Toronto <http://murmurtoronto.ca/>
  - *Real Time Rome*. A project by MIT's senseable city lab that visually represents real-time information about Rome's urban dynamics. <http://senseable.mit.edu/realtimerome/>
  - *Traffic Sense*. Cellint provides real-time traffic monitoring using cellular-based detection. [http://www.cellint.com/traffic\\_data/traffic\\_system.html](http://www.cellint.com/traffic_data/traffic_system.html)

For more general urban sensing, see the Geobloggers website, <http://www.geobloggers.com/archives/>, Google Maps Mania <http://googlemapsmania.blogspot.com/>, and Google Maps Street View <http://maps.google.com/help/maps/streetview/index.html>.





## Notes and References

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11. See: Kang, J., Cuff, D. (2005). Pervasive Computing: Embedding the Public Sphere. *62 Washington and Lee Law Review* 93. See also: Urban Sensing: Out of the Woods. *Communications of the ACM*, 51(3), 24-33.

## ALGORIST'S DELIGHT: EXPERIMENTS WITH PEN-PLOTTERS

Hans Dehlinger

### Introduction

Around 30 000 years ago, prehistoric hunters have depicted their prey on scratched stones, which have been found in the south of Germany and France [1]. We may take the line images on these stones and the images of animals hidden under a layer of lines as a beginning of line-drawn images. Since then, artists (and others) have produced drawings throughout the centuries, and we may envision them as being accumulated in the *universe of hand drawings*. Even when we constrain this universe to strictly line-orientated images, the *universe of hand drawings* is of a tremendous magnitude and it does contain many domains: the one of hastily produced sketches, the one of carefully finished compositions, the one of drawings of the human figure, the one of landscape drawings, the one of scientific illustrations, and a lot more. Its wealth and richness is based on the power of human imagination, the sharpness of the eye and the skills of the hand.

In our lifetime, we have witnessed the emergence of another, quite different universe of line drawings, the *universe of machine drawings*, and it seems to have the potential of being just as extensive, as rich, and as impressive like the one of hand drawings. It also is comprised of many domains, and the *generative drawings* and, a specific class thereof, the *algorithmic drawings*, will be the focus of the following considerations.

The history of art that relies on the use of computers is short yet rich in its diversity of approaches. Again, we restrict our attention to line-oriented work only, and yet, an astonishing variety of approaches becomes apparent. Art works by Manfred Mohr [2] (especially the works from 1969 to 1973), Vera Molnar [3], Frieder Nake [4], Georg Nees [5], Mark Wilson [6], Harold Cohen [7], Charles Csuri [8], Jean-Pierre Hébert [9], Robert Krawczyk [10, 11], Roman Verostko [12], and the early images published by the Tokyo Computer Technique Group [13] all reveal distinctive and very unique ways to generate drawings with the aid of computer programs.

Artists may, in a production process, decide to subject themselves to self-imposed restrictive rules that may run close to what is understood by a “program” in computer science. Sentences like: “use only vertical

strokes of roughly the same length”, “go to and fro along a given contour”, “draw a tree with short, violent strokes”, etc., are examples for such “programs”.

A concept, known in art as *generative art*, makes explicit use of such rules. It may be defined as “an art practice where the artist follows a self-designed system of formal rules” [14].

In drawing as a process where the artist works on a physical piece, immediate feedback on the impact of every stroke is possible. In generative art, the drawing is an idea, a concept for which a generating system is designed, which, if executed, will bring about desired instances of the system. Generative art has a strong relation to design. But contrary to design proper, where usually designing is done for one, and only one, instance of implementation, the emphasis in generative art is on the plural: The generating system is, in principle, able to supply an endless sequence of instances, all within the rules set out – a horror vision for design but also a phantastic designerly playground.

The core concept underlying most of computer-assisted art, which is to rely on some kind of premeditated rule system as a key element of an art production process, is not at all a new concept; it is found throughout art history. In a wider sense, the pattern languages of Islamic tiling, the rules used in the art of etching before the dawn of photography, certain aspects of the serial variations in the ‘Homage to the Square’ by Albers [15], the hypothesized self-similarities in Pollock’s ‘drip paintings’ [16], and the rule-based, line-oriented work by Sol LeWitt [17] are but a few of the many examples we can find where ‘rules’ can be identified as principal components that help shape the art. From this point of view, generative art and algorithmic art using computers are but a variation of a theme long known to art in general. There is one important distinction, however, from earlier times: The strictness of keeping to the rules and the precision in their execution demanded by the computer are unparalleled. With accepting the computer as part of the art-making equation, the rule sets artists devise now have to bow without mercy to this new order. As a reward for accepting this state of affairs, artists are granted the privilege to explore totally new and hitherto unknown domains.

### **Algorithmically Generated Lines**

The line is a very basic element of expression in a drawing. It starts in a point and it ends in a point. From a geometrical point of view, both points have similar properties. From an artist’s point of view, they do not. The starting point

comes first and one may argue it requires special attention. For the algorithmic generation of a fine-art line-drawing it makes sense to pay special attention to the starting points. Such points may be lined up along familiar linear shapes, or they may be gathered in point-clouds of arbitrary shapes. To generate drawings algorithmically we have to make some conceptual decisions. They are very likely based on individual preferences of the artist as well as on his intentions. The drawings discussed here will all be based on polylines, and the definition of those polylines will follow some personal preferences. This is intended, because it will make the resulting drawings *identifiable and unique*. The rules defining a “personally shaped polyline” are deliberately designed from the personal point of view and for the personal use of the artist. Other artists working with algorithmic generation and with line drawings, like, for example, Hébert [9] and Verostko [12], also use personally defined rules for the generation of lines in their drawings.

For the production of the drawings from the polylines, parameters are defined, as, for instance: the number of polylines which will emerge from any starting point (ranging from one to many thousands); the number of segments of a polyline; the angle of diversion for



Fig.1

segments, the length of segments; etc. Rules are designed and programmed which allow generating a great number of lines or an entire drawing “at one blow”.

An example of such a drawing, with the title tree\_11 [18], is given in Figure 1 in three versions, as a pen-plotter drawing proper, in Chinese ink – as a conversion of this drawing into an image molten into glass – and as a color print. Although pen-plotters are by now extinct as peripheral devices to computers, the mechanically drawn lines with pencil or in Chinese ink have properties artists may value highly.

In the drawing of tree\_11, the generated lines become visible as long as they pass through the viewport (the square into which the tree is placed), and they are clipped outside it. The parameter which determines the direction of the first segment of the polylines in the generation process is set to force them all into the same direction, thus forming the “stem” of the tree. And just at the base of the stem, a dense point-cloud is located from which all the lines emerge.

The line is a geometric concept, the “tree” an idea, the program a design, and the result comes into existence in a bang, with no possibility for feedback, as one unique instance in a possible sequence. For the generation, controlled pseudo-random number-generators are used to implement artistic decisions. The drawing belongs to a series of drawings for which a sort of *algorithmic minimalism* [19] is applied. The aim is to generate drawings with a minimal set of commands.

## **A Historical Precedent for Algorithms in Art**

The struggle of Renaissance artists to master the problem of perspective mapping from three-dimensional space to two-dimensional space is an excellent historic example of the use of algorithms in art. Albrecht Dürer, a German artist of the time, designed and published several different mechanisms demonstrating ‘algorithms’ to solve this problem. His *Draftsman of the Lute* woodcut depicts one of them [20]. In addition to his woodcut, Dürer provides the following algorithm [21]:

*[N]un brauch dies also/ leg ein lauten oder was dir sonst gefellt so fern von der ram als du wilt/ und dass sie unverruckt pleyb solang du ir bedarfst/ und laß deinen gesellen die nadel mit dem faden hiaus strecken/ auf die nöttigsten puncte der lauten/ und so oft er auf einem still helt und den langen faden anstreckt/ so schlag alweg die zwen feden an der ram kreuzweyß gestrackes an den langen faden/ und kleb sie zu peden orten mit einem wachs an die ram/ und heiß deinen gesellen seinen langen faden nachlassen. Danach schlag die türlein zu und zeychen den selben puncten da die feden kreuzweyß ober einander gen auf die tafel/ danach thu das türlein wieder auf. [...]*

Free translation by the author:

*[S]o do as follows/ put a lute or something else you like in a choosen distance to the frame/ and see to that it will not move as long as you need it/ let your assistant stretch the string with the needle onto the necessary points on*

**Fig.1**

tree\_11 in three versions: as a pen-plotter drawing, molten into glass, and as a print

*the lute/ as often as he holds still on one of them/ mount the strings crosswise and stretched, so they touch the long string, and glue them with wax onto the frame/ then tell your assistant*

*to slack the long string. And thereafter close the little door and draw the point where the two strings cross onto the board/ then open the little door again. [...]*

Albrecht Dürer	Hans Dehlinger
open door	open door
fix a point	fix a point
close door	fix a point
transfer point to door	fix a point
open door	.
fix a point	.
close door	.
transfer point to door	close door
open door	transfer point to door
fix a point	transfer point to door
close door	transfer point to door
transfer point to door	.
open door	.
Continue, until stopping criteria is reached	Continue, until stopping criteria is reached

**Fig.2**

The left column in Figure 2 shows the steps of Dürer's algorithm, while the author's improved algorithm appears in the right column.

The 'digital woodcut' in the manner of Dürer that is shown in Figure 3 shows the author posing in the role of the master. The image uses elements from *The Draftsman of the Amphora* and the *Draftsman of the Lute* mixed with own drawings. The "woodcut" is based on an experiment carried out for a lecture series at the University of Kassel in 1999. It seems unlikely that Dürer ever used the procedure he suggests in the woodcut *Draftsman of the Lute*. He may, as Hockney [22] suggests, have known about other methods to



**Fig.3**



map three dimensions into two dimensions. Currently, fast and efficient algorithms to construct perspective views are standard components of CAD systems. Unlike during the time of the Renaissance, today artists are seldom able to contribute mathematical advances to computational geometry.

## Fuzzy Transformations

Operations like move, scale, select, rotate, clip, erase etc. are familiar features in image creation and manipulation software. They allow precisely defined actions with predictable results while working on a drawing or manipulating an image. We have a result in mind and want to achieve it with reliability, precision and speed through the application of proven tools. And this is of course just the kind of thing one expects from a computer and its installed software. However, in art, we do not have to accept the strictness of such approaches. Many of the familiar functions in *art image processing systems* may be thought of and designed to operate quite differently from the ones used e.g. in our CAD applications. For example, in a clipping operation, some (or many) of the line-candidates in question may escape being clipped – depending on the type of definition of “clipping” we apply. The results may be entirely useless or plain nonsense in practical terms, but interesting in the context under consideration here. As an example for the negation of a classical definition and its transposition into an art context we will look a bit closer into clipping.

Clipping is a well-established operation in image processing. Through clipping, arbitrary shapes within a drawing can be cleared of lines passing through it. There are a number of clipping algorithms that can be used to clip lines. Probably one of the most commonly known ones is the Sutherland-Hodgman clipping algorithm [23]. As an expansion to classical clipping (which aims at a clean-fitted cut along the clipping line) we introduce the concept of fuzzy clipping [24]. Consider  $c$ , with  $0 \leq c \leq 1$  to be a fuzzy measure for the number of lines which will survive the execution of a clipping operation. For  $c = 0$ , no clipping will be performed; for  $c = 1$ , the classical clipping operation will be performed. Clipping is a sequential operation, and a counting mechanism can be used to determine which of the affected lines will be allowed to survive. Other, equally interesting rules may be designed to allow for the survival of lines in clipping, like:

*Clip all lines except those which originate/end precisely on the clipping line.*

If a clipping polygon is placed over a very dense drawing of randomly generated lines, the starting points or the

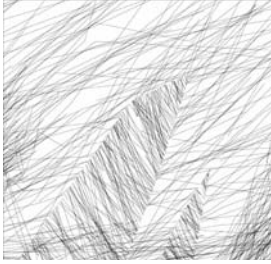
### Fig. 2

Algorithm for construction of a perspective projection by Albrecht Dürer (left column), and improved version by the author (right column).

### Fig. 3

The author posing in a “woodcut” adopted from Dürer, demonstrating improved algorithm.

end points of a number of lines may fall precisely onto the clipping line. The respective lines are earmarked to survive.



*Clip all lines except those which originate/end within a range  $r$  of the clipping line.*

This rule is similar to the above, but it is a little more relaxed, as it allows all lines with starting points in the range  $r$  of the clipping line to survive.

*Identify lines which have their starting points/end points inside/outside an offset  $q$  to the clipping line and earmark them for clipping/survival.*



The offset is accomplished by a scaling operation to the clipping zone and defines a region of starting points. For lines starting in this region/outside this region, clipping does not apply/does apply.

The rules above ask for the identification of one of the defining points, start or end point, of a line. Tighter constraints may ask for both of them.

*Use logical negation on overlapping regions of clipping lines.*

For a line crossing into a clipping zone, a  $\neg$ (draw) command is evoked. Two overlapping zones will result in a  $\neg\neg$ (draw), a double negation, which will be resolved as a (draw) command. Thus, an uneven number of overlaps will result in a (clip), an even number of overlaps will result in a (draw).

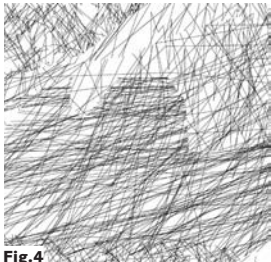


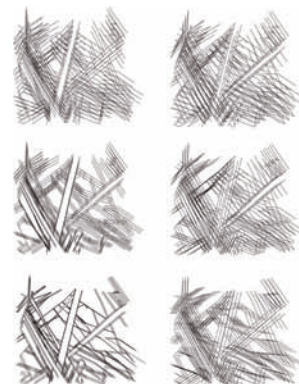
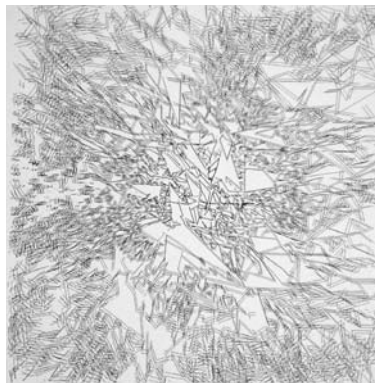
Fig. 4

Some examples, details from various drawings, are displayed in Figure 4 to demonstrate the application of clipping in drawings.

## Unsharp / Sharp



Fig. 5

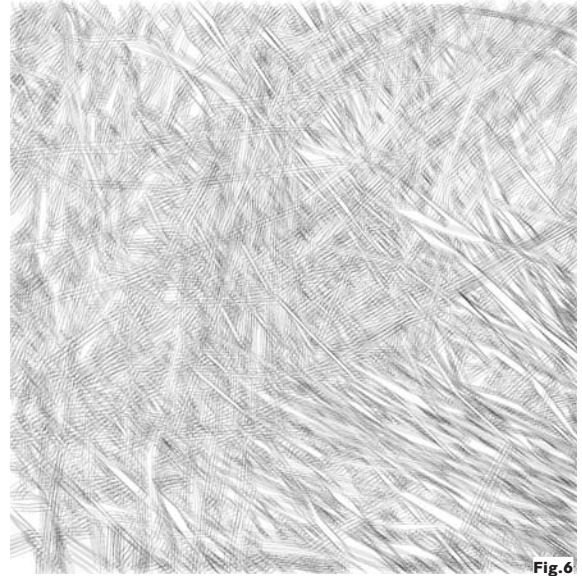




Photographic images which are “out of focus” may be so by a deliberate act of the photographer. The unsharp image is a means to attract the attention of a viewer by the very fact that it is delivered as “unsharp”. An unsharp line drawing is a contradiction in itself, because a line is by definition always sharp and precise. To achieve unsharpness with sharp lines, some of the methods/tricks used by photographers have to be adopted. The image in Figure 5a is a photograph of a willow tree on the shores of Rummelsburger Bucht in Berlin. The photograph was taken near sunset on a windy evening. Movements due to wind and insufficient light within the shutter time produced layers of displaced images that account for the unsharpness when viewed together. The line drawing DSCN0779.1CC in Figure 5b also seems to be “unsharp”. It is produced by layers of the same image, each one slightly scaled against the original [25]. Copy, scale, and paste are very familiar operations in image processing, and they are typically only possible on computers with ease. By exploiting such typical computer-based operations, unsharp drawings, despite sharp lines, become possible. And we can explore them systematically. It is important to note that scaling needs a “center” from which the offsets can be calculated. Figure 5c shows the same image subjected to scaling, with the center of scaling located in the bottom left corner. The figure is composed of three overlays of the same image, each subjected to a scaling process with a marginal offset to the original. Besides scaling, moving and rotating with small displacements have also been tried, producing slightly less satisfying results.

Other settings for the displacement of the center of scaling, or the application of scaling to parts of the image, the additional use of move and rotate in conjunction with scaling, will result in a spectrum of possibilities for the generation of unsharp line-oriented drawings.

As a “proof” of “unsharpness”, the drawings are photographed with a digital camera with “autofocus on”. If the camera lens is pivoting and cannot decide where to stop, “unsharpness” is supposed to be achieved.



**Fig.6**

**Fig.4**

Examples of clipping from generated drawings (details)

**Fig.5a**

Willow tree

**Fig.5b**

DSCN0779.1CC

**Fig.5c**

scale-center bottom left

**Fig.6**

unsharp\_count\_05 (2009). Ink roller on paper, 60x60/70x100 cm.



Fig.7

## Painting with a Pencil

We are discussing generative, line-oriented drawings here. What else can we do with lines? The *black series drawings* are the result of yet another experiment with pen-plotter drawings. In these drawings, the mechanically executed line with a real pen, which is the unique characteristic of a pen-plotter drawing, is pushed to a limit. These drawings are generated by using parallel lines placed very densely against each other only. As a result, “surfaces” are created. The drawings are still strictly line-oriented, but as an image they get closer to what we would call a “painting”. The plotting equipment, as well as the pens,

have in fact not been designed to support such usage. And for this type of drawing a forced mode will have to be used in an excessive way. Consequently, the system will react with slight imprecisions, pens will falter temporarily, irregularities and even serious malfunctions will occur at times. The challenge is to get interesting results, results that may qualify as “aesthetic events” despite such difficulties. Forcing a system to operate on its limits or even push it beyond those limit – as done here – is dangerous in real world, but it is very entertaining in art. For the drawings in this series, soft pencils are used and an example [26] is shown in Figure 7.

Fig.7

IMG\_0698-2 (2007)

60x60/70x100 cm, pencil on paper

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## TANGLED RULES AND THE LIMITS OF DISCOURSE

J. Michael Gerzso

*125. It is the business of philosophy, not to resolve a contradiction by means of a mathematical or logico-mathematical discovery, but to make it possible for us to get a clear view of the state of mathematics that troubles us: the state of the affairs before the contradiction is resolved. (And this does not mean that one is sidestepping a difficulty.)*

*The fundamental fact here is that we lay down rules, a technique, for a game, and that then when we follow the rules, things do not turn out as we had assumed. That we are therefore as it were entangled in our own rules.*

*This entanglement in our rules is what we want to understand (i.e. get a clear view of).*

*It throws light on our concept of meaning something. .... (p 50e, Wittgenstein 1958)*

### Introduction

For several years, I have been reading books on Wittgenstein's work (Sluga and Stern 1996) to satisfy my curiosity about his philosophy and its relation to linguistics. I came across Wittgenstein's comment on "tangled rules" and found it an apt description of what I have been struggling with for many years (alright 30 years). From the beginning of this enterprise, I was attracted to the ideal of mapping out the definitive set of syntax rules for a particular architectural style or designer. But in the process, I found it interesting and disconcerting (mostly to my readers) that the most valuable lessons that I learnt came from understanding the shortcoming of the rules. The result of the "tangling" has led me to suspect, as Wittgenstein did before me, that there may be a limit to what rules can represent, that is, a limit to discourse; a limit to what we can state explicitly in logic or in compiled computer languages.

This paper briefly describes the process I have gone through to define architectural syntax rules by means of computer programming.

### The Question

The simplest version of the question is: How can we program a computer to produce an architectural and/or urban layout? Taken at face value, it assumes that finding

an answer is possible, which is the artificial intelligence position. But having been exposed to the concept of wicked problems (Rittel and Webber 1973), the question changes to: In what way can we compute layouts? That is, what is computable and what is not? Here, the basic criterion is whether or not anything we express in a computer language can be translated into machine code, recognizing that even then some procedures are not computable. As Wittgenstein would ask: What is the limit of discourse?

## **The Space-Based Approach**

By recasting the question in terms of the limit of discourse, we have begun to define our approach to solving the layout problem. Or, more precisely, we have focused on identifying its tame version. At the same time, we turn upside down the typical way that architecture is viewed. That is, instead of studying individual unique artistic creations, we look for recurrent patterns of spatial structures.

However, this is only setting the stage. The approach is space-based, which means that the primary objects in the models are spaces, not geometry or material. We start thinking about spaces first and define them in terms of their geometry, which simply indicates where the space is delimited. The objects are spaces, and not just a collection of geometric objects. The same is true for material. That is, we do not start with walls and then consider the spaces as side effects.

The interrelationships between spaces is described by diagrammatic production rules (DPR), which represents how sets of spaces are organized or structured according to their syntax or position with reference to each other. This structure is also determined by the primary use of the spaces. DPRs are a type of generative system (Gerzso 1978).

Superficially, my approach seems to share the same assumptions and methods of the pattern language (Alexander 1977), but in fact it doesn't. One important difference between the two is that I intend to develop a computer program while Alexander has no interest in computers. Other differences have to do with the limitations of the pattern language as pointed out by J.P. Protzen (Protzen 1978).

DPRs provide the basic algorithm for the computer implementation of producing layouts. However, for the an actual program to be written, additional features must be added to DPRs, the most important one being the attachment of computer code to parts of the DPRs. This code can be used to add additional controls to the

generative process such as constraints. Code bound to DPRs gives SPRs (spatial production or programmed rules).

In summary, the approach is a syntactical space-based programmable architectural and/or urban generative system (Gerzso 2000).

### Tame but Tangled Problems

It turns out that computable layouts are also tame problems. The idea is that whatever can be said is inside the limits of discourse and tame. And whatever cannot be said is outside the limits of discourse and maybe wicked or non-computable, but not necessarily both. Because we don't always know the difference between the two, I call the outside the dark side.

An important characteristic of tame problems is that they can be clearly specified, and that the criteria for determining the existence of a solution is also clear. However, in the case of solving the layout problems, the term "tame" belies the tangled characteristics of syntactic rules of SPRs.

To get a sense of actual and potential entanglements, consider the following. DPRs are related to picture and graph grammars (Rozenberg 1997) which are descendants of string grammars, which were developed by Chomsky (Chomsky 1956). He in turn based his work on post production rules used in mathematical logic. By combining computer code with DPRs, all sorts of potential conceptual confusions are possible (for more entanglements, see Fleisher 1992). For example, string grammars are rules describing natural or computer languages. DPRs are also "grammatical" rules. By attaching computer code to DPRs, we must have a computer language with a defined string grammar to create SPRs. However, SPRs are a source code which must be translated into machine language, the only language a computer really understands. In what computer language should the SPR source code translator be written? Should it be a standard language like C++ or a special architectural computer language designed to program SPRs? It is easy to see how the many interrelationships of various grammars and their rules can get very complicated.

Fig. 1

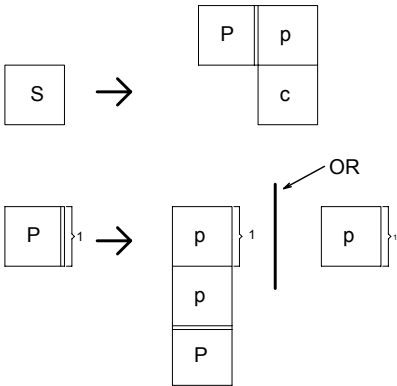
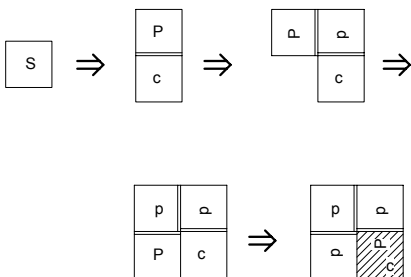


Fig. 2



The rest of the paper is a guide on how to avoid disappearing into this thicket. The general method is to present a type of spatial syntax rule, to get entangled by discovering unintended consequences, to propose a modification, and then to start the process over again.

### Contradiction by Addition

The apparently natural way to begin a spatial syntactic production rule system is by taking a starting symbol “S” and adding peripheral spaces “p” around it, as seen in Figure 1 (DPR type A-G, graphic). These rules describe a very simplified syntax of many examples of architecture, such as the Trullo, Byzantine and Renaissance churches, and some Palladio palaces. The production rules are labeled diagrams. The diagrams of spaces with upper case labels are non-terminals, and the ones with lower case letters are terminals. Non-terminal spaces permit a redrawing or replacement as specified by the rule. Below, the rule “P” means “redraw me with “P” (myself) and two “p” attached OR just redraw me as “p”. The derivation process can be stopped by replacing the non-terminal “P” with the terminal “p”. An example of a derivation appears in Figure 2.

The rules permit the generation of a floor plan in which at least two spaces overlap, which is a contradiction in architectural terms (shaded area in Figure 2). In the computer implementation of these rules, a possible solution could be to introduce a counting mechanism or overlap “detector”. Unfortunately, the overlap dilemma is only one of several unacceptable aspects of additive rules. These rules also permit the generative process to never end as long as we apply the non-terminal “P”, or, if it does, it may allow the production of layouts with an infinite number of rooms. If the rules were modified to create a spiral type layout, then the layout would be infinitely large or never-ending. The possibility of such layouts ignores the fact that real buildings are always without exception placed on a finite site. Sites always have an access to the outside world.

### Divide and Never Conquer

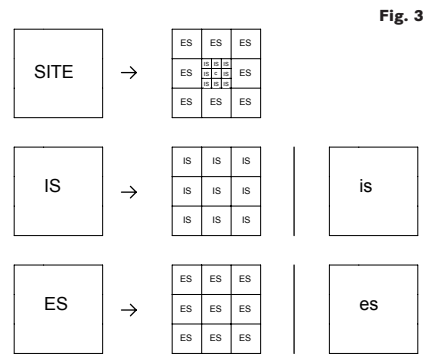
The site is the clue for getting untangled from additive rules. Even though architectural designers may sometimes design in an additive fashion, they are in fact always subdividing a given site. Therefore, the rules begin with the non-terminal

**Fig. 1**  
DPR type A-G: additive graphic rules.

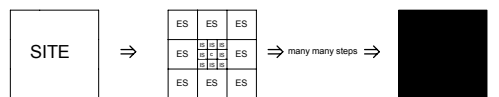
**Fig. 2**  
DPR type A-G: additive derivation.

**Fig. 3**  
DPR type D-G: divisionary graphic rules.

**Fig. 4**  
DPR type D-G: divisionary derivation gives infinitely small spaces.



**Fig. 3**



**Fig. 4**



“S”, which represents not only the starting state, but also the site to be subdivided. The objective is to define rules such that all space of a site is present and accounted for.

The new rules, type D-G, only divide (Figure 3). The site rule produces a spatial schema of a building surrounded by exterior space “ES” and a central space “c” surrounded by interior spaces “IS”. Examples of building that have this schema are houses with central patios in addition to the above-mentioned Trullo, Byzantine and Renaissance churches, and Palladio palaces.

However, divisionary graphic rules still have a variation of the stopping problem of additive rules. Here it is possible to never stop subdividing or to produce a layout with infinitely small spaces. The layout would be represented graphically as appearing completely black (Figure 4).

### **Lost in the Funhouse**

Divisionary graphic rules will produce layouts only in terms of their geometry. They will also produce the geometry of non-architectural objects such as textiles or wire mesh. Our rules have yet to be more specific to the characteristics of buildings while at the same time eliminating the production of very small spaces.

If we take rules type D-G and add circulation, type D-C, then the layouts appear more like floor plans. Each space has a guaranteed access of at least 1 meter, which is represented by a long black rectangle on the inside of the delimiter of the space (Figure 5).

The generative process stops when either two conditions arise: first, if a terminal rule is applied, or second, if a terminal rule is forced to be applied because there was no subdividing non-terminal that fit the space to be redrawn. In other words, one or more subdividing non-terminals were attempted to be applied, but the resulting spaces would be smaller than 1 by 1 meter.

In addition to establishing a lower limit to the size of the spaces, rules type D-C will always produce building layouts in which every space is either directly or indirectly connected to the access of the site.

#### **Fig. 5**

SPR type D-U: divisionary rules with circulation and functions.

#### **Fig. 6**

SPR type D-U: derivation with circulation and functions.

### **Form Follows Patterns of Functions**

Buildings we inhabit are not mazes or fun houses. Their layouts are structured according to how we use them.



These uses or functions are grouped according to recurrent patterns, that is, a “use structure” somewhat analogous to phrase structure in linguistics (Chomsky 1957, McCall 2003). They define which combinations of spaces are valid.

By adding functions to type D-C rules we get type D-U rules (also called SPRs). They are represented by two basic parts: labeled diagrammatic rules and computer code. In previous rule types, labels have been abstract, such as “p”, and do not suggest any function. In rules type D-U, non-terminal labels represent use categories, and terminals represent individual spaces with specific functions. For example, “HA” stands for hall area; “LA” living area; “KA” kitchen area, “GA” garden area, etc. “LA” can have rules that divide the space to produce all variations of living areas, which could include a dining and living room in separate rooms or as one room. The computer code attached to each rule would compute the geometry and dimensions of each subspace according to criteria of proportions and/ or area. The same approach applies to rules “KA” and “GA”.

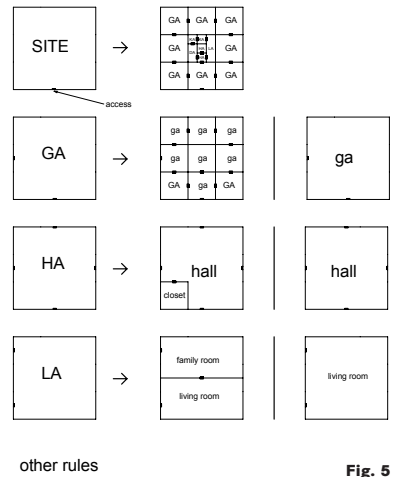


Fig. 5

### Theory and Practice

*In theory there is no difference between theory and practice. In practice there is. (Yogi Berra)*

From the point of view of a computer programmer, everything we have done up to now is purely theoretical. Putting it into practice by writing code validates our conjectures, and confirms that we are within the limits of discourse. The rule diagrams along with their characteristics must be represented in data structures along with code. But there is a catch here.

Computers don’t “know” what end is up, or down, next to it, or diagonal. The hardware only “knows” about the next instruction to be executed. It has no built-in spatial knowledge. So, while implementing a generative system type D-U, we must construct a data structure or data base so that we can determine which “space X is next to space Y” as well as to traverse the spatial structures in a deterministic way.

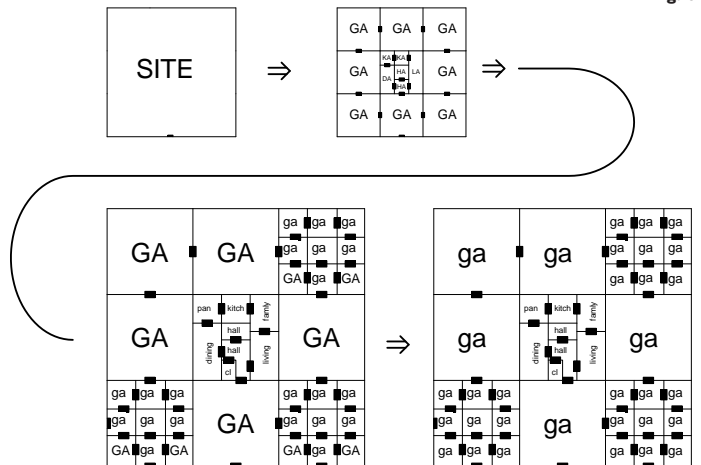


Fig. 6

## **Conclusion**

The limit of discourse is determined by what can be translated into computer machine code, and what cannot. On one side of the limit, there exist tame and tangled problems. On the other side is the dark side, the realm of wicked and non-computable problems. Mapping out these domains in a less fuzzy manner will certainly require further study.

## **Acknowledgements**

This article summarizes for the first time my Ph.D. thesis finished in 1978. The chair of the committee was J.P. Protzen. The thesis research was supported by John Habraken and Nicholas Negroponte of MIT. Aaron Fleisher, MIT, was always willing to go over its contents until the day he died in 2004.

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# DESIGN THEORIES AND COGNITIVE SCIENCE: THE EMBODIED MIND AND DESIGN

David J. Harris

## Abstract

*There is a long-held view that “reason existed in a . . . province of the mind, where emotion should not be allowed to intrude” (Damasio, 1994, p. xi). Horst Rittel spoke of a view of design in which the designer “should be somewhat detached from the problem at hand: he should try to be rational, objective and scientific” (Rittel, 1972, p. 390). But recent findings in cognitive science show that human reason is dependent on, and arises from, the structure of the human body and brain. The conclusions of this research begin to closely parallel many of the conclusions of Horst Rittel.*

*This article compares Rittel’s main assumptions about design, including his basic description of the first and second generations of design theories, of wicked problems, and of the pathologies of design, with conclusions drawn from cognitive scientist George Lakoff’s analysis of politics through the lens of the embodied mind. The implications of these parallels are briefly discussed.*

## Introduction

Design theorist Horst Rittel showed that there were aspects of design problems that were not tractable under the assumptions of what he called the first generation of design methods (Rittel, 1972; Rittel and Webber, 1973) [1]. These assumptions are widely recognized and identified in various ways: Donald Schön’s *Reflective Practitioner* talked about “technical rationality” (Schön, 1983); George Lakoff (2008) talks about “Enlightenment reason” [2]. For Rittel, the inapplicability of first generation premises led to his call for a second generation of design methods that operated with different basic assumptions about the role of rationality and logic.

Cognitive science has developed a view of human reasoning that leads to many conclusions that closely parallel those of Rittel. This view of human reason can be called “the embodied mind” [3]. These conclusions re-affirm the value of Rittel’s primary concern: the development of greater transparency in design processes. According to the view of the embodied mind, reasoning is unconscious, emotional and dependent on framing [4]; therefore, transparency is of great value.

Because reason is founded on emotion and on different kinds of framing, and because our designs are about what we value and what we wish to create, the fundamental questions for design are questions of value and how we frame our understanding of the problems we face.

## Universal Truth and The Universal Mind

There is a view that has been common in Western culture and philosophy for a long time; it relies on “*the* Truth, conceived of as the one answer, determinate and complete” (James, 1907) [6] and holds that “reason existed in a . . . province of the mind, where emotion should not be allowed to intrude” (Damasio, 1994, p. xi) [7]. Lakoff describes a number of key assumptions in his examination of U.S. politics, *The Political Mind*. Reason is supposed to be:

- Conscious – we know what we think;
- Universal – the same for everyone;
- Disembodied – free of the body, and independent of perception and action;
- Logical – consistent with the properties of classical logic;
- Unemotional – free of the passions;
- Value-neutral – the same reason applies regardless of your values;
- Interest-based – serving one’s purposes and interests; and
- Literal – able to fit an objective world precisely, with the logic of the mind able to fit the logic of the world. (Lakoff, 2008, p. 7–8)

These assumptions define what Lakoff calls Enlightenment reason [8]. Lakoff shows how this view of reason is of crucial practical significance because of its use in public policy and politics. This view of reason is used to define the idea of the rational actor, which lies at the bottom of much economic and political theory that traces a history from Adam Smith and the American Declaration of Independence to politicians like Al Gore, whose book on the Bush administration was titled *The Assault on Reason*.

Rittel states that in the “first generation” of design methods, the designer “should be somewhat detached from the problem at hand: he should try to be rational, objective and scientific” (Rittel, 1972, p. 390). This idea was common in the discourse of planning and architecture: in the classic *Towards a New Architecture*, Le Corbusier writes, “We wished to set forth facts of greater value than those in many dissertations on the soul of stones. We confined ourselves to the natural philosophy of the matter, *to things that can be known*. . . . We shall be understood. These are evident truths” (Le Corbusier, 1931/1986, p.18–19) [9].

Le Corbusier is an avatar of a view common to his time [10]. In the early 20<sup>th</sup> century, this view laid the foundations for the proliferation of those design methods, like Operations Research, that Rittel would term “theories of the first generation.” Given that this view of universal rationality was presumed to be the basic foundation for intelligence, it was necessary for design and for artificial intelligence [11]. It is not surprising that it would, at the height of its general success, be applied to social problems [12]. As Lakoff observes, this mindset is still influential today.

## **Horst Rittel and the First and Second Generations of Design Theories**

Rittel was originally a mathematician, trained as a systems designer and analyst in the tools of what he would come to call the first generation of design methods. But, by the late 1960s, he had discovered many reasons that these methods were fundamentally problematic. He observed a number of infinite regressions that prevented a complete rational analysis, and he noted, as well, a number of properties of design problems that violated the necessary assumptions of the first generation (Rittel, 1972; Rittel und Webber, 1973). He argued, for example, that there was no definitive formulation for design problems, which were of a class of problems he called “wicked” [13]. Crucial to the resolution of wicked problems is the choice of how to formulate them: “The formulation of the wicked problem *is* the problem,” wrote Rittel and Webber; “the process of formulating the problem and of conceiving a solution (or re-solution) are identical” (p. 161).

Because of the problems he saw, Rittel began development of a second generation of design methods. Characteristic of these methods is their concern with transparency of the design process: “these methods,” he wrote, “should lead to a situation where every step of the planning process is understandable and communicable” (Rittel, 1972, p. 394). This theory manifested in the idea of the Issue-Based Information System (IBIS) and its descendents – systems meant to capture a record of the argumentative process of the design of a project. If problem statement and problem solution went hand in hand, Rittel wanted to be able to make visible the different possible formulations of the problem. His systems were not systems by which a single answer was reached, but rather systems that could help designers manage the different possible formulations of the problem and make good choices within the context of those different ways of describing the problem [14].

## **The Embodied Mind: A New View of Human Reason**

The evidence from cognitive science shows that reason has a number of characteristics contrary to the first generation or Enlightenment view.

First: reason is unconscious: we are not fully aware of the bases upon which we make our decisions. In particular, we may not be aware of the following three issues: value-dependence, frame-dependence, and biconceptualism.

Our reasoning and the logic that we apply depend on the values that we hold as individuals. This is amply shown by Rittel in his discussion of wicked problems, or Gallie in his discussion of essentially contested concepts (cf. Lakoff, 2008, p. 177 – 189).

Our basic conceptual system depends on frames – entire contexts that determine how we look at a problem and what we focus on. Depending on how we frame an issue, we may look at it very differently. Rittel recognized this as an issue with design problems. But it's not simply a matter of different value systems coming into play; it's how it is presented. For example, more people will choose a course of treatment if told that it has a 90% survival rate than if told it has a 10% fatality rate, although the two situations are mathematically identical; people prefer an option when it is framed in terms of life, not death [15].

To add to the complexity, there is a final issue: we are what Lakoff calls “biconceptual”: we are able to hold two conflicting views – views that each frame the same phenomena in incompatible ways. While we can only apply one such view at a time, we may apply different views for different issues, or even different views for the same issue at different times (2008, pp. 69 – 73).

### **Pathologies of Design and Conceptual Biases**

The convergence between Rittel's work and cognitive science can be seen clearly in the discussion of pathologies of design. Rittel identified a number of different pathologies of design – reasons that plans fail (Protzen and Verma, 1997). Kahneman, whose work showed how framing affects reasoning, co-authored an article “Reasons Hawks Win,” which says, “Our conclusion is not that hawkish advisors are necessarily wrong, only that they are likely to be more persuasive than they deserve to be” (Kahneman and Renshon, 2007). Lakoff elaborates on this article and there are strong parallels between the pathologies and the biases noted by Kahneman and Renshon.

One of Rittel's pathologies is the idea of “patent medicine: what is good for one is good for all,” and we can observe a bias in favor of this pathology in “the salient exemplar effect: citing a well-known example of a rare phenomenon tends to make people think the phenomenon has a high-probability” (Lakoff, 2008, p. 228). Or in other words: what worked in one place will work in another.

The second pathology of Rittel that J.P. notes is “inability to stop the implementation of a plan although it is obviously failing;” which is supported by the reasoning that “All the sacrifices could not, and cannot have been for naught.” Lakoff notes a “risk aversion” bias and says, “This tendency shows up in Iraq policy, where Bush and the Republicans refuse to cut their losses and get out now. . . The framing is, *We can't lose and We shouldn't cut and run*” (2008, p. 228, italics are Lakoff's).

More parallels could be found between the two lists, but rather than pursuing that detail, I would like to note Lakoff's conclusion to the chapter on why hawks win:

We all need to learn to recognize these cognitive biases ... We need public discussion of them wherever they occur ... The Enlightenment bias is that we are rational, that such cognitive biases don't exist in us – no matter who we are – and that we, as conscious rational beings, have direct access to our thought processes and know our minds. A New Enlightenment must transcend the Enlightenment bias. (2008, p. 229)

Lakoff's conclusions here fit closely into Rittel's ideas for the second generation of design methods.

### **The Embodied Mind and the Second Generation: Transparency and Unconscious Reason**

Rittel's second generation of design methods sought to resolve the pathologies of design through tools, like the IBIS, that made design transparent. We can see in such techniques a way to limit the pathologies, and the unconscious biases that exist. Rittel's goal was to make the grounds for reasoning visible; as a result, tools like the IBIS can help reveal unconscious biases and the use of different frames.

In the context of careful argumentation, Rittel did not reject the value of scientific methods – he valued them highly – but he did not believe that the crucial executive decisions could be made through such tools.

By making the reasoning of our arguments transparent – by putting our ideas in a form that can be shared and examined by others – we are continuously challenged to make explicit the reasoning that we are using, and thus we are forced to examine reasoning that might be influenced by the unconscious biases that are natural to our reasoning. Rittel's drive for transparency is the appropriate response to some of the problems created by our unconscious reason [16].

### **Conclusion**

Lakoff closes *The Political Mind* with the statement “the ice caps are melting” (p. 271). If we, the human race, have not already set in motion our certain doom, then we stand at a tipping point: we know that we can destroy our environment and world; will we act to preserve it or allow its destruction?

We are all participating in the design of the future. We are all in this together, but we don't all agree. What future are we attempting to design? Are we to preserve the environment for our posterity? Are we going to re-enact the tragedy of the commons on a global scale? These are the fundamental questions that we must ask ourselves. As Rittel observed, and cognitive science confirms, there is no definitive formulation of this problem, and any formulation is dependent on the values used in the formulation.



If we seek survival – or, even more optimistically, utopia – we cannot rely on the assumption of universal reason. As demonstrated by the cognitive scientists, humans do not act in accord with the Enlightenment view of rationality. As Rittel showed, there is no clear rule that we can follow, even if we did have rationality to guide us [17].

There is no simple logic. Fundamental questions of value underlie any answer. For any scheme for survival or utopia there is a contrary vision: B.F. Skinner suggests a move “beyond freedom and dignity”; Patrick Henry said, “give me liberty or give me death.” Should life be valued even without liberty, or should liberty be valued over life?

What, then, do we do? The first-level implication seems to suggest that the debate of crucial importance is not necessarily a debate about “facts,” but rather is a debate about how to frame things, and in particular what value choices will frame our decisions. In this debate, tools and practices that reveal the reasoning used, tools that create transparency by making explicit the framings and values that underlie our reasoning – in other words, tools like Rittel’s IBIS – are crucial. The debate shifts from what is true to what is “right,” [18] and to the different conceptual framings that lead to different views of what is right. But this also leaves us to wonder whether there is any substrate of values that all humans can agree to. The notion of embodied reason does suggest that there may be some values that could be agreed upon.

For example, one might emphasize the importance of cooperation – not just as a process, but as a value in itself. As Rittel (1972) noted: “no one likes to be planned at,” which suggests that planning processes should include those affected, but not only should we seek to include people in the process because of the expected influence on the outcome, but as a goal in itself. C. W. Churchman wrote: “The future will see that problems should not ‘go away’ because problems are the means by which individuals can contribute to social planning and action,” and “it is *contribution* which is the goal, because contribution is the full expression of each one’s individuality. We create problems and attempt to solve them *in order to* contribute” (Churchman, 1978, p. 189; emphasis is Churchman’s). And, as pointed out by Protzen (1971), the answer we seek must always be idoneous: there will be no ultimate answer; we must seek a new one every time. Thus one vision of a world to seek is one in which each person is a designer and engaged in asking the important question: what future should we try to create? Thus the fundamental question of our times is not scientific or technical but ethical or moral: what is the world that we should seek to create, and how should we seek it, and promote it?

## Notes

1. Rittel's description of wicked problems shares elements with W. B. Gallie's "Essentially Contested Concepts" (1956).
2. Alternatively, "The Enlightenment Mind." In earlier works he called the same set of ideas "objectivism" (e.g., Lakoff, 1987). Lakoff, as a cognitive scientist, is concerned with the structure of human reason, and his term "Enlightenment reason" focuses on a descriptive model of how humans think. This model of reason provided a large part of the foundation for what Rittel termed "the first generation design methods," which also include descriptive theories of the world (e.g., a theory of the nature of problems) and prescriptive theories of behavior. Rittel's second generation was derived from a critique of first generation descriptions of the nature of problems and prescriptions of how to act, thus, while the two critiques lead to parallel conclusions, they do not share a foundation (cf. footnote 14 in this article).
3. Many researchers are engaged in this project. In this piece, Lakoff and Antonio Damasio are used as exemplars of this school of thought.
4. "Framing" refers to the way we view the world (cf. Lakoff, 2008, p. 249). This idea was implicit in Rittel's observation that there is no definitive formulation of a wicked problem: the formulation of the problem is set by the framing.
5. George Lakoff: "reason requires emotion" (2008, p. 8).
6. James's use of italics and capitalization is intentional (he speaks often of "big T truth").
7. This idea is widespread in our culture, as seen, e.g., in the popular fictional character Sherlock Holmes: "All emotions. . . were abhorrent to his cold, precise but admirably balanced mind. He was . . . the most perfect reasoning and observing machine that the world has seen" (Doyle, 1891). Mr. Spock, from the television series Star Trek, is another well-known example of this trope.
8. The history of these ideas predates the Enlightenment, but it was in the Enlightenment that they began to attain the great influence that they have now. It is this same connection with the Enlightenment that leads Antonio Damasio to title Descartes' Error with respect to a great Enlightenment philosopher.
9. Emphasis from the text. It is not difficult to find other architects of the early part of the 20th century to echo these ideas.
10. Corbusier expressed these ideas in a way that reached and influenced many, thus strengthening the ideas' influence, but he was hardly expressing radically new ideas.
11. Simon's work with Allen Newell is an example of a widespread trend in artificial intelligence research. (cf. e.g. Newell, und Simon, 1963.)
12. Newell and Simon's "General Problem Solver" (1963) was designed to handle logical problems, but the very name they give the system is indicative of their view that these problems are structurally similar to other problem (and hence "general"), and we can see Simon apply this reasoning in his later work on design, *The Sciences of the Artificial* (1969).
13. The first property of wicked problems (Rittel, 1972; Rittel und Webber, 1973).
14. Rittel's critique of the first generation did not stem from a critique of its view of reason; in fact he was inspired by Enlightenment ideas: Wolf Reuter notes "Rittel's favoured feature of Enlightenment seemed to be that it is a concept encouraging the human beings to use their own reason ("Verstand") without bending/yielding to any authority. . . . It is mainly a concept of never-ending criticism" (personal communication). This never-ending criticism is, we might imagine, what led Rittel to the paradoxes of rationality or the properties of wicked problems; it also leads to a view of the second-generation search for transparency as an attempt to transfer a principle of hard science into planning (Reuter, personal communication). Ultimately, if we turn universal reason on itself, it starts to break down at its limits – as was shown by Rittel's paradoxes of rationality, and others who have noted similar breakdowns in logic (cf. Borges's "Avatars of the Tortoise"). Lakoff, as a student of Noam Chomsky, began his by trying to use Chomsky's Enlightenment model of mind to explicate

observable linguistic phenomena; it was only in these failures that Lakoff came to reject “Enlightenment reason” (Lakoff, 2008). Despite rejecting the Enlightenment view of reason, Lakoff believes in the importance of scientific practices that are largely derived from the Enlightenment model of empirical scientific practice.

15. This conclusion, reported in both Lakoff (2008) and Damasio (1994), is from a large body of work done by Daniel Kahneman and Amos Tversky and many colleagues and which provided many examples of how human reason deviates from reasoning in accordance with mathematical probability.
16. It is not presumed that all unconscious reasoning will be revealed, but the principle of revealing reasoning will necessarily uncover more than simply accepting arguments *prima facie*.
17. See, also Protzen (1971) for an elegant demonstration of this.
18. I use the word “right” to emphasize the moral dimension of the question.



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# THE EMBRYONIC INCA EMPIRE, WITH PARTICULAR REFERENCE TO CHINCHAYSUYO

Catherine Julien

## Introduction

One difficulty with imagining the Andean world when the Inca expansion first began is that what we know about the later Inca empire interferes with our efforts. Later definitions

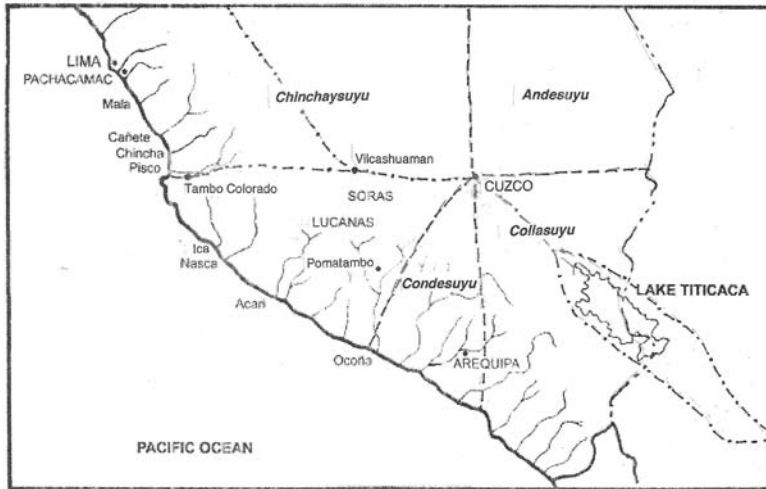


Fig. 1

of territory, in particular, are hard to erase from the mind. Spanish territorial definition was based on Inca provincial organization, while the Incas created something new. They defined provinces of a uniform size, lumping smaller groups together

and splitting larger ones (Julien 1985, 9 - 31). The Incas defined territorial units on an even grander scale, as expressed in the name Tawantinsuyo, the name for the territory they ruled, which means “four *suyos*” or “four parts.” Each *suyo* was named after an important group which resided in its territory: Chinchaysuyo after Chincha, Andesuyo after the Andes, Collasuyo after the Collas and Condesuyo after the Condes (Fig. 1). Even where these names referred to independent political actors in the period prior to Inca annexation, the *suyo* division itself was new.

Each *suyo* name also referred to a road. Chinchaysuyo, for example, began at a place called Ñan, in the plaza of Cuzco, and ran westward to Vilcashuaman, in the modern Ayacucho region, before turning north-northwest to follow the trunk of the Andean cordillera to Quito, or, at least, this was the course of the Chinchaysuyo road at the time Spaniards first traveled along it in 1532.

Chincha was an important pre-Inca polity on the south coast of what is now Peru. Until very recently, the narratives

written in Spanish about the Inca past have been used to ground an argument that Chinchayuyu did not become part of the Inca empire until late in the reign of Tupa Inca, the 10<sup>th</sup> ruler listed in the official genealogy (Table 1.1), after his conquests of Quito and Chile (Rowe 1945). I have recently projected an earlier date for this event, based on one new source and a re-reading of the narratives which describe it. More can be written about Inca Chinchaysuyo in the initial years of the Inca expansion – what I am calling “the embryonic Inca empire.” In homage to Jean-Pierre Protzen’s interests in the archaeological site of Tambo Colorado and its historical and geographic context, I will briefly and tentatively sketch a picture of Chinchaysuyo – the *suyo* in which Tambo Colorado was located – drawn from the narratives of two Spanish authors, Pedro de Cieza de León (1984 [1553], 1984 [c. 1554]) and Juan de Betanzos (1987 [1551–57]).

Table 1.1. The three Incas largely responsible for the Inca expansion (dates approximate).  
 Pachacuti, 9th ruler (in the official genealogy) 1438 – 1471  
 Thupa Inca, 10th ruler 1471 – 1493  
 Huayna Capac, 11th ruler 1493 – 1528

Cieza, a Spanish soldier who traveled in the Andes in the late 1540s, gathered information from people whose memories sometimes extended to the time the Incas annexed their homelands. What he wrote about the region of Chinchaysuyo closest to Cuzco on the eve of the Inca expansion, for example, reveals striking differences in the political map, when compared with the Inca provincial division. The Chancas, who traced their ancestral origins to Lake Choclococha, had embarked on a conquest campaign from their territorial home in Chuquibamba [1], annexing the territory of Andahuaylas, which had been part of the “ancient nation” of the Quechuas (1984, Ch. 90, p. 254; 1986, Ch. 37, 111; Ch. 44, 130). The image we take from Cieza – who cites Chanca sources for his information – is of the disintegration of an earlier polity in the years prior to the Inca expansion. Andahuaylas has been taken to be the Chanca heartland because it was the center of Chanca territory at the time of the Spanish arrival. Cieza tells us that that had not long been the case.

Stories about the Inca conquest often reveal more about alliance in time of crisis than about existing territorial division. Juan de Betanzos, a Spaniard who married a woman from one of the Inca lineages most involved in the Inca expansion and who quickly learned the Inca language, wrote a narrative that, as I have argued elsewhere (2000, Ch. 3), captures an Inca genre that preserved a memory of the life history of the Inca Pachacuti, the 9th ruler.

**Fig. 1**  
 Chinchaysuyo, Andesuyo,  
 Collasuyo and Condesuyo

Betanzos describes only two campaigns captured by Pachacuti. The first was in Chinchaysuyo. The peoples initially encountered submitted without fighting. Others allied to make a collective stand to stop the Inca juggernaut. This pattern is repeated elsewhere in the stories Spanish authors tell about the Inca conquest [2]. We get a sense of who the important political actors were at the time of the Inca expansion, but no sense of their territories.

Betanzos and Cieza are better on a host of other topics. Both authors describe Pachacuti's campaign in Chinchaysuyo. Cieza tells us more about the role of non-Inca peoples, the development of Inca outposts in conquered territory and about campaigns run by captains subordinate to Pachacuti. Betanzos tells us about Inca infrastructure, including the building of roads and bridges at the time of the campaign, communications, and incipient institutions. Because the Betanzos narrative drew from an underlying Inca genre, it also has the capacity to reflect the growth of Inca institutions and policies during this initial phase of the expansion. Betanzos inserts two chapters of ordinances issued by Pachacuti [3], sequenced at the precise moment when he ceased campaigning in person. The first chapter centers on the city of Cuzco. The second includes a series of instructions to captains sent out on campaign that reflect the form of Inca provincial administration. The ordinances are part of the story, and I will return to them at the end.

### **Inca Chinchaysuyo**

The life history of Pachacuti, as told by Betanzos, begins with a story about his unexpected victory over the Chancas, after his father had taken refuge at a fortified site away from the Inca seat of Cuzco. The battle, fought in the streets of Cuzco, was won by stones (afterward called *pururaucas*) that turned into warriors and miraculously assisted the Incas (Rowe 1946, 204). Hidden in the background are lords from the Cuzco region who helped Pachacuti defeat the Chancas. They are not named, but they are referred to later in the story as they come to Cuzco to receive instructions from Pachacuti or are given his daughters as their principal wives. An Inca noble, or *orejón* (Spanish for "big ears," a reference to the ear spools these individuals wore that marked initiation into the Inca dynastic lineage), was also embedded with them. In the story these lords act as willing subordinates at all times (1987, Ch. 12, 55-57). After the Chanca defeat, Pachacuti transformed Cuzco, rebuilding the city, reorganizing the valley and tying the Cuzco hinterland (a larger territorial entity that I have called the "region of Cuzco") to it [4]. The project involved reorganizing this hinterland so that armies



recruited from the region could be away for longer periods on campaign (1987, Ch. 18, 87-88). When Pachacuti was ready to launch his first major campaign outside of Cuzco, in what would become Chinchaysuyo, he called an assembly to tell the lords of the hinterland to make ready for war. This involved planting fields. They were to return to Cuzco after three months with their armies, to accompany the Inca army on its first major conquest campaign (1987, Ch. 18, 87 – 88).

Betanzos tells little about actual battles, focusing instead on the army's march and on the construction of roads and bridges, and particularly, of the impressive straw suspension bridges that were built to span two deep river canyons. At Curahuasi, peoples identified as Quechuas, Omasayos, Aymaraes, Yanaguaras, Chumbivilcas, and Chancas came out to sue for peace [5]. The peoples who chose to resist, after the others submitted, were the Soras, Lucanas, and some of the Chancas. On learning that these peoples had gathered in Soras territory, Pachacuti marched in that direction, building roads and bridges as he went. He won the war in less than a day, and that is all we learn about the fighting.

Cieza describes additional fighting as well as the building of two Inca installations, one near Curamba and the other at Vilcas. In Cieza's story, Curamba resisted in the period prior to Pachacuti's march to Soras. After its defeat, Pachacuti left a "majordomo" to begin construction of residences and a Temple of the Sun (1986, Ch. 47, 137 – 139). The area around Vilcas appears to have submitted without offering resistance. Vilcas, also known as Vilcashuaman, was a major Inca center and one of the principle tribute depots north of Cuzco in later years (1984, Ch. 89, 252 – 253). Cieza always mentions Vilcas when he gives a list of these major centers (1986, Ch. 20, 56). As a center for tribute collection it was also a major storage site (1984, Chs. 91-92, 134 – 237). The individuals he refers to as "majordomos" or "governors" at these sites also served as judges and were entrusted with security. They were *orejones*, members of the Inca dynastic lineage (1986, Ch. 20, 56 – 56).

Betanzos never mentions Vilcas, not in this context nor in any other. He does mention the division of the army after the defeat of Soras. Pachacuti sent two captains out to campaign on their own, one to "Condesuyo" and the other to "Andesuyo" (1987, Ch. 18, 90 – 91). These terms are not precise references to the Condesuyo and Andesuyo divisions of Tawantinsuyo I mentioned at the beginning of this paper, which were located directly south and north of Cuzco, respectively. In this context, the terms refer to halves along an axis defined by the route Pachacuti took to return to Cuzco, with Condesuyo on his right hand and Andesuyo on his left (Julien Ms.). The

captain sent out to campaign in “Condesuyo” was actually annexing territory in Chinchaysuyo. Betanzos does not name this captain nor tell us anything about where he went. Cieza does not name the captain at first, noting that he was sent to Pomatambo, a region to the west of the Cotahuasi river, in Chinchaysuyo (1986, Ch. 47, 139; see Julien 1991, 12 – 13 and Map 11). Cieza tells us that he had some success, winning battles and annexing “most of the province.” The same captain is mentioned again where Cieza tells the story of the Inca annexation of the south coast of Peru. The captain sent by “the father of Topa Ynga” (Pachacuti) from Soras was named “Capa Ynga.” This time Cieza tells us he did not have much success and was unable to annex the south coast, an event which did not take place until the time of Tupa Inca (1986, Ch. 60, 172), effectively contradicting what he had written earlier in the same account.

Various authors tell the story of the Inca conquest of the south coast. Even though they do not agree on *when* the region was incorporated in the empire, they tell the same story about *how* it was accomplished. An Inca captain came down from the highlands in the region to the south of Nasca, perhaps as far south as Ocoña. Traveling along the coast in a northwesterly direction, he annexed a number of valleys without any fighting. Two stories are told about Chinchá, the most important polity on the coast at the time: Chinchá either submitted without a fight or it offered substantial resistance (Julien 2008, 167 – 168). All authors note that fierce resistance was offered at Huarco in the Cañete valleys; Cieza de León noted that this resistance lasted for years (1986, Ch. 60, 172).

If we fit the pieces of the story about the campaigns of this captain back together, a more coherent view of his itinerary emerges. He traveled first to Pomatambo and then down to the coast. The stories about the south coast campaign tell us that he reached the coast somewhere between Ocoña and Nasca (Julien 2008, 168 – 169). The Cotahuasi river flows into the Ocoña river, and Ocoña is the valley that marks the boundary between Chinchaysuyo and Condesuyo (Julien 1998, 499). This captain stayed within the bounds of Inca Chinchaysuyo and initiated if not completed the annexation of Chinchá, the most important polity on the south coast at the time [6].

I believe the argument just summarized helps to resolve a perplexing problem. The idea that Chinchá was not annexed until late in the life of Tupa Inca, after the conquests of Quito and Chile, produces the anomaly that the Incas had named a division of Tawantinsuyo after a place that was not part of Tawantinsuyo. At the time Pachacuti rebuilt and reorganized the city of Cuzco, he designed a program

of sacrifice and other ritual events in Cuzco, using the *suvo* division in his design (Rowe 1979, 1985). The ritual of Citua, for example, clearly relies on the *suvo* division as an underlying structuring principle (Molina 1989, 75). If Chinchaysuyo was the name given to one of the parts of Tawantinsuyo, Chinchá had to have been part of it.

Chinchaysuyo was also the name of an important Inca road that departed from Cuzco toward the west then the northwest, along the trunk of the Andes to Quito, going nowhere near Chinchá. Was this always the case, or was there a time when Chinchaysuyo was the road to Chinchá? If we roll back time to the years following Pachacuti's campaign, an earlier definition of this road suggests itself: the road extended westward from Cuzco to Vilcashuaman and continued on in the same direction, descending the Pisco valley and arriving on the coast just southeast of Chinchá. The road down the Pisco valley was an important transverse road at one time, as the construction of such monumental Inca sites along it as Huaytará and Tambo Colorado attests. By all accounts, this is not the road used by the captain who annexed coastal Chinchaysuyo, but given what all accounts of this campaign tell us about the extended period of resistance in Cañete, a route from Cuzco to the coast near Chinchá would have been quick to develop. The road named Chinchaysuyo may have led to Chinchá after all.

## **The Embryonic Inca Empire**

The construction of roads and bridges not only heralded the arrival of the Inca army, it served to structure an embryonic form of Inca provincial administration. One of the chapters of "ordinances" included in the Betanzos narrative tells us something about it (1987, Ch. 22).

The chapter begins and ends with instructions to captains sent out on campaign. The captain was to establish posts along the road so that he could communicate with Cuzco; the posts were to be supplied by local people. He was also to create *tambos* or "lodging-places" for the army, where a group of assigned women were to prepare food and brew beer for their sustenance. A transport service staffed by local people was also to be established; those assigned to serve in this manner were to be responsible for transporting loads from their *tambo* as far as the next *tambo*. The captain was also instructed to build a major center called a Xuco Guaman every 40 leagues (approximately 220 km, the distance of a "falcon flight," to which the name refers) with greater storage capacity and assigned herds, presumably so that armies could be hosted for longer periods.

Buried in the middle of these instructions to captains is a lengthy “ordinance” that describes how annexed territory was to be administered. No mention of Inca decimal administration, the hierarchy of local officials called *kurakas* who were primarily responsible for labor recruitment (Julien 1982, 1988) appears, because presumably the decimal hierarchy was a later imposition. Another sort of hierarchy was described: officials known as *llactacamayos* were to be embedded in local towns for the purposes of gathering information and for overseeing the collection of goods or foodstuffs produced by subject peoples. The *llactacamayos* of the smaller settlements reported to the *llactacamayos* of larger settlements, who in turn reported to an *orejón*, embedded in the province. These *orejones* were the architects of the storage structures in the major centers where they lived, presumably the centers called Xuco Guaman. They were also concerned with setting territorial limits between provinces and adjusting them when the population of one province grew at a faster rate than that of its neighbors (Julien 2007).

We have already seen embedded *orejones* in the region of Cuzco, prior to the time Pachacuti embarked on his campaign in the Vilcas region. Betanzos mentions *llactacamayos* in this early period, in the service of local lords in the Cuzco region, though he does not clarify whether they were an Inca imposition or a reflection of local practice. He also informs us that Pachacuti reorganized Cuzco so that armies could be away from Cuzco for lengthy periods. The embedded *orejón/llactacamayo* hierarchy which oversaw the collection and storage of a surplus in the Cuzco region could serve equally well in the same capacity in the provinces.

From Betanzos we glean an image of the Inca empire in its embryonic stage. We see the establishment of the infrastructure needed to support and communicate with an army. We also see the emergence of an imperial territory and its definition.

## **Acknowledgments**

The reading offered here of Cieza and Betanzos attempts to mine some of the knowledge of a past world that these sources are capable of reflecting; after all, no Spaniard witnessed any of the events that are described. Still, this enterprise is a decidedly tentative one. I offer this view because it should be taken into account in tandem with other lines of investigation into the Inca past.

I owe a debt to José Brandão, of the Department of History, Western Michigan University, for reading the final draft.

## Notes

1. Chuquibamba is a fairly common place name in the central Andean highlands. The name was used in reference to places in both the Lucanas and Apurimac districts in the nineteenth century (Paz Soldán 1877, 331-332).
2. Two famous stands were made against the Incas after most of a region had fallen, one at Huarco in Cañete (discussed below and in Julien 2008) and at Oroncota in the Andean foothills of what is now Bolivia (Julien 1994).
3. The ordinances are found in the part of the Betanzos narrative unknown to scholars until the publication of a more complete manuscript in 1987. Only the first 18 chapters of Part I were accessible to scholars before that date.
4. Elsewhere I have defined the region of Cuzco (Julien 2002, 12-14). The area subject to Inca authority at the time of Pachacuti's rise to power appears to have included Canas and Canchis territory, annexed in the time of his father, the Inka Viracocha (Cieza de León 1986, Ch. 42, 124-125).
5. What must have been an important victory over a major political power on the south coast (Chincha) has been erased to a large extent from Inca memory because of the problematic character of the captain sent on this campaign. "Capa Ynga," also known as Capac Yupanqui, was the brother Pachacuti later sent to conquer Jauja, after Pachacuti ceased campaigning in person. Capac Yupanqui was under strict instructions to go no farther than a certain point, but exceeded the limit to chase a Chanca captain named Anco Ayillo who had broken ranks and headed on ahead of the Inca army with his Chanca troops. Finding himself in the territory of an important lord in Cajamarca, Capac Yupanqui engaged and defeated this lord. His successes cost him his life: Pachacuti had him killed before he could return to Cuzco (Sarmiento de Gamboa, 1906, Ch. 38, 77-80). His successes also appear to have affected his place in Inca memory; Betanzos's account of Pachacuti's life never mentions him.
6. If the names of the grants to tribute rights (*encomiendas*), made in the years after the Spanish arrival (Chilques and Papres, see Miranda 1925, 180-181) reflect communities of *mitimas* settled in the Vilcas region during the time the region was organized as part of the Inca empire, we can guess the identities of some of the Cuzco lords that participated in Pachacuti's campaign in Chinchaysuyo: they were Chilques and Papres.



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## INCA ARCHITECTURE AND THE CONQUEST OF THE COUNTRYSIDE

*Stella E. Nair*

Architecture was critical to Inca conquest strategies. During the fifteenth century, the Incas rapidly transformed their small state into a large empire [1]. The newly subjugated people disliked Inca rule, and as a result, continuous uprising plagued the young empire. Given that the Incas were a skilled military power, scholars and laymen initially assumed that the distinctive Inca stone structures, often situated on hilltop sites and bordered by terrace walls, were defensive in nature. Yet, subsequent scholarship demonstrated that most Inca architecture lacked any military or defensive structure. These studies provided a greater understanding of the ways in which the Incas used architecture for a diversity of functions, such as the creation of storage complexes, administrative centers, spaces for state ceremonies and religion, as well as pleasure palaces for rulers [2]. Detailed examinations of elite residence near Cuzco, such as Jean-Pierre Protzen's groundbreaking study of the ruler Pachakuti's estate at Ollantaytambo, provided important clues into construction practices and patronage [3].



Fig. 1



The lack of obvious military defenses in most Inca buildings does not mean that these structures were built without reference to colonizing needs. Rather, research by scholars suggests that in order to control a vast and sparsely populated landscape, Inca rulers developed strategies, which used architecture to inscribe and control the new territories physically, visually, and spiritually [4]. In this chapter, I will explore the evolution of these strategies under Pachakuti's son, Thupa 'Inka, focusing in particular on how a network of Inca roads, terraces, storage centers, shrines and guard stations was laid out within a private royal estate named Chinchero. These architectural networks created new social maps of the landscapes that articulated Inca control over many aspects of Andean life [5].

As Simon Schama describes in his book *Landscape and Memory*, forests, mountains and valleys embody social meanings, histories, belief systems and social dynamics [6]. In the geographically diverse and difficult terrain of the Andes, mountains were the source of origin stories, ethnic identities, and the basis for survival. As regional powers expanded, controlling the landscape was crucial to controlling the populace. This is most clearly evident in the late fifteenth and early sixteenth centuries during the reign of the ruler Thupa 'Inka, when the expansion of the Inca Empire was at its peak.

The private estate of Chinchero, located approximately twenty kilometers outside of Cusco, was the royal residence of Thupa 'Inka, which houses residential, administrative and religious functions. It was laid out across a large territory whose access was controlled by roads and marked by shrines, way stations, and storage centers. Chinchero was strategically placed to symbolize the authority of the ruler. Unlike the private estates of the other Inca rulers, Thupa 'Inka did not build this estate in the Sacred Valley. Instead he chose the Chinchero landscape, which he transformed into a symbol of conquest, economic power, and sacredness [7].

There are four ways in which building an estate at this location contributed to colonizing strategies. First, Chinchero was part of the traditional homeland of the Ayamarkas, an important rival ethnic group that the Incas fought before bringing them into the Inca state and making them allies [8]. Building on their homestead reminded the Ayarmarka that, despite peaceful relations, the Incas were their rulers. Second, the site is one of the best farming lands in the region. In contrast to European traditions, the *Sapa Inka's* (ruler's) wealth was not inherited nor given to him by the state; instead it was the product of a ruler's personal

conquests. In an agriculturally dependent culture like the Inca, controlling this rich resource was a powerful element in his presentation of wealth. Third, the landed estate contained many natural elements sacred to the Inca, such as specific carved rocks, hills and a lake. Fourth, Chinchero was located between the Sacred Valley, home to most of the Inca rulers, and the sacred Inca capital of Cuzco, as it connected to both centers symbolically and physically. In sum, the location of Chinchero re-imagined imperial space by placing the royal estate at the center of power, which was then flanked and differentiated on one side by the estates of former Sapa Inkas and by the imperial capital on the other side.

Simply possessing the landscape was not enough for the Inca. Instead, they had to physically reshape it. On a practical level, the vast vertical terrain of the Andes made farming difficult, therefore earth-moving projects created much needed arable land. While prior ethnic groups made small-scale terraces, no one approached the Inca structures in terms of quality and quantity. Inca engineering took into account underground water systems and land stability in order to create agriculturally productive lands in even the most remote places [9].

At Chinchero, terraces were tools for making more land available for use, but they also served as symbols of the Inca's power to control human labor and basic food supplies. Throughout the empire, colonized peoples were sent far from their homes to work as part of their labor tax for the Inca State. Their produce was gathered by official administrators and guarded in state storage centers, called *colcas*. Inca technological superiority, such as agricultural terracing, allowed for increased productivity. But for colonized populations, it meant the loss of control over one's labor and access to basic subsistence needs. Niles has noted that the heaviest concentration of Inca terraces were around royal private estates in the heartland, suggesting that the role of terracing as symbol was of great significance for the Inca [10]. The symbolism was not confined to the end product (the visible terraces) but also incorporated the process of making (constructing the terraces). Non-Inca men made up the bulk of the labor force, hence it was the colonized who had to build the elite royal estates of their conquerors, reminding the people of both their subjugated status as well as the fact that they were making yet another part of the Andean landscape from which they were to be excluded. The Incas used architectural elements (in process and form) as a powerful tool to enact domination across the Andean landscape [11].

Inca earth moving projects went beyond terracing. The Incas excavated large amounts of land for their architectural projects, as can be seen at Chinchero where the magnitude of the earth moving process is clearly visible. Instead of building on the nearby valley floor, large portions of earth and natural base stone were removed from a hillside in order to create a plaza, palace compound, and extensive farm land (Fig. 1). While this allowed the fertile hillside and valley to be farmed, and created habitable spaces, the renovations had great religious implications as well. For Andean people, *Pachamama* (earth mother) was believed to be an important sacred force. Any action to carve into the earth required special rituals, even for farming.

The Incas appear to have used this pan-Andean perception of the landscape to heighten their power and mystique. By transforming the landscape on a massive scale, the Incas identified themselves, and became identified with, sacred power [12]. This was used to justify their domination of the Andes and can be seen in their manipulation of origin stories. An example is the story of the founding Inca ancestors who arrived in the valley of Cusco. Using a sling to turn mountains into plains, they physically and spiritually transformed the local landscape into their sacred capital [13]. At Chinchero, the transformed hillside proclaimed the power of Thupa 'Inka over the region.

At Machu Picchu, the Incas used architecture to frame views and thus emphasize their connection with sacred natural places and objects [14]. This concurs with the work of Jean-Pierre Protzen and John Rowe, who have demonstrated that in the capital of Cusco, only nobles could live within the sacred precinct, forcing servants to undergo daily rituals in order to enter the royal city [15]. This practice of exclusion was transported to the countryside in the form of private estates such as Chinchero.

At Chinchero, the heavily terraced hillside housed the palace of the Inca and visiting nobility. Inca rulers claimed descent from the sacred *Inti* (the Sun), hence they proclaimed their own sacredness. When the Inca traveled, his body as both a representation of the Imperial Inca state and as a sanctified being, transformed the spaces he occupied into imperial and sacred spaces [16]. Therefore Inca terracing visualized the power of the ruler and the sanctity of place. At Chinchero, the presence of Thupa 'Inka created a sacred center that could be seen and fully experienced by only the most privileged. Chinchero was made with a distinctive polygonal stone masonry in which tightly placed stones were used to form thick sloping walls. These walls were only used on high

prestige structures and were devoid of much decoration, with the exception of trapezoidal doors, niches and windows. The Incas used this unusual architectural tradition across the empire as a symbol of their power and rule that was clearly recognizable in the Andean landscape [17]. This architecture proclaimed Inca dominance of the newly conquered landscape [18], such as at Chinchero [19]. Reserved for Inca nobility and high administrators, this distinctive style visually proclaimed an Inca site's high status to any traveler or visiting dignitary.

The association of this type of architecture with Inca power can be seen in the writings of chronicles compiled in the century after the Spanish invasion in 1532. For example, Juan de Betanzos states that Inca informants stressed that it was the Inca ruler himself who took a cord to measure and layout important sites. In the case of Cusco, it was the ruler who chose the stones and helped to lay the bricks. At Chinchero, Betanzos writes that it was Thupa 'Inka who chose the site and the location of specific buildings [20]. The trope of the ruler as architect is common in many cultures throughout the world, such that the ruler or deity is seen as the all-powerful being who constructs the empire and the cosmic order. Hence sacred and secular authorities use the metaphor of the architect as an expression of their power to transform the world.

This association can also be seen in the writings and drawings of Guaman Poma de Ayala, an indigenous author and artist, who created an extensive illustrated manuscript about life under both Imperial Inca and Spanish Colonial rule [21]. His drawings from the early colonial period are one of the most important documents we have that visualizes Andean life. One of Guaman Poma's drawings shows young Inca nobles laying the distinctive Inca stone masonry. The masonry aligned with Inca royalty was both an expression of the sacredness of stone as well as an expression of the Inca's power to alter this important natural element [22].

Across the Empire, the Incas incorporated sacred natural features into their architecture, which reinforced the power and meaning attributed to the landscape. This also helped to displace relationships that colonized populations had to these sites. First, because the Inca's had their own direct relationship with these places and objects; second, because colonized populations were now marginalized as the Inca story become hegemonic and Inca physical possession more complete.

Inca oral histories reiterated Inca control of scared landscapes. Across the Andes, natural rock outcrops believed to be holy shrines were called *wak'as*. This pan-Andean belief was incorporated into Inca origin stories, where one of the founding ancestors became part of a sacred mountain. Thupa 'Inka's father, the ruler Pachakuti, was reported to have called upon the *wak'as* to save Cusco in a critical battle. The stones transformed themselves into great warriors and turned back an invading army. Subsequent rulers are believed to have consulted *wak'as* before heading off into battle. These sacred stones are found in high-prestige sites throughout the Andes and were revered. Thus the narrativized landscape naturalized notions of colonial domination.

The prestige and power of stone was not only interwoven with Inca oral histories, but also the architecture itself. Inca stone masonry mimics the peaks of the Andes Mountains, blurring the line between what is natural and the manmade. An example can be seen at Machu Picchu, where a constructed terrace wall appears to be more like a rocky cliff face than human construction and an Inca shrine is blended into a *wak'a*. This transformative architectural style is typical of construction built under the reign of Thupa 'Inka's father, Pachakuti. Pachakuti proclaimed that he was the direct descendent of the Sun, and therefore he and succeeding Inca rulers were infused with sacredness. The insertion of the royal elite in a direct relationship with sacred power gave weight to their right to conquer other lands and people.

At Chinchero, rock outcrops were incorporated into buildings and terraces. The importance of these *wak'as* probably predates the Inca Empire as they were likely worshiped by the Ayarmarkas. The incorporation of these stones within the site as shrines emphasized the spiritual power of Thupa 'Inka and his control over areas sacred to a conquered people. By incorporating these stones, the Incas were able to identify their rule with an earlier and established sacred iconography. Early chroniclers also tell us that it was common practice for the Incas to capture the movable sacred shrines of conquered peoples and take them to Cusco, effectively as hostages.

At Chinchero, we see a distinct change in carving style. Instead of the subtle gestures seen at some parts of Machu Picchu, at Chinchero masons worked the rocks to make the presence of the Inca more visible. This transition in style most likely reflects a change in the political dynamics of the empire. While Pachakuti apparently used carved stones as an expression of power through association *with* nature, Thupa 'Inka appears to have used the carved *wak'as* at Chinchero as expressions of power *over* nature.

During Thupa 'Inka's reign, a restless and rapidly growing elite class tried to revolt against him. In order to limit insurrection, Thupa 'Inka ordered that the nobility come to Chinchero and build his private estate. The heavily carved wak'as positioned throughout the site no doubt served as a reminder of the supreme might of the Inca ruler over the less powerful nobles. Chinchero became a place where the power of the supreme Sapa Inka was asserted over both the colonized populations and Inca nobles through the extraction of labor and layers of exclusion.

Roads regulated access to Chinchero and its sacred shrines. In the Inca Empire roads were built solely for the use of armies and messengers as part of an extensive system to repress revolt in the Empire. Anyone on a road without permission could be put to death. When city-states tried to repel Inca rule, the Incas, after crushing their uprising, banished the survivors to remote locations scattered across the empire. The control over travel ended any possibility of group revolt, and prevented displaced individuals from returning home.

The building and control of roads also ended traditional migrations that had been at the core of Andean life. The dramatic vertical landscape that characterizes the Andes created distinct microclimates that can only grow a restricted number of crops. Therefore, in order to obtain needed supplies, families and clan groups had to travel and – sometimes live in – different ecological zones. By cutting off these links, the Inca severed access to lands and products that were crucial for survival, making inhabitants even more dependent upon the storehouses of the Incas. At Chinchero, two roads approached the site, one from the Sacred Valley and the other from the Capital of Cusco. For colonized people or punished nobility, roads such as these were not means of access, but became visible symbols of dispossession and displacement.

One of their architectural strategies they used to improve their command over movement on their roads was the *tambo* or Inca way station. Inca *tambos* were built along the roads to serve the purposes of supervising travel and providing a place for rest and ritual. The type of *tambo* built reflected the travelers it was meant to serve, such as armies, dignitaries, or stationed guards and messengers. Evidence suggests that there were several *tambos* on the private estate of Chinchero

Pecaqachu, a small terraced site on the main road to Chinchero, lies at a critical curve in the road and is most likely an example of a guard station that also contained ceremonial functions. Travelers from the Sacred Valley

would not know of its existence until they were directly upon the site and thus could be easily caught by the guards if they were traveling illegally. The size of this site indicates that it could have held a small retinue on their way to visit Thupa 'Inka at Chinchero. There was a series of fountains, suggesting Pecaqachu's high prestige function and possible ceremonial use. The custom of performing rituals upon entering Cusco, the sacred capital of the Inca Empire, was most likely practiced at royal and religious sites in the hinterlands.

Another possible *tambo* that is located near to Chinchero is *Wayq'okancha*, which may have had the function of helping to guard the *colcas*. These distinctive structures had pan-Andean precedents, but the Incas standardized the architecture and located these buildings in visually conspicuous places. This made *colcas* a distinguishing symbol of Inca control across the Empire. The storage center near Chinchero was Machu Colca, which probably contained a large portion of Thupa 'Inka's private holdings of produce. Displaying this distinctive architectural type on an unpopulated but prominent ridge that overlooked the very populated Sacred Valley no doubt sent a clear message of the bounty of Thupa 'Inka's wealth and might to commoners and nobles alike (Niles, personal communication). The display of *Colcas* on prominent mountain faces overlooking populated valleys was a common theme in Inca architecture.

An example of Inca storehouses used as symbols of state possession can be seen in a storage structure on a mountain face that looms over Ollantaytambo, the private estate of Pachakuti in the Sacred Valley. Only recently have scholars seriously examined Inca storehouses and brought to light their important roles as storage facility and state symbol [23]. Previously, the visually dominant but hard to reach locations of the Inca storage centers led many scholars to mistakenly argue that the *colcas* were isolated prisons or houses for reclusive virgins of the sun, interpretations that we now know to be completely incorrect.

While *tambos* and *colcas* proclaimed the Inca's physical control over the countryside, elaborate religious shrines dotting the landscape further emphasized the Incas' spiritual control [24]. Because the shrines were frequently located along roads, travelers were obliged to perform special rituals that linked the power of the Inca to that of the natural pantheon. One example is the shrine at Cuper Bajo, which consisted of a series of curved terraces, double jamb niches, half scale and miniature walls, the latter of which was of multicolored polygonal masonry and is the only Inca

miniature wall that survives today. According to oral history, an *usnu*, or altar, once stood at the top of the site. Travels between Cuzco and Chinchero would have had to pay homage to this well-positioned shrine along the imperial Inca road

The Incas developed complex strategies to conquer a diverse landscape, ranging from the dry coastal plains to the rain-soaked Amazon. As evident at the landed estate of Chinchero, Inca architectural gestures outside of Cusco were not a secondary means of control, but were a critical part of state expansion and conquest. Instead of relying solely on brute force to control the populace, the Incas manipulated pan-Andean notions of the natural



world to create power in image and institutional infrastructure. Through the creation of roads that were the routes of travel for those with permission but forbidden to all others, the Inca stabilized and prohibited the movement of people whose earlier lifestyles necessitated it. Engineering a carefully choreographed network of roads, shrines, guard stations, and private estates, the Incas physically, mentally and spiritually transformed the landscape into an emblem of Inca domination over a dispossessed population.

## Notes

1. Since the people of the Andes did not use a writing system to record their language, there is much debate over the correct spelling of indigenous terms. For example, 'Inca' has traditionally been spelled with a 'c', which I have used in this article when referring to the empire or culture. However, recently there has been some debate over whether a 'k' would be more phonetically accurate, and hence I have used this for individual names.
2. Rowe 1967; Morris and Thompson 1970; Alcina Franch 1976; Gasparini and Margolies 1980; Protzen 1983; Kendall 1984; Niles 1984; Morris and Thompson 1985; MacLean 1986; Niles 1987b; Niles 1987a; Kendall 1988; Lee 1988; Niles 1989; Reinhard 1991; Lee 1992; LeVine 1992; Niles 1993; Protzen 1993; Farrington 1995; Niles 1999; Morris 2001; Niles 2004.
3. Protzen 1983; Protzen 1986; Niles 1987a; Niles 1989; Protzen 1993; Farrington 1995; Niles 1999; Morris 2001; Nair 2003; Niles 2004.
4. For insights into the multiple ways in which the Inca manipulated stone with their architecture and the significance of altering natural elements, see Dean, C. 2007. For a discussion of the ways in which architecture was deployed as part of conquest strategies, in particular, its relationship to sacred landscapes, see Niles 1992. For an examination of the ways in which geography was ritually inscribed, see Farrington 1992.
5. The evidence discussed in this essay is drawn from my research, see Nair 2003.
6. Schama 1995. I am referring here to Schama's broader argument that cultural aspects are encoded in landscape, not that there was a universal coding systems. Rather, there was great variability, as is evident from the Inca example.
7. Nair 2003.
8. Rostworowski 1970.
9. Farrington 1983; Wright, Kelly and Zegarra 1997; Wright, Witt and Zegarra 1997; Wright and Valencia Zegarra 2000; Wright, McEwan and Wright 2006; Wright, et al. 2007.
10. Niles 1982; Niles 1992.
11. Niles 1992; Dean 2007.
12. Farrington 1983; Farrington 1992; Niles 1992. For an analysis focusing on the nuanced and powerful relationship between nature and architecture for the Incas, see Dean 2007.
13. Betanzos 1996.
14. Julien 1990; Reinhard 1991.
15. Protzen and Rowe 1994.
16. Classen 1993; Cummins and Houston 2005.
17. Gasparini and Margolies 1980; Protzen 1999.
18. Gasparini and Margolies 1980.

19. Nair 2003.
20. Betanzos 1996.
21. Guaman Poma de Ayala 1993.
22. Dean 2007.
23. LeVine 1992.
24. Rowe 1980.

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## **DIRECTIONS FOR DOCTORAL EDUCATION IN ARCHITECTURE IN NORTH AMERICA**

*Douglas Noble*

It has taken half a century for doctoral education to begin to become somewhat grudgingly accepted in architecture.

The number of North American universities granting a Ph.D. in Architecture more than doubled between 1998 and 2008 [1]. The number of students in these programs grew steadily and substantially during that time. There are new types of doctoral degrees, and new subject areas being explored. The Ph.D. degree is becoming more widely accepted as a valued credential for full-time faculty at major universities. New avenues for research funding are reinforcing the value of scientific research in academia and in the profession. More students from the United States are joining programs that have historically been dominated by international students. With these changes, doctoral education is becoming much more widely accepted and recognized in schools and by the profession.

Excluding architectural history doctorates, there are multiple claims to the “first architectural Ph.D.” Sami Hassid obtained a Ph.D. at Harvard in 1956 [2]. Steiner (1987) points out that a Ph.D. was granted at Harvard as early as 1945. In any case, doctoral degrees were apparently only granted at one university in the 1940’s and 1950’s, and there were only a tiny handful of students in the program before it closed. With programs at several universities commencing in the mid-1960’s, we first see the beginnings of the public debates about degree content, structure, curricula, and purpose. In the intervening 50-plus years, Harvard has closed and then reopened its doctoral program, and more than 30 other schools in North America have started programs. Ph.D.-granting programs can now be found in one quarter of the architecture schools in the United States, covering academic disciplines including technology, design theory, culture, design, architectural history, media as well as the social sciences of architecture, also known as environment-behavior studies.

### **Expansion**

Moore (1984) found only five doctoral programs operating in the 1960’s (Pennsylvania, Princeton, Carnegie-Mellon, Berkeley, and Michigan). By the early 1980’s, he found 13 doctoral programs “functioning with considerable enthusiasm.” There were only 15 programs when AlSayyad

and Brown conducted their survey in 1991, and little had changed when Wineman conducted a follow-up survey in 1998. In the last ten years, the number of doctoral-granting programs in North America has grown to more than 30. Any statistics regarding the exact numbers of programs and students in the early years should be treated with moderate skepticism. We now know, for example, that there were additional early programs hiding in Schools of Architecture. For example, the School of Architecture at the University of Southern California was operating a “Doctor of Building Science” degree program as early as 1965 or 1966, and the curriculum for this program was effectively the same as in programs labeled “Ph.D. in Architecture.” Even with this type of relatively unknown program included, the early group was quite small and the current trend towards dramatic expansion is clear. There are now many new programs, new degree names (Doctor of Architecture, Doctor of Design, etc.), and substantially more students.

An exact tally of student enrollment is exceptionally difficult to construct. With the variety of programs, settings, and interdisciplinary degrees, each case would have to be individually examined to determine if it “counted” as a doctorate in architecture. It is generally believed that there were less than 200 graduates in the first 20 years of formal architecture Ph.D.s. By 1984, there were an estimated 300 students enrolled, and the growth spike was already being observed. In 2008, there are nearly 600 students in mainstream programs, and almost 100 are graduating each year (not including the professional D.Arch. graduates).

## **Acceptance**

Measures of acceptance in academia can be observed in the recent changes to the language describing university faculty position announcements, and in the growing numbers of tenured and tenure-track faculty holding earned doctorates. In the profession, we are seeing a growing number of conference sessions and workshops focusing the value and purposes of doctoral education.

The Association of Collegiate School Schools of Architecture produces a monthly news magazine during the academic year, the ACSA News. This publication is widely accepted as a well-known source of tenure-track faculty position advertisements. Examination of advertising copy over recent years shows a significant shift from just a decade or two ago. Where the doctoral degree was only inconsistently mentioned just a few years ago, it now appears in well over half of the advertisements. It is described as a desirable

additional qualification in many of the ads. Most importantly, in a significant handful of these ads, those with a Ph.D. “are especially encouraged to apply.” In nearly 20% of the ads in recent issues the Ph.D. is now listed as a “required” degree (for other than history/theory positions). Cortes (1992) noted the early indications of this shift more than 15 years ago. Gary Moore reports that “in Australia, and most of Asia, 100% of ads for new academic faculty now require a Ph.D.” [3]

A study is currently underway to compare the historical ratios of tenured and tenure-track faculty with doctorates. Although several noteworthy objections have been raised about the potential accuracy of the early data sources in the study, preliminary findings indicate a sharp increase in the number of new hires with doctorates. The number of faculty with doctorates has more than tripled since 1987, and there has been a corresponding spike in the number of academic administrators (deans and department chairs) with doctorates.

Professional organizations are also recognizing exploring the implications. There will be a session at the 2009 National Convention of the American Institute of Architects (AIA) devoted to the impacts of doctoral education on the profession.

## **Research**

In the founding decades, doctoral students and faculty in architecture had limited research funding sources and remarkably few appropriate publication opportunities. Since about 1980, the number of organizations, conferences, and publications covering research on the built environment has increased dramatically.

## **Organizations and publication**

Professional societies such as the American Institute of Architects have existed in the U.S. for well over 100 years. However, their emphasis has been on supporting the profession, and scientific research support played only a minor role. The Association of Collegiate Schools of Architecture (ACSA, founded in 1912) was focused on teaching and administrative support during its first half-century. Academic research support organizations, like the Environmental Design Research Association (EDRA, founded by Gary Moore and others in 1968) started to be established at just about the same time that the earliest doctoral programs were minting new graduates.

There was a proliferation of research organizations in the 1980s. The partial list below shows just a few examples illustrating the types of institutes, centers, associations, labs, and societies now supporting research in architecture. Many of these groups and organizations provide publishing venues through conference proceedings or journals. Some of them also provide research support in the form of grants.

- American Solar Energy Society
- Architectural Research Centers Consortium
- Architecture Research Institute, Inc.
- Association for Computer-Aided Design in Architecture (ACADIA)
- Building and Fire Research Laboratory
- Center for Building Performance and Diagnostics
- Center for Health Design
- Center for Resourceful Building Technology
- Center for the Study of the Practice of Architecture
- Center for Understanding the Built Environment
- Congress for the New Urbanism
- Council of Educators in Landscape Architecture
- Council on Tall Buildings and Urban Habitat
- Design Access Clearinghouse
- Design Communication Association
- Design Management Institute
- eCAADe
- EDRA
- Getty Research Institute
- Green Building Council
- Illuminating Engineering Society of North America
- Institute for Energy and Environmental Research
- Institute for Sustainable Design
- Institute for Urban Design
- Intelligent Buildings Institute
- International Association for the Study of Traditional Environments (IASTE)
- Key Centre for Design Computing
- Landscape Research Group
- Lawrence Berkeley Lab
- Lighting Research Institute
- National Center for Appropriate Technology
- National Center for Preservation Technology and Training
- National Institute of Building Sciences
- Sigradi
- Society of Building Science Educators

## **Research Topics**

While some doctoral programs focus on only one or two research areas, a few of the larger programs support a fair variety. By their nature, Ph.D. programs cannot be comprehensive, and even the largest of the doctoral programs still provide a framework of topic areas and faculty interest.

Foremost among the changes noticed by respondents to our survey was the substantial increase in interest and funding for sustainability and energy topics. We also received reports of increased interest in interdisciplinary studies, globalization, modern architecture, and digital media.

## **Globalization**

Global representation has always been a feature of North American doctoral programs in architecture. In the 1990's, it was widely believed that international students routinely outnumbered domestic students in many programs. While international enthusiasm for American higher education remains quite strong, there are growing numbers of students and programs in non-American settings. European and Asian programs are attracting more and more students who are choosing to stay in their home countries.



## Notes

1. This paper describes the growth and trends in doctoral education in architecture separately from architectural history programs. Architecture history and history/theory programs have existed for much longer, and are often housed in art history or other departments. This paper refers the directions of these non-history/theory programs which are housed in schools or departments of architecture.
2. There are others who have claimed to own “the first” Ph.D. in Architecture. The variations in degree programs, titles, structure and curricula will allow a reasonable number of interpretations as to what constitutes a legitimate Ph.D. in Architecture, and the question of the “first” will never be settled conclusively.
3. Email correspondence from Gary T. Moore, October 24, 2008.

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## ON THE OCCASION

*Donald E. Olsen*

Designed productions in general, fine design and fine architecture in particular, always transcend particular expectations; not only the mutual expectations of patron and artist (as well as the public), but the artist's own predications as well—often exceeding initial aspirations. This is so because there are always unintended consequences of any act; and discovery, when allowed critically considered opportunity, may evoke the reformulation of aims and desires. If this were not the case, fine architecture would be as ephemeral as the daily newspaper compared to the works of Shakespeare.

Nor is fine architecture dependent on costly materials. It was one of the great contributions of the late Renaissance that it showed us the sentient powers of light, shade and shadow; the sublime illusions of space—of intimacy as well as grandeur; and that this could be largely accomplished through mere plaster and paint. Again, e.g., traditional Japanese architecture has demonstrated the unmatched elegance achievable simply with wood, plaster and straw. All of this, of course, must grant the availability of artists and craftsmen to respectively conceive of forms and correspondingly work materials. Thus while precious materials in and of themselves may, on occasion, play an important role, they are largely irrelevant to the primary illusions of fine art.

Contemporary technology occasionally displays the possibilities of new dimensions of the simultaneity of light, sound, transparency and translucency, as well as of space and comfort, in greater variety than heretofore possible. Though the examples of greatness in a world of banality are indeed few, it is not reason for despair. We are too close, too much a part of incipient developments, to form a profoundly perceptive assessment of what we have achieved, and, more importantly, what is achievable.

Artist and patron are necessary components of the creative equation; whatever form of “demand” and “supply” (or “market”) relationship obtains, the mutual encouragement between “patron” and “artist” will, in a free society, be as true and necessary for the future as it was in the past.

The current major concern for the status of the environment may be a justifiable cause. But the environment with respect to architecture evokes reference to Zeno's Achilles and the Tortoise.

Despite protests to the contrary, it is nowhere written that the architect's duty is to create or to save the environment. The environment, like society or the economy, is a transempirical,

intellectual, and theoretical construct. Its real properties, and causes and effects, are not the province of any elite: we all contribute to it through an infinitely complex set of interactions. However that may be, the idea of environmental amelioration is not an altogether misplaced objective, provided that it is not a mere verbal substitute for action. Overall environmental improvement transcends any one profession and entails appropriate political and economic policy, as well as cultural development. Architecture, along with the other arts, is part of our intellectual evolution, as distinguished from mere biological evolution. Although primary biological needs may be necessary conditions for the existence of an art, they alone are not sufficient; past or present artistic products influence it as well, and give expression to our desires [1].

And, if we are not blinded by excessive dogmatic ideologies, we had best not abandon the lessons of tradition and of the past, nor lose faith in serious effort for a beneficial future. Efforts toward total environmental reform are vainly fanatical (if not potentially coercive). But unexpected forms of progress may well result from fine individual work – each an exemplary synthesis of past and present – transcending the expectations that comprise our visions of the future.

But (with no Hegelian allusions intended), this in turn creates new problems which may, at an exponential rate, outstrip our capacity to correct the unintended and mistaken consequences which our creations produce. It may be well questioned whether the architectural Achilles can ever catch the environmental tortoise [1].

Finally, if this note even begins to approach the boundary of J.P. Protzen's extensive academic sphere, we may share, at least in some respects, several common attitudes about design. One of these concerns is that prevalent issue, mentioned above, "environmental design." Ironically, we in Berkeley inhabit a place named "College of Environmental Design". But, academic activity is neither place- nor name-dependent. It is a condition offering propositions and arguments pro and con. As well as dispensing information. J.P. and I may share more than a few common interests, but one is, I believe, the issue of the "limits of Environmental Design"!

## Reference

1. Preceding section is a revised portion of: Olsen, D.E. (1978). Epilogue. In: H. Seidler, *Planning and Building Down Under*. Vancouver: University of British Columbia Press.

# **THE WICKEDNESS OF WORK-SYSTEMS PROBLEMS**

*Joe Akinori Ouye*

## **Introduction**

One of the lasting lessons of Jean-Pierre Protzen and our mutual mentor, Horst Rittel, is the concept of “wicked problems.” Rittel famously (or rather infamously) distinguished between wicked and tame problems. Whereas tame problems are easily manipulated and controlled, wicked problems behave badly: they are elusive to define, possess multiple problem levels, derive from many interacting sources and impacts of problems and solutions, and have no stopping rules [1]. Most problem solvers “tame down” wicked problems to the point that they no longer address the essential problems. This deceptively simple distinction has helped me more than anything else I’ve learned for my professional work.

Lamentably, in my world of work-systems, this distinction is not widely understood or appreciated. By “work-systems,” I mean the systemic problems associated with improving the performance of work by organizations [2]. In my experience as a consultant, I’ve tackled many work-system problems, ranging from research and development laboratories, corporate customer support centers, and real estate portfolios (the use, disposal, and construction of the major facilities of a company), to the Coast Guard Vessels Maintenance Group and the investment trading arm of a major bank. The vast majority of work-systems problems don’t get solved – largely because they are not recognized and approached as “wicked problems.” Instead, they are “tamed” by managers and departments who bound them within their group’s function or scope, or by consultants who view the problems and solutions only in terms of their own services and expertise. This paper reviews four case studies and draws lessons for solving wicked work-systems problems.

## **Why Work-Systems Problems Are Important**

Next to spending time with family and sleeping, we spend most of our lives working. Many derive their sense of well-being and identity from work. We perform work in work-systems using information, technologies, places and other resources, as well as working with others, to produce outcomes. There are many types of work-systems, but in this paper I am only addressing office work, or what is known as “knowledge work”. A knowledge worker is a person employed based on his or her expertise in a subject matter, rather than an ability to perform manual labor. Most

organizations want better work-systems, but they are usually addressed to solve symptoms of problems. For example, there are perceived shortfalls or gaps of the outcomes, such as the need for better, more innovative, faster and cheaper results (products or services) or of enabling elements:

- More engaged, knowledgeable and committed participants,
- Better collaboration and knowledge-sharing between individuals and groups,
- Availability of more accurate, relevant and timely information,
- More easy-to-use and available tools and technologies

Organizations want better work-systems, or want to solve their work-system problems, to improve productivity, competitiveness and profitability. Workers want better work-systems, as well, to be productive contributors with better management, collaboration, information sharing, and tools and technology.

### **Work-Systems Problems Are Wicked – Problems 1A and B: Contradictory Facts and Assumptions**

Most people don't base their understanding of how they manage, work, and collaborate on hard data. Rather, they base it on assumptions, expectations, beliefs, or even hunches.

Our team was hired by a major bank to guide the design of a new and better trading floor because the bank wanted higher productivity from its investment bankers. The manager of the trading group thought the trading floor should house as many traders as possible – up to a thousand. Why? Because he intuitively “knew” that traders make the best deals if they can physically communicate (with hand signals or shouting) to other traders, and the more traders the better. When we actually observed the traders working, however, we found that they rarely physically communicated with traders beyond those sitting eight seats

**Fig. 1**  
Trading Floor





Fig. 2



Fig. 3

to the left or right of them, or not more than two rows of desks in front or back of them. Otherwise, they called them on the telephone or used instant messaging (IM) to broadcast their deal – both much faster. Therefore, there was really no reason to put all the traders in one huge space, other than the “buzz” created when they are all together.

As another example of false beliefs, most managers and workers think they are at their desk and engaged in solitary work (reading, writing, thinking) far more than they actually are. Most think desks are occupied about 60% of the time. However, studies upon studies of “desk checks” every hour for a week or more have found that desk occupancy actually ranges from 30 to 40 % for most organizations, and that workers spend most of their time away from their desks, not doing solitary work, but working out of the office, or doing something else at the office. This mistaken belief, based on old stereotypes about work, has led to an over-emphasis on the personal office or desk, which is only used a minority of the time, at the expense of meeting and social areas. On a larger scale, organizations are paying as much as a 50% premium for underutilized space.

If you really want to solve work-systems problems, you need to challenge the beliefs and assumptions. For wicked problems, there are many flavors of what is fact, why something is, and how to do something best, depending on the person’s perspective or world view. Despite this, managers

and consultants continue to operate as if the problem were tame – that the presented facts and explanations are the only “truths”, when there are as many “truths” as viewpoints. Other viewpoints can be uncovered by directly observing or measuring whatever is in question. Another option

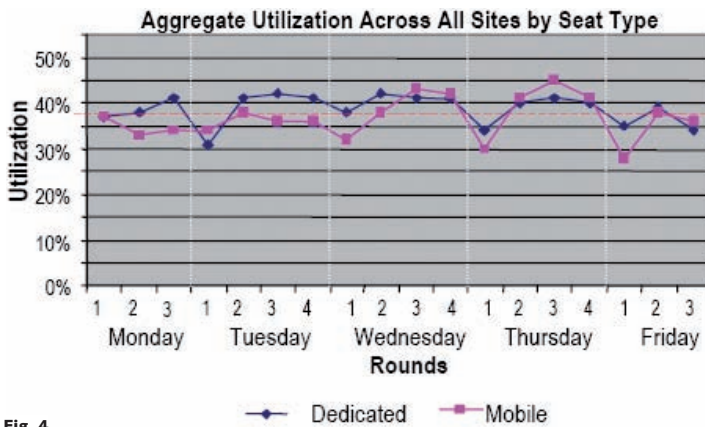


Fig. 4



is to cast as wide a net as possible when seeking different perspectives of the problem.

## **Problem 2: Artificial Problem Boundaries**

Back to the example of the trading floor, through our focus groups and observations of traders on the floor, we soon found other problems outside the immediate trading floor were causing the traders to be less productive. Time is money on a trading floor; trades are made every minute, and a minute lost can mean a deal lost to the bank, and livelihood to the trader, since up to fifty percent of their take-home pay is in commissions. Two time-wasters and major annoyances were the difficulty to find a meeting place, and the inability to take electronic data away from your desk into meetings, since the meeting rooms were not equipped with wireless connections. In this age of instantaneously changing information, the traders needed to print out their data if they wanted to review them in the meeting areas. There were sufficient meeting rooms, but these could not easily be found and reserved because they were controlled by different groups, and you couldn't readily reserve rooms that were not within your group. This problem was solved by making meeting areas available across groups by changing all meeting areas into organizational-wide resources, rather than resources controlled and metered out by each group. Porting live data from the trader's desk was a more difficult challenge due to the bank's understandable concern with data security. Yet, when pressed, the bank's technology group found that it was technically possible to provide adequate security. So, it was really a matter of the bank's willingness to recognize the seriousness of the problem and to commit funds to correct it.

There may be no obvious boundaries to draw around work-system problems. There is also the risk that the problem will morph into so many other problems it can no longer be realistically managed. You may be bounded by practical limits, such as the scope of your expertise, or your client's management responsibilities, and the problem can't be solved without going beyond those boundaries. Commonly, work-systems problems are bounded artificially. They are bounded by the limits of the group requesting help to solve the problem. Whether the request comes from human resources, IT, real estate/workplace or even the business unit, each bounds the problem in terms of its own universe of scope, experience and expertise. Even though, as in the trading group's case, a group (in this case corporate real estate) tries to pierce its envelope and go into other realms, it will always be limited by its experience and expertise. This tendency is aggravated by hiring consultants who

**Fig. 2**

Collaboration on the Trading Floor

**Fig. 3**

Collaboration on the Trading Floor

**Fig. 4**

Typical low utilization of offices of a Fortune 100 company

**Fig. 5a**

Floor plan showing adjacent VAD and VPL groups

**Fig. 5b**

US Coast Guard Group V [4]

**Fig. 6**

To save time, traders eat and drink at their desks

**Fig. 7**

A proposed coffee station on the trading floor

mirror the worldview of the issuing group. Real estate hires real estate consultants, IT hires technology consultants, and so on. Ad hoc or standing inter-departmental groups and interdisciplinary consultant teams begin to get around this limitation. Still, they are difficult to create and manage, and effective examples are few and far between.

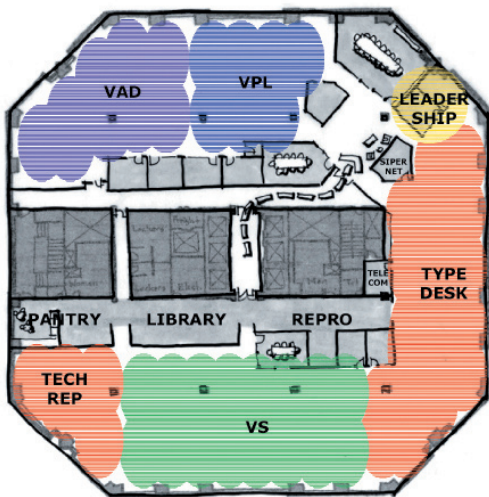
### Problem 3: Problem Level Ceilings

The US Coast Guard's Vessels Maintenance Group is responsible for keeping its ships working. It comprises two main groups: the quick response group (Group VAD) for emergency repairs and the longer-term maintenance group (Group VPL). Our architectural firm was hired as part of a program to test whether organizational performance could be improved through design. Through focus groups, interviews and shadowing (following around individuals during a work day) we found a major disconnect between the groups: they did not share information. In an extreme example, a CG cutter in the mid-Pacific limps into Honolulu for emergency repairs to her engine, and Group VAD gets it fixed efficiently with new parts and back out to sea within a week. The problem is, the newly installed parts had been phased out by Group VPL (longer-term maintenance) for newer, better ones. Now Group VPL will have to maintain a part they had phased out.

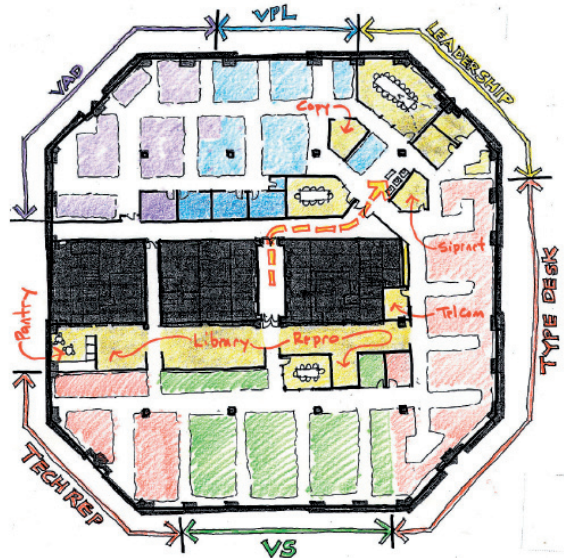
Not surprisingly, the two groups were deeply distrustful of each other because of an accumulation of such incidences,

### Option Refinement

A second version of the "Together" option was developed during the Option Review, combining the best concepts from each option. "Together 2" was based on "Together 1", but flip flopped VPL and VAD to achieve the desired interaction between VPL and Leadership. It incorporates a hybrid of the support space concept, locating the pantry on the window, the small meeting area closer to the middle of the floor and maintaining a pass through to the Library/Copy are from VR, VS and the Lobby.



**Fig. 5a**





perhaps not as dramatic as this example, but multiplied many times over. To solve this problem, the two groups were re-located adjacent to each other along with a social hub of the refreshment area, including casual tables and seating, group copiers, printers and office supplies, for the “water cooler effect”. The expectation was, by casual interactions, the two groups would gradually build trust, and thus be more willing to collaborate and share knowledge. Sadly, it didn’t turn out that way. An analysis of the social interactions after they moved to the new workplace showed virtually no change in group interactions, trust or sharing of knowledge between the groups [3].



Fig. 5b

What went wrong? Frankly, we failed to appreciate that the core problem was not an architectural one, but a management one. It was in the groups’ interests not to work together, because one would look better if the other did worse. The problem we should have addressed was the direction and management of these groups, perhaps through new leadership, or an organizational change of scope or structure. Although this would have been beyond the scope of the General Services Administration (GSA), the facilities contracting organization, and the architectural team, it most likely would have been received positively by the commanding officer. In any case, it would have been better than going forward with the design and not getting the intended results.

Similarly, in the case of the trading floor, we were compelled to address management issues (which were not within our scope), as they were seriously affecting the morale and productivity of the traders. We encountered problem ceilings even for seemingly simple needs such as refreshments. For example, we found that traders were going down eight floors and across the street to Starbucks, because it was corporate policy not to provide decent free coffee.

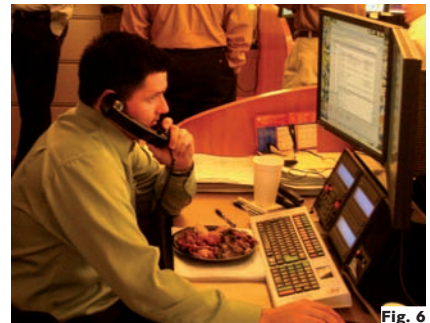


Fig. 6



Fig. 7

It turned out that changing this practice would have required changing a corporate-wide policy of not providing free beverages. Our inability to change this policy cost the company the equivalent of about \$200 in lost revenues every time a trader took time out to go to Starbucks for a cup of coffee! In the end, changing the corporate beverage policy was avoided by offering (not free) coffee on the trading floor provided by a supplier such as Starbucks.

In another example, we convinced the bank they needed to change some of their practices to reflect their commitment to “value their people,” something they felt differentiated them from their competition. Specifically, the bank’s food and security services pretty much shut down before 8 AM and after 5 PM, even though many traders came into work in the early morning hours and worked late into the night, since they covered 24 x 7 global markets. Aside from vending machine junk food, there was no food service, and, dangerously for the women, there were no escort services to the outlying parking lots during the late evening hours.

It’s not difficult to see why work-systems problems don’t have natural levels, and are often symptoms of higher-level problems. The tendency of the problem-solver, therefore, is to take the easy route and work at the level you believe you can actually change, that is, those aspects of the business within the management scope of your direct client. But, very likely, that also means that you won’t actually be solving the problem.

#### **Problem 4: The Hard Road of the “Wicked Problem” Solver**

The final example concerns sustainable work-systems. As corporations jump on the sustainability bandwagon, to be good environmental citizens, and start measuring the sustainability of their products, they find that there aren’t any tools to measure the sustainability of their own organization or work-systems. Many sustainability calculators are available, calculating everything from impacts of technology usage of computers, telephone systems, servers and routers, building efficiencies, and air travel and commute patterns, to manufacturing supply chains. But, there is no way of understanding the sustainability impacts of the organization itself, i.e. how it is organized, where and how it works. Why? Because existing tools measure sustainability in terms of traditional corporate areas of responsibility. To fill this gap, a group [5] of the New Ways of Working [6], a community I co-founded comprising diverse experts that research, explore and advocate new ways of

working, developed *eco2Workplace* [7], a tool that calculates the sustainability of group organizational and geographic distribution, building efficiencies, commute patterns, technology use patterns, meeting and air travel patterns (<http://www.eco2worplace.com/>).

The beta test of *eco2Workplace* revealed a serious obstacle: it's very difficult to collect the data, for the very same reason there's a need for the tool. Most corporations do not have a single point of responsibility for the sustainability of work-systems. Infrastructure groups, corporate real estate and information technology, for instance, are accountable for only portions of work-systems. You may think that the Human Resources (HR) groups could do this, but HR groups have been down-sized in the last twenty years of cost-cutting to the point that they do little more than hire, fire and track salaries and benefits. Group business managers possess data regarding group organization, location and meeting patterns and, assuming that they are held accountable, desire the results, but they lack expertise and data on the technology and facility infrastructure. Furthermore, few corporations have comprehensive and accurate data on the commute patterns of their workforce, which also engender potential privacy concerns.

In the opinion of one global manager of a Fortune 50 company who reviewed the *eco2Workplace*, corporations will soon need to get beyond their sustainability branding and marketing campaigns and start to measure the actual sustainability of their work-systems. Once she and other managers begin to be measured and evaluated on the sustainability of their groups in addition to costs savings and customer satisfaction, points of responsibility will emerge very quickly.

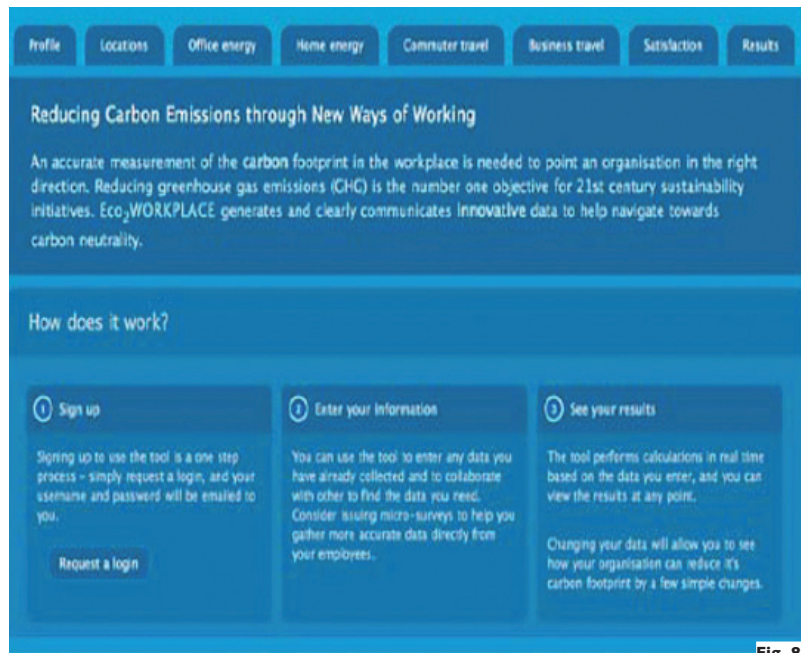


Fig. 8

Fig. 8  
Sign on webpage of  
*eco2Workplace*

No one ever said it would be easy to tackle wicked problems. It's a lot easier to define and solve tamer, piece-meal versions of a problem. Taking the hard road of dealing with work-systems comprehensively means dealing with organizations that don't have the proper procedures or groups to handle the issues, and reaching out for expertise beyond your own. But you'll have a far better chance of actually solving the real problem if you do.

### **Summary and Conclusions**

Work-systems problems are usually not solved because problem solvers don't appreciate their "wickedness". These problems are difficult to define, hard to corral and cut off, unavoidably connected to higher level issues and problems, and nasty to implement. Most of the time, they are tamed to the point that the real problem is no longer addressed. The likelihood of solving a work-systems problem will be much higher if the planner dares to break through the presumed boundaries of the problem, reach upward through problem ceilings to grapple with higher level problems (of which the original problem is just a symptom), challenge initial assumptions and beliefs with other perspectives and factual research, and prepare to deal with the messy nature of wicked problems.

## Notes

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## **WUNDEN NARBEN KRISEN – DAS ARGUMENTATIVE MODELL IN DER ZEIT**

*Wolf Reuter*

Mitte der 60er Jahre entstand die denkwürdige Konstruktion einer „Studiengruppe für Systemforschung“ (SfS) in Heidelberg. Sie war hervorgegangen aus einer losen Vereinigung von Angehörigen verschiedener Disziplinen, Sozialwissenschaftlern wie Hans Paul Bardt und Jürgen Habermas, den Chemikern Helmut Krauch und Werner Kunz, dem Psychologen Paul Mattusek und dem Mathematiker und Physiker Horst Rittel.

Anlass war, angesichts der exorbitant hohen Anteile der Atomforschung am Etat des Forschungsministeriums, die Verteilung bundesrepublikanischer Forschungsgelder auf die Füße wohl begründeter Planung zu stellen. Der Impetus aber, der die Gruppe einiger Wissenschaftler zusammenhielt, hatte zu tun mit der Bestrebung, auseinanderscherende Wissenschaften wechselseitig verständlich zu machen, sowohl weil es an sich interessant ist, ihre gemeinsamen Strukturen zu sehen, als auch um sie für irgendeinen Zweck kooperieren zu lassen.

Derartige Zwecke gab es vielerlei. Für die Studiengruppe war es anfänglich die Forschungsplanung, also ein inter- und transdisziplinäres Projekt. Zu den umstrittenen gehört die Entwicklung von Waffensystemen, zu den weniger umstrittenen solche der Raumfahrt, der Medizin oder der Umweltplanung. Die gemeinsamen Sprachen entfernt voneinander liegenden Disziplinen fand man, außer in der Mathematik, die dies schon immer leistete, in der Systemtheorie oder der Kybernetik oder der Informationstheorie.

Letzterer hatte die SfS eine ihrer Abteilungen gewidmet. „Information“ und die Prozesse ihrer Verarbeitung wurden als ein Vehikel betrachtet, mit dessen Hilfe ein Spektrum von Typen kognitiver Aktivitäten analysiert, abgebildet, unterstützt und untereinander verbunden werden konnte. Zu derartigen Typen gehören das Betreiben von Wissenschaft, das Lehren, das Organisieren, das Planen und Entwerfen. Letzterem können Tätigkeiten wie die Steuerung von Wirtschaftseinheiten, die Politikgestaltung, die Stadtplanung, die Architektur und das Industriedesign zugerechnet werden. Unter dem Fokus der Informationsverarbeitung konnten so Vorgänge in den verschiedensten Disziplinen erhellt und für praktisches Handeln erschlossen werden.

Zu Beginn der siebziger Jahre traf ich Jean-Pierre Protzen in den Räumen der Sfs wieder, nachdem ich als Student ihn als Lehrer drei Jahre zuvor in Berkeley kennen gelernt hatte. Er recherchierte, wenn ich mich recht erinnere, über Begriff und Rolle von Information, über den Stand der Überlegungen, auch als Vorbereitung eines Buchprojektes über „Die Informationswissenschaften“. Ich war meinerseits befasst mit einem Projekt, dass die Aktivierung von Information für die Umweltplanung der Bundesrepublik Deutschland zum Ziel hatte.

### **Die Überzeugung: Information kann und soll überzeugen**

Die damalige räumliche und zeitliche Berührung fiel zusammen mit dem Status einer mit Horst Rittel geteilten Überzeugung: Dass argumentative Prozesse zur Lösung von Planungsproblemen geeignet seien; dass diese Argumentation geeignet sei, die Meinungen von Akteuren des Planens zu verändern, ihn also zu informieren; dass, wie Horst Rittel später aufschrieb [14], es egal sei, ob das Argumentieren mit Anderen, also kommunikativ, passiere, oder ob sie sich im Kopf des einzelnen Planers abspiele, der entweder so dialektisch diskursiv zu denken gelernt habe, oder der aus professioneller Einsicht die möglichen Argumente von Kontrahenten im Kopf simuliere.

Eine weitere Annahme war, dass dieses Modell von Planung als einem argumentativem Prozess darauf beruhte, dass beim Planen Argumente leisten, was man Überzeugung nennt, also dass ein ihnen innewohnendes „rationales“ Potential Einsicht auslöst [13] Die Einsicht würde, so die weitere Annahme, die in eine Definition von „rational“ gegossen war, zu entsprechendem Handeln führen.

Zu den Annahmen gehörte auch, dass es in den für Planung entscheidenden Sollfragen keine Letztbegründung gäbe, dass deontische Aussagen nicht von empirischen Befunden ableitbar seien, und dass damit eine historisch permanente Diskussion über die handlungsleitenden Normen in Aussicht stünde. Die Entscheidung würde überzeugender Argumentation folgen oder im Fall, dass ein überzeugendes Argument fehle, immerhin auf transparenter Basis, d.h. angesichts der größtmöglichen Menge relevanter Argumente fallen.

Auf diesen Annahmen gründete ein Planungssystem, das gedacht war, Problem lösende Gruppen zu unterstützen. Es war das Fragenorientierte Informationssystem, das Rittel 1970 als „Issue Based Information System“ (IBIS)



konzipiert hatte [9]. Es bestand aus dem Apparat der Fragen innerhalb von Problembereichen, der Positionen und Antworten zu den Fragen, den dazu gehörigen Argumenten, Modellproblemen sowie einem operativen Teil, diese Elemente zu organisieren. Neben seinem situationsunabhängigen Potential, die Struktur von Debatten zu zeigen, hatte es den Anspruch, reale Debatten zu strukturieren, systematische Prozeduren zu installieren und dadurch Entscheidungsprozesse zu unterstützen.

Ich möchte das System als die instrumentelle Version eines argumentativen Modells bezeichnen. Es ist wichtig, das Planungssystem als Instrument von dem zugrunde liegenden Modell zu unterscheiden, weil sich spätere Einlassungen teils trennscharf, teils explizit oder implizit gekoppelt auf die beiden Konzepte beziehen. Verschiedene Interpretationen sind möglich, was genau das argumentative Modell modelliert.

Neben dem unbestreitbar faktischen Aspekt, dass Planer ohnehin argumentierend denken, bevor sie Handlungsanweisungen geben, hatte es ebenso unbestreitbar einen normativen Anspruch: Immerhin sollte Überzeugung, nicht Manipulation, Konditionierung oder Überredung das Ziel sein [13]. Mit diesem Appell an die kritische Ratio durch Überzeugung platziert es sich deutlich in die Tradition aufklärerischen Denkens, wie auch mit einer weiteren Denkfigur. Bestes Wissen sollte zur Verfügung stehen. Es sollten also diejenigen Leute Argumente in den Diskurs einbringen können, die zum besten Wissen beitragen können, z.B. die Betroffenen von einer Planung; und dies nicht aus einem prinzipiell basisdemokratisch-idealistischen Grund, sondern aus dem epistemologischen Grund, dass sie ein besonderes Wissen beisteuern können, das die Planung verbessern könnte. Der Diskurs sollte also offen sein.

Lassen wir es zunächst bei der Schilderung dieser Überzeugungen in den Zeiten der Studiengruppe für Systemforschung in Heidelberg und fragen uns: Kann Argumentation als Basis eines Planungsmodells und Struktur von Planungssystemen ihr aufklärerisches normatives Potenzial in realen Handlungszusammenhängen entfalten?

### **Die ersten Angriffe: ein offenes, transparentes, kontroverse Meinungen zeigendes Instrument wird abgelehnt; das trifft auch das Modell**

1972 arbeitete ich an dem Projekt mit, den IBIS als Nukleus eines Informationssystems für die Umweltplanung (UMPLIS) der Bundesrepublik Deutschland zu installieren [7]. Wie eine Spinne im Netz sollte ein IBIS die Fragen, wie sie von



Parlamentariern, Ministerien, interessierter Öffentlichkeit, Betroffenengruppen, Wissenschaftlern, einzelnen Bürgern aufgeworfen und diskutiert werden, aufnehmen und ihre Behandlung organisieren. Zu dem Konzept gehörte, dass man dabei auf diverse andere Untersysteme zurückgreifen könnte, wie Datenbanken über den gemessenen Zustand der Umwelt (Wasser, Luft, Boden) oder Expertendateien oder Messtechnikdateien oder „Gelben Seiten“, die auf weitere Informationsquellen verweisen könnten.

Als ich in Bonn im Innenministerium und später in Berlin, wo das Umweltbundesamt als Behörde und auch potentieller Träger dieses Informationssystems gegründet wurde, diese Vorstellung in der Administration einzupflanzen versuchte, traf ich auf einen widerständigen Boden. Man werde sich hüten, das System zu offenen Diskursen zu benutzen, da würden auch ministerielle Sonderinteressen eine Rolle spielen. Die Ein- und Ausgabeberechtigung würde ohnehin so geregelt, dass vorzugsweise Parlament und Minister bedient würden und zwar auf Anfrage für Ausarbeitungen, die dann durch die Hierarchie des Beamtenapparates hindurch gefiltert, kommentiert, geändert und abgesegnet würden. Externe hätten keinesfalls Zugang, weder im Input noch im Output. Man würde wohl die Datenbanken installieren, nicht aber ein System, welches Transparenz erzeugt, „Meinungen“ – welche eine unverlässliche, beliebige Nebensächlichkeits-enthielte, und gar Kontroversität abbildete.

Man kann im Nachhinein sagen, dass die Vorstellung, ein derart egalitär – also ohne Rücksicht auf die Stellung des Äußernden – auf Argumenten beruhendes Instrument ausgerechnet in einer hierarchisch organisierten, nicht gerade für Streitbarkeit bekannten, auf Konformität ausgerichteten Bürokratie zu installieren, hemmungslos naiv war. Es ist fatalerweise genau die Gruppe, die politische Entscheidungsprozesse vorbereitet.

Man kann im Nachhinein auch sagen, dass der so gedachte IBIS in seiner unübertrefflichen Rationalität genau die Umweltdebatten abzubilden in der Lage war (und in seinen prototypischen Läufen in der Studiengruppe dies auch tat), die in den Jahrzehnten danach national und global entbrannten. Aber diese Rationalität hatte eben ein kompliziertes Verhältnis zur Realität der planenden Verwaltung.

## **Reaktion: Geteiltes Informationssystem**

In den folgenden Jahren befasste ich mich, auch aufgrund der Bugschüsse bei UMPLIS, mit einer theoretischen Vergewisserung, die das argumentative Modell und Planungen mit hohem Konfliktpotential in Theorien über die Möglichkeiten von Planung im politischen Raum verortete [10]. Der Befund war, dass die „akademische“ Kontroversität beim Argumentieren in Konfrontation im Handeln umschlägt, gerade wenn die Ursache der Antagonismen in grundsätzlichen Ungleichgewichten liegt, die z.B. mit der Existenz von Klassen oder Schichten, privilegierten Politikbereichen, potenten Gruppen oder Akteuren mit bornierten Einzelinteressen zu tun haben. Politik bis hin zur Gemeindeebene bedeutet eben gerade, bei argumentativ unauflösbaren Konflikten dennoch zu handeln. Die Idee war daher, dieses argumentative Planungsinformationssystem jeweils für agierende Parteien, Personen oder Gruppen zu entwerfen, nicht aber für die Gesamtheit der Akteure. So gab es zwar die Hoffnung, bei jeder Partei durch die Simulation auch der Argumente des Gegners Verständnis für dessen Position zu wecken, aber die andere Hoffnung – und dies war eine wichtige Idee des argumentativen Modells – war ausgesetzt: ein Planungssystem für die ganze planende Gruppe für den ganzen zu planenden Gegenstand zu haben.

## **Angriff auf das Instrument: Das störrische System taugt nicht**

Später habe ich zusammen mit dem „Forschungsinstitut für Angewandte Wissensverarbeitung“ (FAW) in Ulm weitere Erfahrungen mit Versuchen gesammelt, solche fragenorientierte Informationssysteme in realen Handlungszusammenhängen zu platzieren. (Eines sollte die Umweltplanung im entsprechenden Ministerium des Landes Baden-Württemberg, das andere die strategische Planung des Konzerns Daimler-Benz unterstützen. Letztes scheiterte, weil ein Teilbereich des Konzerns nicht die 100.000 DM beisteuern wollte, die zu den geschätzten 700.000 DM Gesamtkosten nötig gewesen wären: Immerhin waren also sechs Siebtel des Konzerns dafür, aber nicht die Führung.)

Wir fragten uns, weshalb ein so kluges Instrument so wenig Anklang bei denjenigen fand, die als Handelnde doch eigentlich ein starkes Interesse hätten haben müssen [5].

Der erste Grund war, dass verantwortliche Meinungsführer bezweifelten oder bestritten, dass diese Art expliziter argumentativer Verfahren zu ihren Problemlösungen beitragen könnten. Teils waren sie Objektivisten und Sachzwanggläubige, teils Kapitulantinnen vor für

unauflösbar gehaltenen Machtsituationen, teils selbst Spieler im Machtgefüge, die ihre Schachzüge ungern durchsichtig machen wollten. Dies weist über das Instrument auf das dahinter stehende Modell.

Ein zweiter Grund lag in der Enttäuschung schnell auftauchender, unerfüllbarer, aber auch nie versprochener Erwartungen in ein solches Instrument wie IBIS. Die Hoffnung angesichts der Investition von Geld, Zeit und Personen war, dass das System Lösungen zu erzeugen in der Lage sei, dass es als eine Art Konsensmaschine, gar Entscheidungsmechanismus dienen könne, mindestens aber vollständige und möglichst „objektive“ Information zur Verfügung stellen möge. Diese Enttäuschung wurde genau dann formuliert, wenn in Verhandlungen die besonderen Eigenschaften des Instruments genannt wurden: die Systematik der Gedankenführung, die kommunikative Erarbeitung, sein ständiges Wachstum (welches gleichzeitig als ständige Unvollständigkeit gelesen werden musste) und seine Koppelung mit allen Arten von Daten, Modellen, Wissensinput, um die kreative Intelligenz der Gruppe bei ihrer Problemlösung zu stimulieren.

Weitere nicht zu unterschätzende Schwierigkeiten hängen zusammen mit dem Betrieb IBIS-artiger Systeme. Damit ist nicht die – mehr oder minder komfortable, aber machbare – Computerstützung gemeint, sondern der Rigorismus und die Pedanterie, die es erfordert, sein Denken zu ordnen, zu reinigen, zu raffén und schließlich in Atome von Fragen, Antworten, Argumenten zu spalten, und zwar so, dass die Spaltung das Denken angemessen wiedergibt. Der eingebaute Status- und Verweisapparat ist zwar logisch konsistent und komplexitätsadäquat, aber mühsam in der Herstellung. Das Instrument stieß auf eine störrische, streikähnliche Haltung.

Vielleicht weist dieser letzte Grund auf ein fundamentales Problem im Denkansatz für das Instrument: Auf die Distanz des Gebrauchs von Alltagssprache, von Meinungsäußerungen und Diskursbeiträgen im gewohnten Zusammenhang der Lebenswelt und im politischen Raum, von diesem stetigen, wilden, ungeordneten Rauschen des Diskurses, wie Foucault das nennt, zu seiner Eingießung in ein rigides System, das einer (rüden) Bändigungsmaschine gleichkommt. Dies betrifft das Verhältnis von assoziativ und situationär ausgerichteter RedeAnarchie mit ihrer sprachlichen Wendigkeit und Mehrfachcodierung zu inhaltlich und strukturell disziplinierter Strenge. Der andere Aspekt dieses Angriffs auf das Instrument betrifft – jenseits dieser Polarisierung von Freiheit und Disziplin – die rein formale Differenz zwischen loser Sprache und

diskurslogisch strukturierter Sprache. Die Betroffenen sehen nicht den großen Unterschied, bezogen auf die Essenz des Geäußerten. Dann wäre das Problem – so auch ein eigener dringender Verdacht – nicht das weite Auseinanderklaffen von Realität und Instrument, sondern seine Nähe.

Insofern mag IBIS eher als wissenschaftlich-analytisches Modell zur Abbildung von Strukturen, von Planungsdiskursen, also als Protokoll oder in der Methode der Diskursanalyse seine Rolle finden denn als Instrument für den praktischen Gebrauch während des Planungsprozesses.

### **Der fundamentalere Angriff auf das Modell: Macht**

Ich komme zurück auf den schon formulierten Unterschied zwischen der instrumentellen Ausprägung des fragenorientiert organisierten Planungssystems und dem zugrunde liegenden Modell, welches Argumentation als generelle Form und Struktur des Denkens beim Planen fordert.

Ich hatte in den achtziger Jahren die Gelegenheit, in der Praxis tätig zu sein. Dabei erfuhr ich gelegentlich drastisch, dass neben dem Modell, welches Planungsprozesse als argumentative Prozesse konzipierte, in der Planungspraxis noch etwas anderes existierte, welches durch dieses Modell nicht abgebildet wurde.

Ein solcher Planungsprozess, über den ich hier spreche, erstreckte sich – theoriekonform – über die gesamte Zeitspanne vom Auftauchen der Idee, etwas zu verändern, bis zu den letzten Zuckungen seiner Realisierung und evtl. kritischen Kontrolle. Ich verallgemeinere meine Erfahrung, weil sie mit den Analysen anderer Untersuchungen [3] übereinstimmt. In diesem gesamten Prozess versuchen verschiedene Akteure Einfluss auf den Output des Prozesses zu nehmen, auf das, was wir als Plan bezeichnen. Dabei sitzen sie nicht unbedingt in einer Gruppe um einen runden Tisch zusammen. Und dabei argumentieren sie nicht nur, sondern überraschen, überrumpeln, drohen, schaffen ohne Drohung neue Tatsachen, entziehen, stückeln oder verfälschen Informationen. Dies sind Akte, die dem Konzept der Macht zuzuordnen sind.

Nun könnte man, wie Rittel, sagen, dass auch vor dem Machtakt das Kalkül steht, welches definitiv aus Argumenten für und wider den Machtakt besteht. In der Sicht, dass alles geplante Handeln durch Denken vorbereitet sei, fällt auch das Machtkalkül unter das argumentative Modell.

Doch wird, bezogen auf einen gegebenen Planungsgegenstand, dann die Ebene gewechselt. Dann war der Machtakt das Problem und der Planungsgegenstand. Bezogen auf ein anstehendes Problem aber, zum Beispiel der Planung eines Bahnhofs, sind zwei Sorten von auf den Planungoutput zielenden Akten zu unterscheiden: solche, die als Äußerung von überzeugenden Argumenten gedacht sind, und solche, die als Erzwingung selbst gegen überzeugende Argumente gedacht sind. Das bedeutet, dass außer den Akten, die dem argumentativen Modell zuzurechnen sind, es Akte gibt, die einem anderen Modell zugehören, welches eben diese Seite der Planung konzipiert, das Modell des Machthandelns. Ohne es weiter darzustellen, möchte ich es in seinem Verhältnis zur Argumentation beleuchten. Dieses Verhältnis hat verschiedene Facetten:

### **Verteidigung 1: Machtakte sind argumentativ vorbereitet**

Machtakte sind selbst Planungsvorhaben. Sie sind meist wohl kalkuliert, wenn sie nicht instinktiv oder im Zorn vollzogen wurden. Wesentlicher Teil des argumentativen Kalküls ist die wechselseitige Imagebildung. Der Akteur überlegt z.B., welche Maßnahme ein Gegenüber zum Einlenken bringen könnte – der Bauherr, ob er im Konfliktfall dem Architekten mit Entzug des Auftrags droht oder ob er ihn gleich entlässt, ob er, ohne den Architekten zu informieren, einen Konkurrenten ins Spiel bringt, oder ob er durch unsinnige Auflagen den Architekten zur Aufgabe zwingt. Der Repräsentant eines Staats, ob er Truppen aufmarschieren lässt, oder die Gashähne für einen halben Kontinent abzustellen droht. Dabei macht er sich ein Bild von der möglichen Reaktion des Gegners und schließt in das Kalkül ein, welches Bild sich seinerseits der Gegner von ihm macht, was wiederum Gegenstand der eigenen Imagebildung ist, usw. (siehe auch [9]). Dabei argumentiert er sowohl die pros und cons seiner Einschätzung über die Handlungserwägungen der anderen als auch die seiner eigenen Handlungsoptionen.

Im Kontext einer Planung sind Machtakte Einflussnahmen auf die anstehende Planungsmaterie und auf den Planungoutput, den Plan. Die Macht-Akteure wollen den Status des Plans, letztlich seinen Endzustand, mit diesem Mittel der Macht zu ihren Gunsten ändern. Die Planung von Machtakten ist ein vom Planungsgegenstand X zu unterscheidender Planungsgegenstand M. Beide werden argumentativ behandelt.

## **Desillusion 1: Diskurse unterliegen Steuerungsintentionen**

Diskurse sind selbst durch Macht gesteuert, obwohl sie der Rationalität wegen, die man dem Argumentieren zuschreibt, dagegen gefeit zu sein scheinen. Foucault [2] hat gezeigt, welchen Verformungen Diskurse ausgesetzt sind; Interessenten setzen Tabus oder erhalten sie aufrecht; Themen werden ins Spiel gebracht, die andere Themen verdrängen oder ihr Aufkommen verhindern; Positionen ziehen Gegnerschaften auf sich und lenken Aufmerksamkeit, sprich intellektuelle Energie, um. Wer Medien besitzt, in denen Diskurse sich abbilden und über sie verbreitet werden, setzt Agenden, kann Inhalte selektieren, die Streuung von Information steuern. Anfangsentscheidungen blockieren sie betreffende Nachfolgediskussionen. Bei Architektur- und Stadtplanungsdiskussionen ist auch die Form der Referenz gegenüber nicht zu verletzenden Autoritäten zu beobachten, wie z.B. kritischen Kollegen, vorherrschenden Richtungen, Zeitgeistern, Entscheidungsträgern wie Baubürgermeistern etc. Diese Formen fallen unter Etiketten wie vorwegnehmenden Gehorsam, Gefallenssucht Übervätern gegenüber, den Griff zur inneren Schere, die von außen initiierte Errichtung innerer Zäune, die man zu überspringen nicht den Mut hat.

## **Desillusion 2: Argumentation als Machtinstrument**

Sobald eine Konfliktpartei durch die Argumente des Gegners überzeugt ist, würde sie so handeln wie er. Es gäbe weder Anlass zu Machtgebrauch noch zu weiterem Argumentieren. Stellt jemand fest, dass ein Argument bei dem einen Gegner erfolgreich wirkt, bei einem anderen nicht, dann wird er den Einsatz des Argumentierens kalkulieren. In der funktionalen Disposition als Alternative zu anderen Durchsetzungsmöglichkeiten wandelt sich Argumentation zum kalkulierten Machtmittel.

Hinzu kommt die Erkenntnis, dass Artikulationsfähigkeit, Einfühlsamkeit in Schwachstellen des Gegners, intellektuelle Beweglichkeit, rhetorische Begabung in Diskursprozessen von Vorteil sind. Was liegt näher, als geschickte Rhetoren einzusetzen?

Ähnliches gilt für das Gewicht dessen, der ein Argument vorbringt. Wenn von Autoritäten geäußerte Argumente wirksamer sind, dann wird sie der machtbewusste Akteur einsetzen.

In der zunehmend medial überformten Gesellschaft entfaltet die Äußerung von Argumenten in einem Medium zusätzliche Kraft: einmal durch die pure Tatsache, dass sie in einem Medium geäußert wird; des Weiteren durch die Vervielfältigung, zum Dritten durch die Unmöglichkeit einer individuellen Gegenrede. Die ungleiche Verteilung der Potentiale, wie der besseren Rhetorik, der gewichtigen Autorität oder der medialen Verbreitung, sowie der Einsatz von Argumentation als taktische Variante machen sie zu einem Machtinstrument par excellence.

### **Verloren: Das Machtmodell ist umfassend**

Die in Punkt (8) beschriebenen Formen zeigen, wie Argumentation durch zusätzliche Faktoren in ihrer Wirkung über ihren „eigentlichen“ Wirkungskern hinaus genutzt und missbraucht wird. Was ich als ihren „eigentlichen“ Kern bezeichne, ist nichts anderes als die am Anfang dieses Essays erwähnte, von allen anderen Wirkungskräften befreite, reine Kraft der Überzeugung, die das Motiv, die Hoffnung, die Eigenschaft von Argumentation sei. Entkleiden wir die Argumentation von allen anderen Ge- und Missbräuchen, so stellen wir fest, dass sie auch dann in einer infamen, aber unausweichlichen Weise in einen Machtzusammenhang passt. Denn hat nicht Max Weber Macht so definiert, dass sie die Chance sei, Ziele auch gegen Widerstände durchzusetzen, gleichviel worauf diese Chance beruhe? Und ist nicht Argumentation eine hervorragende Chance, ein Ziel auch gegen Widerstand durchzusetzen? Demgemäß ist Argumentation, d.h. die Äußerung von Argumenten mit Überzeugungsintention, nichts anderes als ein Machtmittel im Machtspiel.

Hier offenbart sich vielleicht eine Offenheit in der Lesart der Weberschen Definition. Denn wenn man auf Argumente baut, die mit Gründen überzeugen, und wenn das Gegenüber auch tatsächlich überzeugt wird, dann wird es keinen Widerstand geben, also auch keine Notwendigkeit, Macht auszuüben. Jedoch hat da eben die Macht der Überzeugung gesiegt. Oder: Macht bedeutet als Chance das Potential, nicht den Einsatz, eines Machtmittels. Es bleibt also – damit dem Machtmodell eingeschrieben – die Chance der auf Überzeugung setzenden Argumentation.

Folgen wir dieser Gedankenführung, so sind zwei Phänomene zu beobachten: In der realen Planungspraxis benutzen permanent Akteure Macht, um ihre eigenen Interessen am Plan durchzusetzen; ebenso permanent steht das Potential der Überzeugung intendierenden und damit Macht mindernden Argumente dagegen, und zwar im Rahmen dieses Kräftespiels

als Drohmasse, die vielleicht sogar den Machttakteur davon abhalten kann, eines seiner ihm zur Verfügung stehenden Machtmittel wie Korruption, Verbreitung von Gerüchten, Medieneinsatz oder Fehlinformation zu gebrauchen. Dann kommt es zur Konfrontation von irrationalen Machtakten und argumentativer Arbeit, die jeden dieser Machtakte entlarven kann und damit genau das Potential entfaltet, die eigene Position durchzusetzen. Argumentation hat im Kontext eines Machtkampfes die Funktion von Gegenmacht. In diesen Sinn ist das argumentative Modell einem Machtmodell eingeschrieben. Wir leben in einer Praxis, in der dieses Kräftespiel zu beobachten ist und die diese Modellierung zulässt.

### **Auflösung in einem neuen Modell der Bikonzeptionalität, der Polarität, der Komplementarität**

Als Schwäche der Einordnung des argumentativen Modells in ein Machtmodell bleibt in dem schon oben angeführten Phänomen, dass Gegner, die überzeugt wurden, zu Partnern werden, denen gegenüber keine Macht notwendig ist, weil sie die Ziele einer Planung teilen und sich somit nicht der Widerstand aufbaut, gegen den Ziele durchzusetzen wären.

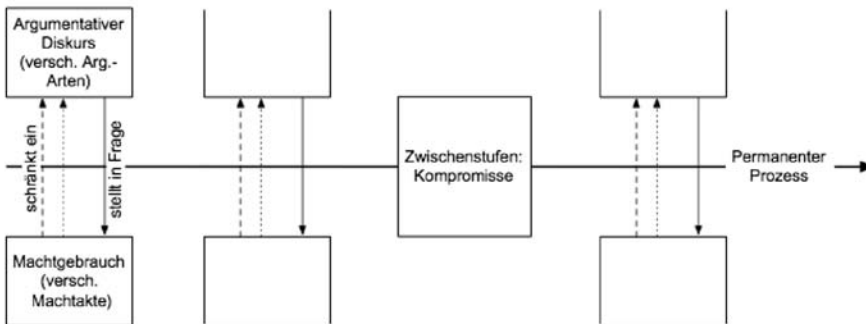


Abb. 1

Entgegen allen inneren Widerständen: Ich schlage vor, mit einem Modell von Argumentation mit zwei fast paradoxen Eigenschaften gleichzeitig zu leben, der Eigenschaft, Machtmittel zu sein, und der, Macht zu entlarven. Zum einen ist Argumentation, wie gezeigt, in einem definierten Machtmodell als Mittel, und damit nachgeordnet, immer auch enthalten. Zum anderen sprengt sie mittels der ihr innewohnenden grundsätzlichen Intellektualität das Machtmodell, mit dem Versuch, seinen ureigenen Verstand auf alle Phänomene anzuwenden, interpretierend auch zwischen den Zeilen zu lesen, grundsätzlich und grenzenlos jede Frage zu stellen und sich nicht – auch nicht durch sich selbst – täuschen zu lassen. Damit



entlarvt sie jeden Versuch machtbasierter Durchsetzung mit aller Art Mittel, auch dem der instrumentalisierten Argumentation. Das bedeutet aber auch: Es führt kein Weg um die Schwierigkeit herum, zwischen entlarvender und entlarvter Argumentation zu unterscheiden.

Komplementär sind die beiden Modelle insofern, als diese Eigenschaft eine aufeinander bezogene Ergänzung konträrer Phänomene beschreibt, die je eigenständig auf Dauer koexistieren. Jedes der beiden Modelle konzipiert einen Bereich der Wirklichkeit, keines lässt sich in das andere endgültig überführen oder geht restlos in ihm auf. Allerdings existieren sie nicht gleichsam beziehungslos nebeneinander, sondern ihre Komplementarität schließt ihr antinomisches/polares Verhältnis zueinander ein und zwar im Prinzip und auf Dauer.

Unabhängig von den verschiedenen Modellierungen besagen die Befunde, dass Planung sich prinzipiell und permanent in diesem Spannungsfeld von Machtakte vorbereitendem, Macht stützendem, durch Macht infiltriertem und Macht entlarvendem Argumentegebrauch befindet. Was dann unangefochten bliebe, wäre die Reduktion des Modells auf ein einfaches Substrat: Die Denkfigur des Argumentierens gehört zu allen Modellierungen der Planung als Denken vor Handeln, zu allen Prozessen der Erzeugung und Beeinflussung von Plänen, gleichviel in welchem Zweckzusammenhang. Dann allerdings würde Argumentation als pure Denkstruktur Teil eines gleichsam technokratischen Modells, jedenfalls als eines nur „technischen“ Modells, reduziert auf seine intentionslos operative Struktur.

Argumentation würde dann ihres normativen Potentials entkleidet. Dieses jedoch war dem Modell bei seiner Konzipierung von Beginn an eingeschrieben. Und es wäre ein armes Modell, würde es diesen normativen Impetus der Argumentation mit ihrer Kraft der Überzeugung nicht enthalten. Es ist ohnehin und de facto in einer noch so desillusionierenden, von bornierten Einzelinteressenten mitgeformten, machtdurchgesetzten Praxis normativ, d.h. als Orientierung real präsent.

Indem es sich bewusst der Realität ausgesetzt hat, sowohl in seiner instrumentellen Ausprägung als auch mit seinem Konzept der Argumentation, das das Modell trägt, hat es teils lähmende Verwundungen davongetragen, die insbesondere dieses kluge und hoffnungsvolle Instrument des fragenorientierten Planungssystems trafen. Es hat sich, selbst gewählt, in eine widerständige Umgebung platziert. Es hat sich damit in einen Konflikt hineinbegeben, in

**Abb. 1**

Pragmatisches Modell von Planung

welchem es sich mit seiner Dynamik, die ständig aus einer aufklärenden Intellektualität schöpft, gegen die ebenso ständigen Usurpierungsversuche durch Taktiken der Macht permanent zu behaupten hat. Es tut dies, indem es sein normatives Potential in einem noch so widerständigen Planungsgeschehen entfaltet, mit einer zunehmenden Fähigkeit, seine Wirkung auf ein immer besseres Wissen über die Mechanismen der Macht zu gründen.

Dieses Wissen zu intensivieren ist für den Architekten und Planer genau so wichtig wie seine Fähigkeit im Argumentieren. Erst dann wird er in dem so heterogen charakterisierten Geflecht seiner Praxis erfolgreich sein können. In diesem Zusammenhang werden weitere Konzepte interessant. Eines betrifft eine auf Erfahrung basierende Fähigkeit, normativ orientiert zu handeln, ein Konzept, welches Aristoteles mit Phronesis benannt hat. Ein anderes stellt die Fähigkeit in den Mittelpunkt, ein Situationspotential zu nutzen, gleichviel ob es sich mit oder ohne eigenen steuernden Einfluss so entwickelt hat, bis es für den Akteur günstig ist. Dieses Konzept hat Francois Jullien [6] im chinesischen Kulturkreis entdeckt. Es gibt viel zu lernen.

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## ON WU AND THINGS

Vimalin Rujivacharakul

*Wu* (物) is composed of two characters: niu (ox 牛) and wu (animal 勿). This ox-cum-animal character is a word typically defined in modern-day Chinese-English dictionaries as “things, matter.” Further samples in dictionaries such as *Xiandai Hanyu da cidian* [modern Chinese dictionary, enlarged edition] (2000) identify “things” as being physical or tangible, and “matter” as being abstract or intangible. As such, wu as a word is born of the signifiers of living beings, but represents the overlapping between the tangible and the intangible, the visible and the invisible, the countable and the uncountable, and the object and the subject. In the modern world reigned by rationalism, the co-existence of these dialectical oppositions in one same definition is uncommon. Wu thus challenges our modern ways of perceiving external conditions in relation to our own intellect.

In the history of Chinese philosophy, there have been multiple attempts to analyze, deconstruct, recreate and re-access the meaning of *wu* from medieval to modern periods. However, it was during the early twentieth century when the meanings of wu was first related to and analyzed in conjunction with the English word *things*. The first person who began the task was Hu Shi (胡適, 1891-1962), a Chinese philosopher who was a student of American philosopher John Dewey (1859-1952).

Hu’s interests in redefining wu originated from his attempt “to reconstruct the Chinese philosophical system.” (Hu, 1922, i-ii) As a young student of philosophy, Hu was hoping to introduce to his Chinese contemporaries objective methods for modern research that are based on scientific logics. This was not easy to achieve. One of the problems Hu found was that the pre-modern Chinese philosophy often stressed the interplay between subject and object. Hu believed that while the modern research required an objective engagement with research materials, pre-modern Chinese scholarship, particularly that of the Neo-Confucian school, had always emphasized that scholars must engage with “things” subjectively in order to transcend conflicts in the material world and reach a higher stage of morality through reasoning. Such subjective engagement with “things” troubled Hu and complicated his attempt to reorient Chinese thinking toward an objective research perspective. He thus announced early on in his career that he decided to study the history of logical methods in China in the hope of synthesizing a compatible platform between modern research logics and Chinese philosophy. (Hu, 1922, 8-10)

In 1922, Hu published an expanded version of his doctoral thesis, *The Development of the Logical Method in Ancient China*. (Hu 1922) Citing a paragraph from *Da Xue* [大學 lit., The Great Learning], a text recovered by Neo-Confucian philosophers of the Song dynasty (960-1277), Hu opened the very first chapter of his book with the argument that the lack of logical methods in Chinese philosophy was due to the Neo-Confucian interpretation of the meanings of “things”:

When things are thoroughly investigated,  
knowledge will be extended to the utmost.  
When knowledge is extended to the utmost,  
our ideas will be made true. When our ideas  
are made true, our minds will be rectified.

By “things,” Hu argued that the text *Da Xue* originally referred to the specific term *wu*, as in the compound noun: *gewu*. He pointed out that in the history of Chinese philosophy *gewu* carried two meanings: first, “to investigate into things” and, second, “to bring forth the intuitive knowledge of the mind.” The first meaning of *gewu* (“to investigate into things”) was the result of the term’s interpretation by Song-dynasty thinkers such as Cheng Hao (程顥 1032-1085), Cheng Yi (程頤 1033-1108), and Zhu Xi (朱熹 1130-1200). Then he cited Zhu Xi:

The saying [of *Da Xue*] that the extension of knowledge depends on the investigation of things means that in order to extend our knowledge we must study everything and find out exhaustively its reason. For in every human soul there is knowledge, and in every thing there is a reason. It is only because we have not sufficiently investigated into the reason things that our knowledge is so incomplete. [...] After sufficient labor has been devoted to it, the day will come when all things will suddenly become clear and intelligible. When that time has arrived, then we shall have penetrated into the interior and the exterior, the apparent and the hidden, principles of all things, and understood the whole nature and function of our minds.

Hu subsequently repositioned Zhu Xi’s ideas within modern philosophy of logics by arguing that things as *wu* bearing significance because everything had in itself a *reason* (li, 理). As a result, in order to discover the reason of each thing, one must investigate *into* things (as the mind engaging with the matter). By firmly relating “things” to *gewu*, Hu followed Zhu Xi and transcended the differences between subject and object. Yet Hu still argued that even though Zhu Xi’s approach might lead to “the final stage of sudden enlightenment,” it

could not direct the mind to objective examination of “things.” That is, Zhu Xi’s method might appear similar to modern logic theory, yet it was not logical methods. As such, Hu concluded that it lacked “scientific spirit” because Zhu Xi only engaged with things on an observational level, and not through a methodical examination with hypotheses and experiments.

However, Hu argued that Zhu Xi should not be held accountable for the lack of proper logical methods in pre-modern Chinese philosophy. In Hu’s view, the most critical and severe change actually took place at the hand of the Ming philosopher Wang Yangming (王陽明, 1472-1529), who later reinterpreted the Song Neo-Confucian philosophy. (Wang, 1972, 3 and 93; Elman, 2005, 7) Wang, according to Hu, rejected the Song philosophers’ ideas about *wu* by arguing that:

The objects under heaven need not be investigated and the task of “investigating things” can only be carried out in and with reference to the individual’s character and mind.

Hence,

the ruler of the body is the mind. That which proceeds from the mind is the idea. The nature of the idea is knowledge. That on which the idea rests is the thing. For instance, when the idea rests on serving one’s parents, then serving one’s parents is the thing. (Hu, 1922, 3)

In effect, Hu explained, Wang Yangming’s theory ushered in the second meaning of *gewu* 格物, which Wang identified as “to bring forth the intuitive knowledge of the mind.” (Hu, 1922, 3-4; Wang, 1916,56-58) For this very interpretation, Hu argued that Wang’s suggestion of subjective meditation detached “things” from the conditions of their materiality. In Hu’s reading of Wang’s philosophy, the “things” that surround us are mere subjects, with which one’s mind chooses to engage at variable levels. “Things,” according to Wang, were only the stimuli that activated the intuitive knowledge of the mind. (Hu, 1922, 3-5)

Hu then concluded that, in the history of Chinese philosophy, not only methods in objective research had been dismissed, but also the focus on the materiality of things had been rendered unnecessary, because objective materials had always been replaced by subjective matters. By Hu’s account, “things” in pre-modern China had never acquired their status as “objects,” for any

objective research into things would be rendered as merely subjective interactions between the mind and its external surroundings. (Wang, 1916, 59) In Hu's words:

While fully recognizing the merits of the philosophy of Wang Yangming I cannot but think that his logical theory is wholly incompatible with the spirit and procedure of science. The [Ming] philosophers were right in their interpretation of the doctrine of "investigating into things." But their logical method was rendered fruitless (1) by the lack of an experimental procedure, (2) by its failure to recognize the active and directing role played by the mind in the investigating of things, and (3), most unfortunate of all, by its construction of "things" to mean "affairs." (Hu, 1922, 3-5 and 7-8)

Hu's attempt to analyze *wu* in conjunction with *things* was problematic. One of the blunders was his deduction of the meaning of *wu* from *gewu*, for which he failed to study the entire compound noun *gewu* more thoroughly. D.C. Lau, for example, argues that *ge* 格 (as in *gewu* 格物) should be interpreted not only as "to investigate," but also "to come," "to penetrate," and "to reach." (Lau, 1967, 353-357) The various meanings of *gewu* thus suggest that the meaning of *wu* should not be understood merely as "things," but also as "a passage to things" (when *ge* is interpreted as to penetrate) or "the means to achieve things" (when *ge* is interpreted as to reach). Benjamin Elman further argues that the interpretation of *gewu* should be understood as part of the philosophical concept of *gewu zhizhi* (the investigation of thing and the extension of knowledge), which states that there is a principle for all things in the world. Moreover, because the concept of *gewu zhizhi* emphasizes the existence of principles in the real world, Zhu Xi and other the Song philosophers likely presented the concept to counterbalance the Mahayana Buddhist claim that things in the world was "ephemeral and emptying of reality." (Elman, 2005, 5) Zhu Xi's reading of *wu* as "things" in *Da Xue* not only suggested the pursuit of knowledge based on worldly environments but also the means to understand such an endeavor as part of one's moral cultivation process. (Elman, 2005, 6-9) Accordingly, the revision of the concept of *gewu zhizhi* by Wang Yangming during the late Ming period had less to do with the absence of logical methods, as Hu Shi argued, but more with the prospect of moral cultivation and the development of the mind.

Lau's and Elman's arguments are intriguing because they allow us to reconsider more thoroughly the interplay between *wu* as thing-object for objective research methods

and *wu* as thing-subject for the practice of the mind. Yet Hu, too, had contemplated this complex interplay and, for decades, attempted to resolve it. His attempt and resolution, however, were framed and limited by his commitment to modern logics, particular the dialectics of hypothesis and evidence in research methods.

One of the evidence that presents Hu's attempt to understand the interplay between *wu* as thing-object and *wu* as thing-subject is an incident that took place during his debate with Chen Duxiu (陳獨秀 1879-1942) on the subject of historical materialism and the role of historians. In 1923, Chen proposed that the study of the past should follow the process of historical materialism, which principally addressed changes in things according to factors in economics and social structure. Hu disagreed with Chen. He argued that non-economic factors, namely knowledge, thought, and idea, were also causes of historical changes, and, therefore, should be considered by researchers. In his response to Chen, Hu wrote:

[Chen] Duxiu said, 'the mind is one manifestation of matter [wu] ... it seems, in that case, that "objective material causes" ought to include all "intellectual" causes—knowledge, thought, self-expression, education, among others. If we explain the problem in this fashion, then Duxiu's definition of historical materialism comes to read: 'Only objective causes (including economic organization, knowledge, thought, etc.) can change society, explain history, and shape one's philosophy of life.' (Hu, 1923, 1-42; Grieder, 1970, 60)

Hu's response is both interesting and revealing. As he was revising Chen's definition of *wu*, it seemed that he had expanded the meaning of *wu* beyond objective materialism of things. By concurring Chen's interpretation of *wu* as "matter" and that the mind being a form of its manifestation, Hu appeared to espouse the idea that *wu* could be both the cause and the method of observing historical-social change. In these two intertwined conditions, *wu* as "things" immediately formed a binary of objective materiality and objective causes.

Hu continued to investigate as his ideas and definitions of "things" in Chinese philosophy developed and gained multilayered contexts. But his shift toward more intricate definitions of materiality in intangible materials and non-physical evidence was not easy. In the following three decades, Hu constantly struggled to find a compatible synthesis between Chinese philosophy and the pragmatic theory of logical methods with which he had once been



so closely associated. The results of his struggle reveal themselves in many of his discussions on Chinese artifacts, poems, paintings, and other subjects. The further Hu delved into these materials, the further his perspectives on Chinese philosophy of things changed. Gradually, Hu began rereading Chinese philosophy and reframing different schools of thought to fit layers of modern philosophies. War and political turmoil in the late 1930s interrupted Hu's work, and Hu moved to Taiwan in 1949 where he was principally based over the following decade. But, finally, three years before he passed away, Hu Shi appeared to come to a conclusive understanding of *wu* in Chinese philosophy.

In 1959, Hu revised his landmark publication *The Development of the Logical Method in Ancient China* into an essay titled "The Scientific Spirit and Method in Chinese Philosophy." (Hu, 1962) In this lecture, he returned to where he had started forty years earlier by re-examining the philosophy of Zhu Xi. Hu asked, once again:

What are "things"?

Then, he responded to his own question once again with the analysis of Zhu Xi's works. However, unlike the view he had posited earlier in his life, the older Hu insisted that Zhu Xi did not succumb to the typically repetitive method of interpreting the Classics as other Neo-Confucian scholars did because:

Truly inspired by the "Socratic tradition" of Confucius, Zhu Xi worked out a set of principles on the spirit, the method, and the procedure of investigation and research. He said, "investigate with an open mind. Try to see the reason (li) with an open mind. And with an open mind follow reason wherever it leads you." (Hu, 1962, 404)

Hence:

As an experienced worker in textual and semantic researches, Zhu Xi was able to develop a more practical and constructive methodology out of idea of doubt. He realized that doubt did not arise of itself, but would come only when a situation of perplexity or difficulty was present. [...] In one of his letters to his friend and philosophical opponent, Lu Jiuyuan, he again used the example of the judge trying a case of litigation: "Just like the judge trying a difficult case, one should keep his mind open and impartial, and must not let his own inclination or disinclination

influence his thinking. He can then carefully listen to the pleading of both sides, seek evidences for cross-checking, and arrive at a correct judgment of right and wrong.” [...] In short, the method of doubt and resolution of doubt was the method of *hypothesis* and *verification* by evidence. (Hu, 1962, 404-9)

The method of doubt and resolution of doubt were the method of hypothesis and verification by evidence! Here, in the final years of his life, Hu strove with all remaining effort to reconcile the differences between Chinese philosophy and modern methods of logics that had once been world apart. Turning to the Song school of Neo-Confucianism that he had once criticized for lacking “scientific” approaches to research, Hu reread and reframed Zhu Xi’s theory to fit his definition of the theory of logics, and subsequently insisted that modern logics did indeed exist in Zhu Xi’s theories. In the end, Hu concluded that “things” as *wu* in Chinese philosophy were neither subjective matters nor objective materials, for he came to agree with Zhu Xi that the existence of things depended upon the emergence of reasoning within the human mind. In Hu’s mind, the world of twelfth-century China must have finally come to resonance with that of the twentieth century, for his quest for a synthesized compatibility between modern logics and pre-modern Chinese philosophy was settled, at last.

### **To Jean-Pierre Protzen**

This paper is a section of my current work. It stemmed in part from the many years of our transcultural dialogues.

### **Glossary of Chinese Terms**

*by order of appearance in the essay*

Wu (物)  
niu (ox 牛)  
wu (animal 勿)  
Hu Shi (胡適, 1891-1962)  
Da Xue [大學 lit., The Great Learning]  
Cheng Hao (程顥 1032-1085)  
Cheng Yi (程頤 1032-1085)  
Zhu Xi (朱熹 1130-1200)  
reason (li, 理)  
Wang Yangming (王陽明 1472-1529)  
gewu 格物  
ge 格  
Chen Duxiu (陳獨秀 1879-1942)

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## UNDER GLASS AND IN THE LOOKING GLASS PERSPECTIVES ON THE PRESERVATION AND DISPLAY OF CULTURAL HISTORY

Anne Toxey

A visitor to central San Antonio, Texas, inhabits more or less simultaneously the Tex-Mex Capital of the World, the locus of the Texas War for Independence (the Alamo National Historic Landmark), the capital of Spanish Texas (past and present), a Roman Catholic Mecca since 1731, a major stop on *El Camino Real de los Tejas* National Historic Trail, the King William National Register Historic District, and the San Antonio Missions National Historic Park. A host of significant museums and remaining examples of three centuries of urban planning and of architectural preservation spanning one century lend the city other distinguished titles. Granted, San Antonio has an unusually rich archive of histories to draw upon; however, the city is not unusual in receiving layers of monikers and identities. The phenomenon of marking sites and marketing identities is a subset of the culture of collection, interpretation, and display. These endeavors have recently expanded exponentially. Culturally rich or not, both urban and rural settings are being framed and displayed at a dizzying rate. This large project absorbs such previously separate fields as museology, historic preservation, social studies, and regional economic development.



Fig. 1



Fig. 2

I am apprehensive about what this phenomenon signifies. Is it a commodification of culture? A side-effect of the heritage industry? If so, what does this do for cultural values and for scholarly integrity? What motivates the current trend to objectify the past (and even the present) through preservation and display? What sentiments deeper than the obvious nationalistic and commercial intentions does this urge belie – perhaps a fear of loss or a distrust of the future?

The title of this article, “Under Glass,” refers both to my own work as an exhibit developer and to the broader culture of display. “In the Looking Glass” refers to the introspective analysis of my work and of this cultural occurrence, and it alludes to society’s obsession with self-examination. Drawing from professional experience as well as my research in urban history and preservation, I seek to understand why these cultural changes are occurring and what they mean for contemporary society and for us academics and designers, the producers of knowledge.

State-of-the-art exhibit design expands the concept of interpretation beyond the iconic – and by now dusty – white index card and into the setting. It pushes past the museum’s conventional performance of knowledge by stimulating the visitor’s performance through participation in the exhibit space. Believing that people learn best through experience using multiple faculties, this approach erases the line between static display and theater and then erases the stage itself to immerse the visitor in the set [Fig. 1]. Portraying the exhibit message through different media, as well as through volumes, colors, light, sound, and textures, makes its impact on the visitor strong. In other words, through design and interpretation the exhibit designer wields a lot of power: the ability to influence ideas, to dictate visitor experiences, and to brand sites.



Fig. 3

For example, Fig. 2 illustrates a proposed western heritage museum in northeastern Utah for which my firm is developing the historical content throughout the exhibits, the building envelope, and the surrounding garden. While the region has previously been identified with dinosaurs [Fig. 3] – being the home of Dinosaur National Monument and the Utah Field House of Natural History – it will now be overlaid with a Wild West identity, as it was also the home of Butch Cassidy and his infamous friends as well as being the site of many other significant western expansion events.



Fig. 4

Our professional motives are to interpret events that took place here and elucidate their relationships to larger movements elsewhere. To present these concepts to a child-oriented public, we identify and encapsulate stories within this material, which we often dramatize with simulated spaces that use high and low technologies to teach visitors through experience. The intent is to teach; however, the effect may be the creation of “heritage,” which the museum gift shop will market with toy guns and tomahawks.

While the very nature of museums has always been the collection and display of culture, in recent years museums have become more spectacular in order to compete with other attractions, to tap the growing tourism industry, and to reach the mass public – with whom many museums had lost touch, having become ivory towers accessible only to esthetes and scholars.

**Fig. 1**  
Edwards Aquifer exhibit,  
Austin, Texas (Toxey/  
McMillan Design Associates;  
Charles Toxey, photographer)

**Fig. 2**  
Model of exhibits, Uintah  
County Western Heritage  
Museum  
(Toxey/McMillan  
Design Associates)

**Fig. 3**  
Vernal, Utah, welcome sign  
(Anne Toxey, photographer)

**Fig. 4**  
Shopping mall at the Louvre,  
Paris  
(©Creative Commons 2007,  
Roddh, photographer)





Fig. 5

Museums now combine education with entertainment in order to draw audiences. Loss of public funding has also forced them to become more commercial, addressing the consumer-orientation of mass culture. Museums are reinventing themselves as cafes, reception rental spaces, cinemas, IMAX theaters, conference centers, shops, and even shopping malls [Fig. 4].

The same commercial force is, to an increasing extent, driving preservation as well. An example of this can be seen with the ancient cave structures called the Sassi [Fig. 5] in Matera in southern Italy. Acting largely out of shame for the living conditions held within, the state government closed the Sassi in the 1950s–70s and transferred the population to new housing. Officials reversed their antagonism toward the caves in the 1980s,

naming them a national monument; however, it was not until the mid-1990s that preservation here began in earnest with the arrival of tourists following UNESCO's listing the site as World Heritage. While the stigma of the Sassi remains among a large portion of Materans, they embrace this cultural capital for its money-making potential.



Fig. 6

Another connection between commercial ambition and preservation is the interpretation of preserved sites for tourist consumption. In the case of the Sassi, for example, the



Fig. 7

museums and historical displays that have developed there simplify the site's complex lineage of millennia of political and social upheavals, sieges, and assassinations into an apolitical, aestheticized presentation of peasant life. This reading is propagated visually with checked tablecloths in restaurants picturesquely decorated with preindustrial farm tools. [Figs. 6–7]

New themes have joined the happy, hard-working-peasant theme, for example, the erection of the Stations of the Cross in the streets of the ancient city, following

the filming here of Mel Gibson's "The Passion of the Christ." These transform the remote Italian city into a New Jerusalem – eclipsing Matera's rich but fading religious mosaic of Byzantium, Islam, Judaism, witchcraft, and Pagan cults [Figs. 8–9]. Another divergence from the peasant theme and a new spectacular way to experience the caves – especially for wealthy, golf-playing tourists – is through a venue called the 19th Hole. This is a mini-golf course, virtual driving range, and chic wine bar staged in one of the city's enormous, 19th-century, municipal rock cisterns [Fig. 10]. Overlaid interpretations of filmic Jerusalem and high-tech leisure are not re-creations of Materan history: they are representations of contemporary Materan culture and narratives.

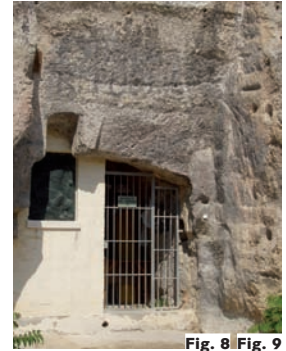


Fig. 8 Fig. 9

Instead of wandering through the streets and unoccupied caves to experience the place on their own, visitors are more and more funneled through these paths and experiences construed by others. Many visitors prefer the interpreted experience – like that offered by exhibits – because it fast-tracks their appreciation of the place without investing years

of research into it. Few of them, however, ask who is doing the interpretation, what their motives may be,



Fig. 10

and how these inform the narratives presented. For example, both the Stations of the Cross and the 19th Hole, as well as other new Sassi attractions, were developed by different social and financial leaders, whose generosity to the community in providing public art and conducting elaborate preservation projects is colored by political meaning and economic drive.

While museums and preservation sites are becoming more entertainment-oriented, popular, commercial, and, in general, touristic, the opposite is also occurring. Commercial and leisure venues are becoming museal by adding interpretive and interactive exhibits. This is visible everywhere: churches, shopping malls, banks, show rooms, .... The result is a merging of these spaces. A trip to the museum includes food, entertainment, and shopping; while a trip to the airport or movie theater will include educational displays – as well as food, shopping, etc. For example,

Fig. 5

The Sassi of Matera, Italy (Anne Toxey, photographer)

Fig. 6

Peasant-themed restaurant in the Sassi (Anne Toxey, photographer)

Fig. 7

Peasant life museum in the Sassi (Anne Toxey, photographer)

Fig. 8–9

Stations of the Cross overlaid on Sassi of Matera (Anne Toxey, photographer)

Fig. 10

The 19th Hole in the Sassi of Matera (Patrick McMillan, photographer)

SAS, a huge shoe store in San Antonio, Texas, is themed in an early 20th century general-store pastiche. A museal attraction in itself – with snack shop and gift shop – , it draws tour buses from around central Texas and northern Mexico [Fig. 11].



Fig. 11

Another museal transformation involves states' highway rest area and visitor center programs. In Texas, for example, my firm has been engaged to turn highway rest areas into mini-county history museums [Fig. 12]. We develop exhibit content into theatrical settings that include a variety of media all presenting aspects of a region's history and culture. One of our goals is to generate tourism to remote areas, which does in fact occur.

What we are really doing, however, is creating heritage in locales that had been fairly untouched by this force.

For example, while collecting research about Columbus, Texas, we noticed that in the past century a number of prominent artists had been connected with the city and that there were quite a few contemporary artists living there. So we developed a video about Columbus's history of art. Thanks to our film, which is now also shown at the Visitors' Bureau, the community now embraces its art "heritage," which previously did not exist, and has developed a tour of artists' studios.

With broader and broader nets of "heritage" and "culture" being cast across the globe, cultural display has become ubiquitous. Countless groups are objectifying themselves, claiming heritage, and overlaying interpretation on both the manmade and natural environments. For example, much of undeveloped New Mexico has been claimed as Georgia O'Keefe Country. We even make our own quotidian lives into spectacles with thousands of home videos on YouTube, countless personal web pages, webcams, blogs, MySpace, and online photo albums – shared with the worldwide web.

This is the *museumization* of the world. Culture is defined and packaged into views, posters, architecture, and tee shirts. We analyze and stage ourselves, our identities, histories, and ethnicities. I perceive these manifestations of display as simulacra: they present culture as a simulation of itself. Intentional conservation of cultural practices and products objectifies them and separates them from their original, "real" trajectories. Self-conscious representation of these objects or stories (for consumption) transforms them from the realm of real into the realm of

Fig. 11

SAS Shoe Store, San Antonio, Texas (Anne Toxey, photographer)

Fig. 12

Donley County Safety Rest Area, Texas (Toxey/McMillan Design Associates; Patrick McMillan, photographer)



the representational. Like walk-through scrapbooks, they assemble historical, cultural, and aesthetic moments in a concentrated experience: a simulacrum of time and place.

Causes for this drive toward self-conscious self-representation, which defines the very essence of postmodern society, are complex, but my examples show a few repeating stimuli. One is the quest for and assertion of identity, a general social preoccupation intensified by mass tourism and mass communication. These forces juxtapose cultures and societies, causing a general increase in social awareness – in other words, the need for and the production of group identities. Related to this is heritage production: the populist reclaiming of history and culture from the clutches of the privileged. It also results from attempts to protect natural and cultural sites from the ravages of development. And related to this is the political and economic need for organizations and communities to develop revenue-generating strategies. Making money, especially through tourism, has much to do with the display of culture – and the more experiential, the better able to fulfill the entertainment-lust of current audiences.

Two results of these stimuli include: the overlay of interpretation everywhere and the experiential orientation of exhibits as well as many other spaces. Both of these phenomena are representational, and both contribute to our mediated experience of the world.

The sensory and intellectual stimulation provided by the museumized environment, though somewhat exhausting, has great teaching potential. Educating people and making them more aware of their surroundings is beneficial for society. Clearly, they willingly participate in these devised settings, seeking out the mediated over non-mediated experiences.

In my experience with exhibits, I find that even if visitors are conscious of the spectacle that they inhabit, they are generally unaware of the power and agency hidden behind the smoke and mirrors. We expect news media to have a political bias; however, the general public trusts museums to tell them impartial truths. Exhibits, however, are not neutral. They are constructed, and they reflect the values and biases of their creators – as well as those of the backing institutions, funders, and boards of directors, who are usually politically appointed. For example, the voting



Fig. 12

members of the Smithsonian Board of Regents are composed of: the Vice President of the United States, the US Chief Justice, three senators, and three members of the House of Representatives.

Most exhibits are not politically transparent. Since the public is used to being entertained, spoon-fed, and non-critical of authoritative teaching, it is not trained to recognize the controls behind displays, which can exploit the public by influencing consumption as well as shaping perceptions. The more experiential the display – following the current direction of exhibit design – the less likely visitors will consider questions of who is behind the message and why it is being stated. The more that people’s understanding of the world comes through filters, the greater control others exert over their thinking.

My intent is not to criticize or attempt to change the political nature or the growing dimensions of interpretive displays. Besides, I, too, use exhibits as a platform for disseminating my views and influencing knowledge, which is part of pedagogy. I do, however, believe that exhibits should teach the public to think beyond the topic presented by asking such critical questions as why it is being displayed, who is behind it, and what alternative interpretations there may be for the material.

To the old axiom, “those who forget history are doomed to repeat it,” I add: those blind to the authors of history are beholden to them.



## GRID AS DESIGN METHOD: THE SPATIAL IMAGINATION IN EARLY NEW ORLEANS

Dell Upton

*Looking at the plan of Ollantaytambo, one might be tempted to argue that the town block is derived from a grid cast onto the land, as it is in modern North American cities. But that is not the case: the blocks are the result of a particular building arrangement – a kancha. The grid was a convenient way to accommodate the kancha on relatively flat land, such as at Ollantaytambo. Under somewhat less propitious conditions, the grid was modified to fit the particular terrain (Protzen 1993).*

### I

The grid is one of the oldest and most widely distributed of urban planning types. It organized cities in Europe, Asia, Africa, and the Americas as long as five thousand years ago (Kostof 1991). It is popular to dismiss orthogonal planning on these grounds as a self-evident, instrumental strategy (“the developer’s grid”) and to contrast it unfavorably to more self-consciously aesthetic or representational schemes. Yet, as Jean-Pierre Protzen noted at Ollantaytambo, each grid is informed by its own peculiar logic, a spatial imagination that sharply differentiated apparently similar town plans. This was no less true of modern North American cities than it was of Ollantaytambo.

The *spatial imagination* as I use it here is a conceptual process that combines relatively specific, if not always realized, social and functional urban intentions with deeper, more diffuse values and expectations. It operates in a realm beyond simple instrumentality, translating non-spatial goals and categories into spatial terms. The spatial imagination is based on a sense of the proper relationships among people or institutions, fusing physical and non-physical attributes into a kind of Platonic space that accommodates all connections, all relationships, all hierarchies at once. In other words, it is a monumental act of synthesis. Even spatial arrangements that in retrospect appear to be “natural” spatial expressions of social relationships often take years or centuries of experimentation to coalesce. We try many arrangements: we can recognize similar spatial conceptions in apparently different material forms (Upton 2008). At the same time, a careful examination of historical grids demonstrates great variety in this supposedly monotonous urban form. Grids can be differentiated by size and spacing of block units, patterns of circulation, placement (or lack) of central features and other forms of public or ceremonial space, and manner of bounding them (Groth 1981).

**Fig. 1**  
Plan of New Orleans 1764

The possibilities of the grid were well understood by the Europeans who seized North America in the seventeenth and eighteenth centuries. They might have known medieval new towns from many parts of central Europe. Among the most distinctive of these were the bastides, walled, gridded agricultural fortress towns the English built in southern France and Wales (Morris 1979). The principles of bastide planning were carried to Northern Ireland in the late sixteenth century, and many of the same colonizers involved there brought the idea to New England and the Chesapeake region early in the next century (Garvan 1951; Reys 1972).

Bastides housed farmers in hostile settings. Typically a market square abutted by a church and the civil government's headquarters were placed somewhere near the town's center. Bastide planners assumed that their authority was threatened both from without and within, so they usually provided an interior strong point from which the urban population could be controlled, along with the town's encircling defensive walls.

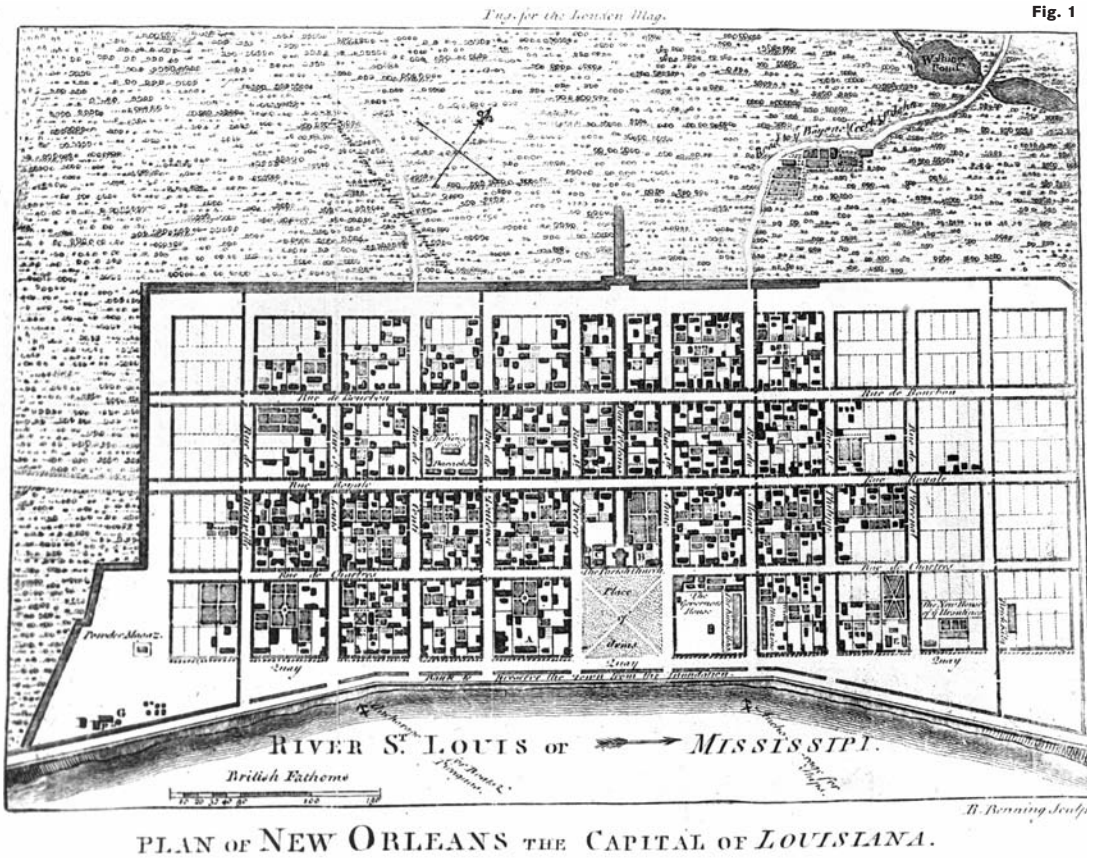


Fig. 1

## II

The early plan of New Orleans derived from this European tradition (Fig. 1). French authorities chose the site for its potential for controlling the economy of the vast Mississippi-Missouri-Ohio River basin (Clark 1970). As early as 1708, colonists were sent to the banks of the Bayou St.-Jean, which served as an Indian path from Lake Pontchartrain to the Mississippi at the site of the modern city. Ten years later, Jean Baptiste Le Moyne, Sieur de Bienville, established an outpost there on behalf of the Company of the West. A building line was established, but no other attempt was made to shape the settlement until 1721. In that year, the engineer Pierre Le Blond de la Tour made a plan for a new French headquarters, New Biloxi, intended for a site on the Gulf of Mexico in present-day Mississippi. As Le Blond de la Tour conceived it, New Biloxi was a tiny settlement three blocks by four. Midway along the bay edge of the rectangle was an open square, or *place d'armes*. On the far edge of the square, at the center of the plan, stood the parish church, which was approached from the rear by an axial street that split the middle rank of blocks. To the left of the church as one faced it was the *corps de garde*, to the right the *maison curiale* or clergy's residence. Le Blond de la Tour's drawing depicted a fortification more than a city, for each of the "blocks" of New Biloxi was assigned a single, official use, and the whole was surrounded by elaborate French-style earthworks. Yet, as Samuel Wilson, Jr., has shown, it formed the basis of the plan Le Blond de la Tour proposed and Adrien de Pauger laid out at New Orleans, which supplanted the never-constructed New Biloxi as the capital of Louisiana, that vast Gulf Coast and inland territory ultimately sold to the United States in 1803. The siting of *place d'armes*, church, *corps de garde* and *presbytère* (priests' house), and even the axial street behind the church were all transferred directly from New Biloxi to the much larger New Orleans. The new city was to be fortified, although no defenses worthy of the name were ever constructed. A series of flimsy wooden palisades and anemic, incomplete earthworks appeared and fell into ruin for a century, until they were finally removed in 1810 [1].

The earliest extant maps show the bare bones of the plan. On the first, from August, 1721, only the two ranges of blocks nearest the river are depicted, with the location of the church and a form of the subdivision of the blocks sketched in. A second plan, from April, 1722, shows the platting in more detail and assigns the blocks on the up- and downriver flanks of the *place d'armes* to unspecified royal uses. In both these plans, the city is only nine, rather than the final eleven, blocks long. In a third map, probably from the same year, a block has been added at each end of the city. The royal



blocks are occupied by the civil and military officers, and the residences of other officials stretch along the waterside of the plat. Along the Mississippi River front, the second block from the downriver end is given to the arsenal. On this map, forges, craftsmen's and soldier's houses, and a hospital are listed in the key but omitted in the plan. Other maps of about the same time show the hospital to have been located adjacent to the arsenal and the forges and workers' and soldiers' houses in what is now the 500 block of Royal Street.

As straightforward as New Orleans appears, it combined several not-always-consistent ideas in a way that exemplifies the spatial imagination as I have defined it. They were revealed in the vagaries of the city's early history, as the details of the plan were elaborated and modified. The initial grid was intended both to represent a constellation of political and social authorities and to facilitate the operations of an imperial trading company. The mixed character of the plan was evident even in the street names. Some designated urban functions, such as the Rue du Quay and the Rue de l'Arcenal. Others honored the powerful, such as the Sieur de Bienville, the Count of Chartres and the Bourbons, while a third group of streets commemorated religious figures such as St. Louis, Ste. Anne (who was associated with the cathedral of Chartres in France), and St. Peter.

The instrumental and the representational burdens of the plan intersected at the town's center. Until it was gentrified in the nineteenth century, the place d'armes was a rough-hewn combination of parade ground and market place, a customary use of such a square. The juxtaposition of corps de garde, parish church, and parsonage along one side was equally conventional (Upton 1994). However, early maps of the city show the place d'armes flanked not only by the public buildings but also by elaborately planted gardens, making it a kind of royal square not necessarily suitable for the informal commerce, military exercises, impromptu spectacles, and executions that took place there.

These gardens, on the upriver and downriver sides of the place d'armes, served official residences but also, for a time, the arsenal, which led a peripatetic existence in the early years of the city's history. Originally located at the downriver end of the plat, the arsenal was moved to the public square in 1727, for "it is a thing to be put in the center. I might say in the middle of the place," wrote Pauger's successor, Ignace de Broutin. When the barracks were redesigned in 1733, the local officials, "having considered that the city not being surrounded by walls, [determined that] it would be much more suitable to place [them] at the center" as well.

They proposed to divide the barracks into two, one on each side of the place d'armes, "with a pavilion in the front facing the river for lodging the officers," so that they would be symmetrical when seen from the river. Bienville's fortified square recalled the strong points of European bastides as well as the enclosed, fortified plazas and courtyard houses then being built in Spain's North American colonies.

In defense of their alteration of the original plan, two officials wrote that to place the barracks at the edge of town as standard French military practice recommended would leave "the inhabitants at the mercy of the least savage party which might descend by the river or by the lake, [thus] the idea came to me to make a sort of fort in the middle of the city by dividing these barracks in two on the two sides of the Public Square, by means of which, and with the church which is located at the extremity of the Square, we could close up the inhabitants and their possessions by barricading the streets which abut upon it. This project was greatly favored because, besides the utility which would be drawn from it, it would make a decoration for the city."

The elaboration of New Orleans's plan and the deliberation over its details reveal the conflicting models that shaped it. The regularity of the grid, unvaried throughout except for Orleans Street, the axial street leading to the rear of the parish church, suggests an expected pattern of equal development, yet the relative placement of the place d'armes, the officials' houses and the forges stress the river's edge, as does the provision of land entrances to the city only at the waterfront corners of the town. These elements gave the city a bell-shaped settlement pattern.

### III

A second spatial conception that shaped New Orleans was that of a fortified town with its marketplace and public institutions at the center, surrounded by the populace, all enclosed by the city wall (Morris 1979). This model expected uneven development, with the densest building and the most intense activity at the center and large institutions on unfilled at the edges. When the military was moved to the place d'armes, for example, the Ursuline nuns were given the block the arsenal formerly occupied. The town's new hospital was to be built adjacent to the convent, "at the end of the town as is suitable." By 1759, the barracks had been moved to the same neighborhood. In this conception, the hierarchies of power were concentric, with authority emanating from the center, to the populace, to the unorganized territory outside, and threats reciprocally focused from the exterior on the



populace, and (as the bastide builders assumed) from the populace on the central authority. Authority was concentrated at the center and (military) strength was distributed at the edges; the community was the area within the walls. On the other hand, as the siting of the arsenal and barracks suggests, a competing image was that of the central strong point surrounded by undefended, and somewhat unorganized, population, similar to a medieval castle town. In this case, the loci of authority and of strength were identical.

The approach from the river, as the planners imagined it, presented a unified urban image, a wall of authority centered on the three main institutions at the rear of the place d'armes, flanked by officials residences and warehouses and other public stretching along the levee the length of the city. To step onto the levee and enter the place d'armes was akin to entering the *cour d'honneur* of a French Renaissance palace, and indeed the waterfront footprint of New Orleans resembled nothing so much as Louis XIV's Versailles. New Orleans's parish church and corps de garde occupied the location of the *corps de logis*, the ruler's apartments at the Sun King's palace. Although the public buildings faced the river, the place d'armes seems also to have been imagined as the culmination of a processional route entering the city from the Lake Pontchartrain side. For most of the city's early history, this was swampy and accessible only through the bayou road that extended Hospital (now Governor Nicholls) Street at the downriver end of the city. Yet how else can one explain Orleans Street, which split the central rank of blocks on axis with the east end of the parish church, and which was labeled "Rue d'Orléans ou grande Rue" on the plan of April 1722?

Finally, the town's planners attempted to synthesize a conception of the city as a rural village with a desire for images of urban density. Pauger's subdivision scheme, with five large plots on each street front parallel to the river and a single large lot at the center of each of the cross streets was intended, he wrote, "in order to proportion them to the faculties of the inhabitants and of such size that each and every one may have the houses on the street front and may still have some land in the rear to have a garden, which here is half of life." Early maps of the town emphasize these private gardens equally with the official ones on the place d'armes, although they were of very different purposes. Indeed, de la Tour asked the country for a grant of the entire waterfront block at the downriver end "to begin building at my own expense, laying it out at present for a barnyard to raise poultry and cattle so as to procure myself some sweets and refreshments of which there is a great need here." But an urban image – the appearance, if not

the actuality, of continuous, dense building – was a widely shared European value and ordinances in many European colonial towns in North America required building within a short period of time, ordered that central and corner lots to be built on first, or threatened the reassignment of undeveloped lots. In New Orleans Pauger ordered houses to be set at the street line rather than in the middle of the plot like a farmstead, and required grantees to have their lots “surrounded with stakes and the stumps dug out in front of half of the street” within two months. In September, 1722, the company ordered “that all the inhabitants of this place must have their houses or land enclosed by palisades” within the same period, “or else they will be deprived of their property and it will revert to the Company.” The planners sternly enforced these rules, at least at first. Pauger demolished one misaligned house, built before the town had been surveyed and, in a fit of pique that its owner protested, beat the man and imprisoned him (Cruzat 1924).

A hundred years later, New Orleans’s rulers had not succeeded in shaping the city to an urban image. Louis Moreau Lislet and Nicholas Girod, two of the city’s wealthiest men, protested to the mayor in 1821 against an order requiring them to fence in the lots they owned in the Faubourg Marigny within ten days. They complained about the inconvenience of such works on completely unoccupied blocks. Fenced lots grew up in weeds which were good for nothing but concealing snakes and malefactors and they required “considerable detours” to walk around them. Moreover, the neighbors stole the fences for firewood. Moreau Lislet and Girod argued that these undeveloped blocks were more useful to the public unfenced, where they could be used for pasturage and as short cuts (Moreau Lislet 1821).

Viewed through the lens of the spatial imagination, some of the confusing aspects of New Orleans’ plan are easier to understand. Rather than being bound to seek the planners’ “true” intentions, we can acknowledge, as the New Orleans founders’ words show, that many conflicting intentions shaped the city’s plan. They were neither purely formal nor purely social; rather, each spatial arrangement was predicated on an idealized social relationship. It proved impossible to reconcile them all, hence such incongruities as Orleans Street.

## Note

[1] Except as noted, the descriptive information about New Orleans's earliest development and all of the primary-source quotations are derived from Wilson 1968.

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### **Education**

- 1962     Diplome d'architecte de l'Ecole polytechnique de l'université de Lausanne (EPUL), Switzerland
- 1954     Maturité latin-science du College St. Michel, Fribourg, Switzerland

Professional Registration:  
S.I.A., Association of Swiss Engineers and Architects, Switzerland

### **Positions**

- Spring 2008     Acting Chair, Department of Architecture, University of California at Berkeley
- 2004-date     Professor of the Graduate School
- 1992-1993     Chair, Department of Architecture, University of California at Berkeley
- 1990-1992     Associate Dean, College of Environmental Design, University of California at Berkeley
- 1983-1987     Chair, Department of Architecture, University of California at Berkeley
- 1979-1983     Vice-Chair, Department of Architecture, University of California at Berkeley

### **Fellowships and Awards**

- 2004     Kacyra Family Foundation Grant for Tambo Colorado Project
- 2003     University of California, Committee on Research Competitive Grant for Uhle Project
- Stahl Endowment Grant for Tambo Colorado Project
- 2002     University of California, Committee on Research Summer Research Grant
- 2001     University of California Humanities Research Fellowship
- Stahl Endowment Grant (Archaeology)
- 2000     University of California, Committee on Research Summer Research Grant
- 1998     University of California, Committee on Research Summer Research Grant
- 1997     California Institute for Energy Efficiency
- 1995     Stahl Endowment Grant (Archaeology)
- 1994     International Architecture Book Award
- 1986     Earthwatch Expedition Grant
- 1985     University of California, Center for Latin American Studies Summer Research Grant
- University of California, Committee on Research

- Summer Research Grant  
University of California, Committee on Research
- Research Assistant Grant
- 1984 University of California, Committee on Research  
Summer Research Grant
- 1984 American Philosophical Society
- 1983 University of California, Center for Latin American Studies  
Summer Research Grant
- 1982 University of California Humanities Research Fellowship
- 1967 Swiss National Science Foundation Research Fellowship

## **Honors**

- 2001-2002 Ernest R Graham Lecturer in Ancient Architecture,  
Archaeological Institute of America
- 1999 / 2000 1999/2000 Doris Z. Stone Lecturer,  
Archaeological Institute of America
- 1998 1998 Nix-Mann Lecturer, Carlos Museum,  
Emory University, Atlanta

## **Teaching**

- 1968-present Department of Architecture, College of Environmental Design,  
University of California, Berkeley
- 1997 Universidad Central, Caracas, Venezuela
- 1994 Universidad Francisco Marroquin, Guatemala City  
Ecole d'Architecture, Université de Montreal, Montreal, Canada
- 1990 Institute of Latin American Studies,  
Cornell University, Ithaca, NY
- 1979 Faculdade de Arquitetura e Urbanismo,  
Universidade de São Paulo, Brasil  
Faculty of Architecture, University of Manitoba,  
Winnipeg, Canada
- 1974 Fachbereich Architektur, Universität Stuttgart,  
Stuttgart, Germany  
Ecole d'architecture, Ecole polytechnique federale,  
Lausanne, Switzerland
- 1973 Ecole d'architecture, Université Laval, Quebec, Canada
- 1964-1967 Abteilung für Architektur, Eidgenössische  
Technische Hochschule, Zürich, Switzerland

## **Architectural Professional Experience**

- 1964-67 Professor P. Waltenspuhl, Zürich  
Various urban design projects in Morges, Geneva, and Neuchâtel
- 1963-64 Peikert & Co., Zug  
Development of a prefabricated building system for  
industrial buildings
- 1962-63 Beric S.A., Geneve  
Development of a prefabricated building system for  
multi-dwelling housing units

- 1961-62 Igeco S.A., Geneve  
Building components, design of sanitary units
- 1960-62 Free-lance Architect
- 1959-60 Professor H. Brechbuehler, Bern  
Electronics Laboratory, EPUL. Lausanne  
Research Laboratories for Swiss National Telephone Co.
- 1957-59 Igeco S.A., Lausanne  
Prefabricated Industrial Buildings

### **Professional Activities, Consulting**

- 2003-date Consultant to the Instituto Nacional de Cultura, Lima, Peru, for its "Inca Road Project"
- 2008 Swiss Institute of Technology, Urban Planning Project
- 1988 Professional Staff, Earthwatch Expedition
- 1987 Professional Staff, Earthwatch Expedition
- 1986 Professional Staff, Earthwatch Expedition
- 1984 Consultant to the University of Colorado, Boulder, CO on program development of the Division of Environmental Design
- 1982-87 Leader of research expeditions to Peru for the exploration of Inca construction techniques
- 1980-81 Consultant with Skaburskis, Vischer Planners, Vancouver, Canada, to the Alberta Ministry of Housing and Public Works, Edmonton, Canada
- 1980 Consultant to the "Energy Efficiency of Trend Setting Buildings" project, directed by V. Bazjanac, sponsored by D.O.E.
- 1980 Consultant to the Association of Collegiate Schools of Architecture, Washington, D.C., for evaluation of survey on accreditation
- 1979 Consultant to the Faculty of Architecture, University of Manitoba, Winnipeg, Canada, on merit, tenure, and promotion
- 1978 Consultant to School of Architecture, Laval University, Quebec City, Canada, on curriculum design
- 1977-78 Consultant to the Faculty of Architecture, University of Manitoba, Winnipeg, Canada, on curriculum design
- 1974 Consultant to the Faculty of Architecture, University of Manitoba, Winnipeg, Canada, on curriculum design
- 1971-73 Consultant to the Martin Luther King Boulevard Development Corporation, Miami, FL
- 1968- Consultant and Collaborator to Studiengruppe für Systemforschung, Heidelberg, Germany

### **Service to Scholarly or Professional Societies**

- 2004-2007 Chair, Advisory Committee of the Archaeological Research Facility (ARF), University of California, Berkeley
- 2005 Evaluation of Architecture Department, Swiss Institute of Technology (ETH), Zurich, Switzerland
- 2002-date President and Member Board of Directors, Institute of Andean Studies (Berkeley)

2001-02 Board of Directors, Institute of Andean Studies  
 2000-01 Board of Directors, Institute of Andean Studies  
 1999-00 Board of Directors, Institute of Andean Studies  
 1998-99 Board of Directors, Institute of Andean Studies  
 Evaluation of Architecture Department,  
 Swiss Institute of Technology (ETH), Zurich, Switzerland

## Lectures

March 2008 “Navigating between Fields”, Architecture Research Colloquium,  
 Department of Architecture, University of California, Berkeley  
 October 2007 “Inca Architecture: Building a World”,  
 Dumbarton Oaks, Washington D.C., inaugural lecture  
 July 2007 “The Cities of the Incas”, ORIAS Summer Institute  
 December 2006 “Inca Architecture: Building a World”,  
 Harvard University, Cambridge  
 July 2006 “How Times Go By at Tambo Colorado”,  
 International Congress of Americanists, Sevilla, Spain  
 June 2006 “Design Theories and Methods in Perspective”,  
 Swiss Institute of Technology (ETHZ), Zurich, Switzerland  
 May 2006 “Max Uhle y Tambo Colorado Cien años más tarde”,  
 Uhle Symposium, Pontífica Universidad Católica del Perú, Lima, Peru  
 “Max Uhle On-line”, Uhle Symposium,  
 Pontífica Universidad Católica del Perú, Lima, Peru  
 January 2006 “Max Uhle and Tambo Colorado a Century Later”,  
 Annual Meetings, Institute of Andean Studies, Berkeley  
 October 2005 “Ancient Stonemasonry in the Andes”,  
 Stone Foundation, St. Clairsville, Ohio  
 May 2005 “Design Thinking at Berkeley”,  
 Arab Academy of Science, Alexandria, Egypt  
 April 2005 “Design Thinking at Berkeley”, Cairo University, Cairo, Egypt  
 January 2005 “A Vision of Tiahuanaco Architecture”,  
 Denver Art Museum, Denver, Colorado  
 January 2005 “John Rowe, A Memorial”,  
 Annual Meetings, Institute of Andean Studies, Berkeley  
 October 2004 “Exhibit of Student Work at Tambo Colorado”,  
 Department of Architecture, University of California, Berkeley  
 July 2004 “Trabajos en Tambo Colorado”,  
 Pontífica Universidad Católica del Perú, Lima, Peru  
 October 2003 “Historical Review of Design Theories and Methods”,  
 Design Theories and Methods Symposium “Wicked Problems:  
 Information Technology, Collaboration and the Design Process”,  
 Department of Architecture, University of California, Berkeley  
 November 2002 “Tambo Colorado: An Inca Administrative Center”,  
 Department of Anthropology, University of California, Berkeley  
 October 2002 “Tambo Colorado: An Example of Inca Colonial Architecture”,  
 Architecture and Urbanism Research Colloquium,  
 University of California, Berkeley  
 “Recent work on the Site of Tambo Colorado, in the Pisco Valley,  
 Peru”, Archaeological Research Facility,  
 University of California, Berkeley

- August 2002 “Los Colores de Tambo Colorado: Una Re-evaluación”,  
Pontífica Universidad Católica del Perú, Lima
- April 2002 “New Questions about the Gateways of Tiahuanaco,  
an Ancient Architectural Wonder of the Andes”,  
Fine Arts Museums of San Francisco, invited lecture
- March 2002 “Technology and Culture: Inca and Tiahuanaco Stonemasonry  
compared”, Stanford University, Archaeology Seminar,  
invited lecture
- January 2002 “Tambo Colorado: 100 Years after Max Uhle”,  
Institute of Andean Studies, Berkeley
- November 2001 “Tiwanaku and Inca Architecture: Is there a Link?”,  
Smithsonian Institution, Washington DC, invited lecture
- January 2001 “Of the ‘Puesta en Valor’ and the Destruction of  
Inca Architecture”, Institute of Andean Studies, Berkeley
- November 2000 “Inca Architecture and Site Planning”,  
Portland, Oregon, Archaeological Institute of America
- November 2000 “Who Taught the Inca Stonemasons Their Skills?”,  
Spokane, Washington, Archaeological Institute of America
- October 2000 “Inca Architecture and Site Planning”,  
Vancouver, Canada, Archaeological Institute of America
- October 2000 “Inca Architecture and Site Planning”,  
Eugene, Oregon, Archaeological Institute of America
- August 2000 Plataformas y Portales”,  
Pontífica Universidad Católica del Perú, Lima
- February 2000 “Genetic Engineering is not Science, it is Design”,  
Novartis, Basel, invited lecture
- January 2000 “Ancient Architectural Model: What Can They Tell Us?”,  
Institute of Andean Studies, Berkeley
- November 1999 “Who Taught the Inca Stonemasons Their Skills?”,  
Tallahassee, Florida, Archaeological Institute of America
- November 1999 “Inca Architecture and Site Planning”,  
Dallas, Texas, Archaeological Institute of America
- November 1999 “Inca Architecture and Site Planning”,  
Houston, Texas, Archaeological Institute of America
- October 1999 “Inca Architecture and Site Planning”, Fresno,  
California, Archaeological Institute of America
- June 1999 “Wer lehrte den Inkas die Steinmetzkunst?”,  
Technische Universität Berlin, invited lecture
- May 1999 “Models and Their Architects”, National Gallery of Art,  
Washington DC, one of two keynote speakers
- February 1999 “The Stones of Pumapunku: Reconstructing Tiahuanaco  
Architecture”, University of Southern California,  
School of Architecture Lecture Series, invited lecture
- January 1999 “The Stones of Pumapunku: Reconstructing Tiahuanaco  
Architecture”, Institute of Andean Studies, Berkeley
- October 1998 “The Art and Craft of the Inca Stonemasons”,  
School of American Research, Santa Fe, NM, invited lecture
- October 1998 “The Stones of Pumapunku: Reconstructing Tiahuanaco  
Architecture”, Nix Mann Endowed Lecture at the M.C. Carlos  
Museum, Emory University, Atlanta



- September 1998 “The Stones of Pumapunku: Reconstructing Tiahuanaco Architecture”, CED lecture series
- October 1997 “Inca Architecture and Site Planning”, Archaeology Institute of America, Stanford
- September 1997 “Inca Site Planning”, SameSky, Oakland
- August 1997 “Inca Architecture and Construction”, Disney Feature Animation, Burbank, CA
- June 1997 “Von wem erlernten die Inkas die Steinmetzkunst?”, Hessisches Landesmuseum, Kassel, Germany
- January 1997 “Splendors in Stone: Inca Architecture and Construction”, Smithsonian Institution, Washington D.C.  
 “The Gates of Tiahuanaco Revisited” (with Stella Nair), Institute of Andean Studies, Berkeley  
 “Lasers in the Formative: New Methods for Revealing Form, Function, and Sequence at Chavín de Huántar” (with John Rick et al.), Institute of Andean Studies, Berkeley
- July 1996 “Las técnicas constructivas de los Incas”, National Congress of Civil Engineering Students, Cuzco, Peru  
 “The Stones of Cuzco: Inca vs. pre-Inca Stonemasonry”, The Incas, A Symposium, Cuzco, Peru
- January 1996 “What do we Know of Pumapunku’s Original Appearance?” (with Stella Nair), Institute of Andean Studies, Berkeley
- May 1995 “Inca Construction Techniques”, Swiss Architects’ Association, Bern, Switzerland
- April 1995 “The Tiahuanaco Connection”, Archaeology Bag Lunch, Berkeley
- January 1995 “The Stones of Pumapunku” (with Stella Nair), paper presented at the Annual Meeting of the Institute of Andean Studies, Berkeley
- October 1994 “On Rittel’s Pathologies of Planning”, paper presented at the ACSP Annual Meeting, Phoenix, AZ
- April 1994 “Architecture et aménagement chez les Incas”, public lecture, University of Montreal, Montreal, Canada
- March 1994 “Wer lehrte die Inkas die Steinmetzkunst?”, public lecture, Institut für Allgemeine und Vergleichende Archäologie, Bonn, Germany  
 “Architektur und Umweltplanung bei den Inkas”, public lecture, University of Kassel, Kassel, Germany
- January 1994 “Advances in Design Methods”, public lecture at the Universidad Francisco Marroquín, Guatemala City, Guatemala  
 “Who taught the Inca stonemasons their skills?”, keynote paper at the Annual Meeting of the Institute of Andean Studies, Berkeley
- November 1993 “Ancient Stonemasonry in the Andes”, invited lecture, The Getty Conservation Institute in conjunction with the exhibition “Royal Tombs of Sipán” at the Fowler Museum, UCLA, Los Angeles
- May 1992 “Desktop Design: a toolkit approach to cost and planning modeling”, with Tze Hsiou Lin, and “Deliberated performance Evaluation”, with Quinsan Ciao, papers presented at Technical University of Delft, The Netherlands

- February 1992 “Architecture and Town Planning of the Incas”, paper presented at the American Association for the Advancement of Science meeting in Chicago
- October 1991 “Baukunst der Inkas”, lecture at the Universität Kassel, Kassel, Germany
- January 1991 “A very different ‚Inkaraqay‘”, with M. I. Escalona, paper presented at the 31st annual meeting of the Institute of Andean Studies, Berkeley
- December 1990 “Stand der Kunst der Planungswissenschaft”, keynote lecture, Symposium on Design Theories and Methods, Universität Stuttgart, Stuttgart, Germany
- April 1990 “Inca Planning and Design”, lecture for the CED Alumni Association
- January 1990 “Ollantaytambo: its plan and architecture”, with R. Batson and B. Bocek, paper presented at the 30th annual meeting of the Institute of Andean Studies, Berkeley
- November 1989 “Methods Appreciated”, lecture in an interdisciplinary series on Design Theories and Methods, University of California, Berkeley
- October 1989 “Inca Site Planning and Architecture”, lecture at Texas Tech, Lubbock, TX
- January 1989 “High and windy places: storehouses at Ollantaytambo”, with R. Batson and B. Bocek, paper presented at the 29th annual meeting of the Institute of Andean Studies, Berkeley
- November 1988 “Inca Planning and Design at Ollantaytambo”, lecture at the University of Texas, Austin, TX
- March 1988 “La Cantería Inca”, lecture at the Universidad Central, Caracas, Venezuela
- January 1988 “How many rooms does it take to make a wall?”, paper presented at the 28th annual meeting of the Institute of Andean Studies, Berkeley
- October 1987 “Recent Advances in Design Methods and Theories”, paper presented at EHDD, Architects, San Francisco
- July 1987 “La Cantería Incaica”, lecture to the Sindicato de Guías del Turismo de Cusco (union of tourist guides), Cusco, Peru
- June 1987 “La Construcción Arquitectónica bajo una Perspectiva Arqueológica”, paper presented at the Escola Tècnica Superior d'Arquitectura, Universitat Politècnica de Catalunya, Barcelona, Spain
- March 1987 “Second vs. First Generation Design Methods”, lecture at the School of Architecture, Cairo University, Cairo, Egypt
- March 1987 “Computer Applications in Architecture”, lecture to the faculty of the School of Architecture, Cairo University, Cairo, Egypt
- February 1987 “Architectural Theory: What does it mean?”, lecture/seminar at the School of Architecture, Cairo University, Cairo, Egypt
- January 1987 “Was Saqsaywaman ever Finished?”, paper presented at the 27th annual meeting of the Institute of Andean Studies, Berkeley
- October 1986 “Stone Technology and Architecture”, lecture at the Archaeology Bag Lunch, University of California, Berkeley
- October 1986 “What can we learn from Inca Architecture?”, lecture at the School of Architecture, University of New Mexico, NM
- October 1986 “Inca Architecture and Construction”, lecture at meeting of State of California Budget Analysts, University of California, Berkeley

- April 1986 “Design Methods and Theories”, lecture for Arch. 200B, Department of Architecture, University of California, Berkeley
- April 1986 “Inca Architecture”, lecture at the Women’s Faculty Club’s “Lunch and Learn” series, University of California, Berkeley
- March 1986 “Buildings Have No Memory”, presentation at the International Laboratory for Architecture and Urban Design Seminar, Department of Architecture, University of California, Berkeley
- March 1986 “Inca Architecture and Construction”, Museum of Cultural History, University of California, Los Angeles
- October 1985 “Inca Construction Techniques”, lecture at the Night of the Architectural Historians, Berkeley
- October 1985 “Expert Systems in Construction?”, panel discussion, National Bureau of Standards, Gaithersburg, VA
- June 1985 “High Technology der Inkas”, lecture at the Institut für Grundlagen der Planung, Universität Stuttgart, Stuttgart, Germany
- May 1985 “Experimental Methods in Archaeology. An Example”, Department of Archaeology, Stanford University, Stanford, CA
- May 1985 “A Farewell to Joe Esherick”, address at the opening of the exhibition of work by J. Esherick, Department of Architecture, University of California, Berkeley
- April 1985 “Inca Architecture”, lecture at the University Extension, Berkeley
- February 1985 “Work Patterns in Inca Stone Cutting”, lecture at the Archaeology Bag Lunch, Berkeley, CA
- January 1985 “Transportation of Building Blocks at Ollantaytambo”, paper presented at the 25th annual meeting of the Institute of Andean Studies, Berkeley
- December 1984 “Inca Construction Techniques”, lecture at the School of Architecture, The City College of the City University of New York, New York
- April 1984 “Inca Quarrying and Stone Cutting”, lecture at the Department of Anthropology, Stanford University, Stanford, CA
- March 1984 “Inca Stone Masonry”, lecture at Marquis Assoc., San Francisco, CA
- January 1984 “Some Observations about Inca Construction at Ollantaytambo”, paper presented at the 24th annual meeting of the Institute of Andean Studies, Berkeley, CA
- November 1983 “Design Methods Applied to Archaeology”, seminar, Center for Latin American Studies, University of California, Berkeley
- “Inca Stone Masonry”, lecture at annual meeting of the Association of Swiss Scientists in the USA, Berkeley, CA
- October 1983 Panel Participant, ACSA Western region Conference, Los Angeles, CA
- June 1983 “La Cantería Incaica”, lecture at the Instituto Nacional de Cultura, Cuzco, Peru
- April 1983 “Probleme einer zukunftorientierten Architektur”, lecture to European professionals, sponsored by RIGIPS International, Berkeley
- March 1983 “Design Methods: Where do we Stand?” and “Design Methods and their Application to Archaeology”, lectures at the College of Design Planning, Boulder, CO

- January 1983 “Inca Quarrying and Stone Cutting”, keynote paper at the 23d annual meeting of the Institute of Andean Studies
- November 1982 “Hammer Stones vs. Laser Beams: A Tale of Inca Stone Masonry”, public lecture, University of California, Berkeley
- March 1981 “On Teaching Architecture” with M. Comerio, opening paper, Association of Collegiate Schools of Architecture annual meeting, Asilomar, CA
- February 1981 “Attribute Zukunftorientierter Architektur”, invited lecture for professionals from Europe, RIGIPS International, Berkeley, CA
- December 1980 “A Criticism of the Pattern Language”, public lecture and a seminar, and “Inca Construction Techniques”, public lecture, Massachusetts Institute of Technology, repeated at the Graduate School of Design, Harvard University, Cambridge, MA
- December 1980 Invited paper on “Accreditation, do we need it?” Association of Collegiate Schools of Architecture, Washington, D.C.
- March 1980 Invited paper on “Design in Architecture”, with J. Esherick and H. Rittel, Seminar on “Design”, School of Business Administration, University of California, Berkeley
- February 1980 Invited paper on “Scientific Methods in Architecture”, Alberta Architects’ Association, Banff, Canada
- September 1979 Public lecture on “Participatory Design” at University of Brasilia, Brasilia, Brazil
- Aug.-Sept. 1979 Seminar on “Planning Methods” for practitioners and graduate students, Faculty of Architecture, University of São Paulo, Brazil
- February 1979 Invited paper on “Science and Architecture”, Conference on Science in Art and Art in Science, University of California, Santa Cruz
- January 1979 Three lectures on specific aspects of design methods, University of Manitoba, Winnipeg, Canada
- December 1978 Lecture on “Operations Research in Planning”, Rotary Club, Fribourg, Switzerland
- November 1978 Invited paper on “Conflict Resolution in Planning” at Conference on Foundation of Planning Theory, University of Montreal, Montreal, Canada
- January 1978 Public lecture on “Ethics and Design” at Laval University, Quebec City, Canada
- March 1977 Four public lectures on “Major Issues in Design”, University of Manitoba, Winnipeg, Canada
- December 1976 Public lecture on “Ethics and Design” at the Swiss Institute of Technology, Lausanne, Switzerland
- June 1976 Panel Participant at NSF Conference on design research, University of Washington, Seattle
- May 1976 Lecture on “Creativity and the Architect” at College Five, University of California, Santa Cruz
- October 1975 Lecture on participatory design practices at School of Architecture and Urban Planning, Massachusetts Institute of Technology, Cambridge, MA
- September 1975 Seminar on design methods and engineering at Infra-Consult, Berne, Switzerland

- May 1975 Lecture series on operations research in design,  
Ecole d'architecture de l'université de Lausanne, Lausanne,  
Switzerland
- February 1975 Lecture series on the logics of participatory design,  
Washington University, St. Louis, MO
- November 1973 Public lectures on design methods at Nova Scotia  
Technical college, Halifax, Canada  
Lecture series on design methods for the Société des Architectes  
de la Région de Québec, Québec City, Canada  
Lecture series and graduate seminar on design methods at the  
Ecole d'architecture de l'université de Montréal,  
Montréal, Canada
- September 1973 Address at 2nd Design Methods Conference, London
- May 1973 Public lecture and graduate seminar on design methods,  
Division of Design, Ohio State University, Columbus, Ohio  
Seminar on "Defining the Community" and seminar on  
"Community Information Systems", "Tinkertoy"  
National AIA Convention, San Francisco
- April 1973 Public lecture on "Design of an Environmental Planning  
Information system",  
School of Librarianship, University of California, Berkeley
- March 1973 Paper on "Information Science in Architecture?",  
with H. Dehlinger, presented at the Information  
Sciences Colloquium, University of California, Berkeley
- December 1973 Paper on "Evaluation Method", read at the  
Gerontological Society Meeting, San Juan, Puerto Rico
- November 1972 Lecture on "Alternative Environments",  
UC Berkeley Extension

### **Publications, Writings**

- 2008 "Tschudi, Johan Jakob (1818-1889)", in: *Guide to Documentary  
Sources for Andean Studies 1530-1900*, Vol. 3: M-Z,  
Joanne Pillsbury ed., University of Oklahoma Press, Norman.
- 2007 "Times Pass at Tambo Colorado" in: *Ñawpa Pacha* 28, Berkeley.  
"Cuzco-Hawkaypata: Senlik Terasi",  
Jean-Pierre Protzen and John H. Rowe, in:  
*Şehirler ve Sokaklar*, Kitap yayinevi Ltd., Istanbul. "Bibliography  
of Horst W.J. Rittel" with C. Rith, S. Durham, and H. Dubberly,  
in: *Design Issues*, Vol. 23, No. 1, pp. 78-88.
- 2006 "Max Uhle and Tambo Colorado a Century Later", in:  
*Ñawpa Pacha* 28, Berkeley.
- 2005 *Exploration in the Pisco Valley. Max Uhle's Reports  
to Phoebe Apperson Hearst, August 1901 to January 1902*,  
Jean-Pierre Protzen and David Harris eds., Contributions of  
the University of California Archaeological Research Facility,  
No. 63, Berkeley. *La Arquitectura y Construcción Inca en  
Ollantaytambo*, Fondo Editorial, Pontificia Universidad Católica  
del Perú, Lima.

- 2004 “The Fortress of Saqsawaman: Was it ever finished?”,  
in: *Ñawpa Pacha* 25-27, pp. 155-176, Berkeley.  
“Los colores de Tambo Colorado: una reevaluación”,  
Jean-Pierre Protzen and Craig Morris, in: *Boletín de Arqueología PUPC*, No.8 (2004), pp. 267-276, Pontificia Universidad Católica del Perú, Lima.  
“Wie steht es eigentlich um die Planung?”, in: *Die Verbesserung von Mitteleuropa steht nicht mehr auf meinem Plan. Eine Festschrift zur Verabschiedung von Hans Dehlinger*, Heike Raap and Philip Zerweck eds., Books on Demand, Norderstedt.
- 2003 “Pumapunku: portales y plataformas”, Jean-Pierre Protzen and Stella Nair, in: *Boletín de Arqueología PUPC*, No. 5 (2001), pp. 309-336, Pontificia Universidad Católica del Perú, Lima.
- 2002 “The Gateways of Tiwanaku: Symbols or Passages?”, Jean-Pierre Protzen and Stella Nair, in: *Andean Archaeology 11*, Helaine Silverman and William Isbell eds., Plenum Press.
- 2001 “The Roads of Tawantinsuyu / Los Caminos de Tawantinsuyu”, in: *Arquitectura y Urbanismo en Las Americas* (AULA), No. 2, 2001.
- 2000 “On Reconstructing Tiwanaku Architecture”, Jean-Pierre Protzen and Stella Nair, in: *Journal of the Society of Architectural Historians*, Vol. 59, No. 3.  
“Limited Computation, Unlimited Design”, with Humberto Cavallin and David Harris, in: *Artificial Intelligence in Design 2000*, J. S. Gero. ed., Kluwer Academic Publishers, Dordrecht.
- 1999 “Managing Design Information: Issue Based Information Systems and Fuzzy Reasoning Systems”, Quinsan Ciao and Jean-Pierre Protzen, in: *Design Studies*, Vol. 20, No. 3.
- 1997 “On Rittel’s Pathologies of Planning”, Jean-Pierre Protzen and Niraj Verma, in: *Planning Theory*, No. 18, Winter.  
“Inca Stonemasonry” and “City Planning: Inca City Planning”, in: *Encyclopedia of the History of Science, Technology, and Medicine in Non-Western Culture*, Helaine Selin, ed., Kluwer Academic Publishers, Dordrecht, Holland.  
“Who Taught the Inca Stonemasons Their Skills?”, Jean-Pierre Protzen with Stella Nair, in: *Journal of the Society of Architectural Historians*, Vol. 56, No. 2.  
“Desktop Design: A Toolkit Approach to Collaborative Design”, Tze-Hsiou Lin and Jean-Pierre Protzen, in: *IFIP, 97 Proceedings*, Sydney, Australia.
- 1995 “Das Wagnis Design”, in Lucius Burckhardt, *Design ist unsichtbar*, Cantz, Ostfildern, Germany.
- 1994 “Hawkaypata: the Terrace of Leisure”, Jean-Pierre Protzen and John H. Rowe, in Z. Celik, D. Favro, and R. Ingersoll eds., *Streets: Critical perspectives on Public Space*, University of California Press.  
“Aggregation and Uncertainties in Deliberated Evaluation”, Jean-Pierre Protzen and Quinsan Ciao, in B. Munier ed., *Theory and Decision*, Kluwer, Academic Publishers, 1994.  
“Deliberation and Aggregation in Computer Aided Performance

- Evaluation”, Jean Pierre Protzen and Quinsan Ciao, in: A. Tzonis and I. White eds., *Automation Based Creative Design (ABCD): Current Issues in Computers & Architecture*, Elsevier Science Publishers, 1994.
- 1993 *Inca Architecture and Construction at Ollantaytambo*, Oxford University Press, New York, 1993  
 “The Limits of Intelligence in Design” with Konstantinos Papamichael, Lawrence Berkeley Laboratory Paper LBL-31742, Berkeley.  
 “Reflections on the Fable of the Caliph, the ten Architects and the Philosopher”, in: FORM four, Spring 1993, USC School of Architecture Journal, Los Angeles. Reprint. 1992 “Architettura Inca”, in L. L. Minelli, ed.: *I Regni pre-incaici e il mondo Inca*, Jaca Books, Milan, 1992.
- 1992 “Die Wissenschaft vom Planen und Entwerfen - zum Stand der Kunst”, in: Gisliind Budnick, ed., *Entwurfs- und Planungswissenschaft*, in memoriam Horst W. J. Rittel, Symposiumsbericht, Institut für Grundlagen der Planung, Universität Stuttgart, Stuttgart, 1992.  
 “Toward a Concurrent Architecture: Applying Recent Developments in Concurrent Engineering to the Practice of Architectural Design”, Jean-Pierre Protzen and Tze-Hsiou Lin, in: *Advances in Computer-based Design Environments*, Proceedings, Vol. 1, 6th International Conference on Systems Research, Informatics and Cybernetics, Baden-Baden (Germany), August 17-23, 1992.
- Dec.1986 “Inca Stonemasonry”, in “Discover: The World of Science”, a 15-minute videotape on Inca stonecutting aired nationally on Public Broadcasting Stations.
- Oct. 1986 “Royal Estate of the Incas”, Jean-Pierre Protzen and Susan Niles, a research proposal submitted to the National Endowment of the Humanities, Berkeley and Easton.
- Feb. 1986 “Inca Stonemasonry”, in: *Scientific American*, Vol. 254, No. 2.
- May, 1985 “Inca Quarrying and Stonecutting”, in: *Journal of the Society of Architectural Historians*, Vol. XLIV, No. 2
- 1986 “Inca Quarrying and Stonecutting”, in: *Ñawpa Pacha*, No. 21, Institute of Andean Studies, 1983.
- 1982 “Eine Typologie der Informationssysteme unter besonderer Berücksichtigung von Faktendatenbanken”. Gesellschaft für Information und Dokumentation, Heidelberg.
- 1981 “Reflections on the Fable of the Caliph, the Ten Architects, and the Philosopher”, in: *Journal of Architectural Education*, Vol. 34, No. 4. Also as I.U.R.D. Working Paper No. 327, University of California, Berkeley, 1980.
- 1980 “The Poverty of the Pattern Language”, in: *Design Studies*, Vol. 1, No. 5.  
 “Notes on Multiple Channel Information Systems for the Distribution of ‘Unique’ Information Items”, Institute of Urban and Regional Development, University of California, Berkeley, W.P. No. 328.



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Mike Gerzso has professional (UNAM, Mexico) and Ph.D. degrees in architecture (U.C. Berkeley, with J.P. Protzen as thesis advisor). After working and teaching at MIT, he began, in 1978, a 17-year career in computer science in academia (UNAM and Fundación Rosenblueth) and in his own consulting business in Mexico. His clients were primarily agencies of the federal government, book publishers, and the telephone company (Telmex). Since 1998, he has taught at the School of Architecture, University of Colorado, and is developing a commercial version of his Ph.D. thesis.

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David Harris received a Ph.D. in Architecture from U.C. Berkeley in 2002 for a dissertation titled "Design Theories: From Scientific Method to Humanist Practice," under the supervision of J.P. Protzen. Dr. Harris is an editor and writing coach. He has co-authored an article with J.P. Protzen and Humberto Cavallin (*Limited Computation, Unlimited Design*, in J. Gero, ed., *Artificial Intelligence in Design*, 2000), and co-edited, with J.P. Protzen, *Explorations in the Pisco Valley: Letters by Max Uhle* (2005). Currently he is working with J.P. Protzen on a collection of previously unpublished work by Horst Rittel.

## Donald E. Olsen



Donald E. Olsen holds a M.Arch. from Harvard University and conducted postgraduate studies in Civic Design at the University of Liverpool, England, and in Philosophy of Science at the London School of Economics. He has worked as an architect in the offices of Saarinen; Skidmore Owings & Merrill; Wurster, Bernardi & Emmons and since 1951 in his private architectural practice. In 1954 he joined the faculty of architecture at the University of California, Berkeley, and is Professor Emeritus since 1990. He has lectured as guest professor in the U.S., England, Germany, Denmark, and France, and his work was shown in numerous exhibitions and is widely recognized throughout the U.S. and Europe. He is the recipient of prestigious awards and a member of the British Society for Philosophy of Science.

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