Accident and Predictability: An Analytical Methodology for Persistent Forces in the American City

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ABSTRACT

American cities are a curious blend of strongly predictable and profoundly accidental relationships, built consequences of persistent forces, the presence of which may be either visible or hidden. Observed urban form and space can be understood as resulting from decisions taken within a specific, but evolving, spatial and temporal context. The contextual elements which remain the same for the longest time are defined as being the most persistent forces of urban form-giving. I propose a methodology which seeks to identify instances of persistent forces, to discern their collisions in space and over time, and to understand observable built form and space as evidence of those forces. Results consist of completed case studies of the freeway system and instances of accidental urban relationships within Minneapolis, Minnesota.

1. INTRODUCTION AND STATEMENT OF PURPOSE

This paper proposes a research methodology for understanding the American city which seeks to identify and analyze the built evidence of *persistent forces* as manifest in accidental and predictable urban form. The purpose of the methodology is not to provide a universally applicable means of categorizing every possible observation of the urban environment; but is rather to suggest a productive means of *asking questions visually* as an aid toward understanding and acting within the city.

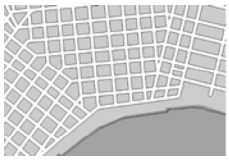
The difficulty of analyzing the idiosyncratic form of cities may be defined as one of separating cities into discernible systems, or of identifying a set of forces or ideas which have the power to guide or shape the creation of cities over time. While I believe that it is possible to identify forces behind the development of the city, and that an act of separating observations into discernible subsystems or layers is critical to an understanding of the city, I am not convinced that these forces are fundamentally deterministic in nature: but rather, that their intersection and overlap at specific localities results in urban form accidental or chaotic in appearance.

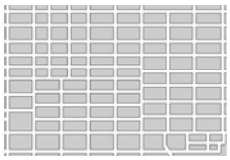
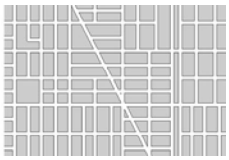
I argue that the difficulty of analyzing urban form can be defined as one of executing an iterative process of seeing, describing, internalizing, and proposing a specific set of actions upon images, resulting in graphically discernible layers. These layers may not relate directly to nameable urban subsystems, but they may, when reorganized and recombined, enable the identification and analysis of persistent forces in urban development. This happens because the production of layers involves abstraction away from the original image and opens up possibilities of observing and interpreting fundamental patterns in the urban landscape. The successful description of these patterns is equivalent to identifying persistent force.

2. ACCIDENTAL APPEARANCE IN AMERICAN CITIES

American cities are particularly characterized by idiosyncratic and apparently accidental relationships in urban form and patterns of use – for example, as interruptions to a street grid, or as apparent disregard to local topography within a planned grid, or a collision of uses in partially

reclaimed abandoned industrial districts. These relationships may be observed at multiple and simultaneously overlapping scales: examining the city or its wider region as a whole through maps or aerial photographs may reveal interruptions to the grid, while observing the city from a ground- or building-level scale, or at a scale of the human body, may reveal surprising or odd relationships between and among individual buildings whose use and purpose has changed over time.



Figs. 1, 2, 3, 4.

At a scale apprehensible in city maps, apparently accidental relationships in American cities are generally visible as interruptions to a ubiquitous city grid.[1] These occur in various manifestations in response to distinct and specific overlapping forces. *Colliding grids* are visible in places like New Orleans and Cairo, Illinois (Figs. 1, 2), where land-speculation grids trace their origin to early patterns of settlement adjacent to landings along a meandering river, resulting in oddly shaped street corners or irregularly shaped or triangular blocks. Milder, less obvious versions of colliding grids occur in flat cities where surveyor's adjustments or the vagaries of speculative land development cause adjacent grids to misalign, as in St. Paul, Minnesota (Fig. 3). Also, *sliced grids*, such as in Chicago (Fig. 4), Washington, New York, or Philadelphia are not uncommon, whether due to deliberate planning or the persistence of a pre-urban intercity road.

Examples of apparently accidental relationships in American urban form apprehensible at ground level include *collisions between street plans and topography* and juxtaposed mixed-use structures within reclaimed industrial districts.[2]

3. A DEFINITION OF PERSISTENT FORCE

I assert that instances of apparently accidental relationships in urban form as cited above are the consequence of collisions between and among persistent forces. By persistent force, I mean something like *causalities* as described in Kostof (7) or *design ideas* in Bacon (2): concepts which posit the existence of forces or ideas, either deliberately formulated or inherited from established convention, which surround and guide the multiplicity of decisions composing urban form over time.[3] My definition maintains a specific identity distinct from Kostof and Bacon: I define those city-shaping forces or ideas which possess persistence over time or persistence through space as persistent forces.

An example of a force persistent over time is *the navigable river:* the establishment and continuing development of American cities such as Minneapolis, Cincinnati, St. Louis, New Orleans, and dozens of others owes much to specific physical relationships to rivers, waterfalls, crossings, or landing places; most such cities have struggled with their river-relationship throughout their existence.[4]

An example of a force persistent through space, one which is typical of mid- and large-sized American cities, is the national freeway system. By spatial persistence, I mean that a force or idea takes its physical form at large scale and in precedence to pre-existing physical forms.[5] The freeway system is unique among the persistent forces affecting the development of American cities because it is designed to be deliberately predictable: it rigorously conforms to a set of guidelines and rules which regulate its design, its construction, and its continued use. Local,

particular, unusual, and exceptional features, when encountered, are dealt with predictably: when drivers engage the system, they can expect that any curves and inclines which they encounter will exist within a defined range; that any features outside of the normal range of acceptability will be adequately and consistently identified in advance of encountering them; and that their ability to adapt to these local, surprising conditions can be safely assumed to operate within a given speed.[6]

The graphic analysis of the freeway system has the potential of significant promise precisely because of the consistency and predictability of the system. Every interruption in predictability has the potential to indicate some locally powerful and intersecting persistent (spatial or temporal) force.

4. THE DIFFICULTY OF URBAN ANALYSIS

"The principal difficulty most students of the city face is that of ordering the entire urban area into spatial subsystems due to the extreme multiplicity of such subsystems and the complex interrelationships within and between them." – Bourne (4)

Bourne's spatial subsystems (of which he cites for possible inclusion on a potentially "infinite list" transportation networks, social communities, and industrial linkages), whether seen as the physical traces of forces such as Kostof's *causalities* or Bacon's *design ideas*, are subject to identification, ordering, and analysis. Bourne suggests that the difficulty of this process is due first of all to *multiplicity* and secondly to *complexity* of interrelationship. If a list of such systems is potentially infinite, it will never be possible to identify every system. I propose instead that the difficulty exists not in an attempt to do so but rather in the selection of a mode of inquiry (e. g. of identification, ordering, or analysis) which is most likely to productively enable the discernment and description of patterns in the landscape. Specifically in response to this idea, I propose an iterative method of seeing, describing, internalizing, and proposing specific actions on images, described in detail below.

5. PROPOSAL AND EXAMPLES OF METHOD

I propose a method of urban analysis which begins with an image (e. g. a map, or an aerial or ground-level photograph), and the production through pseudo-automatic digital means of clear and separable graphic layers in response to this image.

The purpose of proposing pseudo-automatic digital means (such as auto-tracing of image contours, stratification or posterizing of images into distinct tones, blurring, inverting, or pixellating) is specifically to promote an analytical shift away from a deliberate statement of hypothesis and to instead open the possibility of accident in observation. As I argue in my paper titled Productive Accident in Student Analysis of Urban Form and Space (5), the deliberate pushing of creative and analytical processes into places where accident is likely to happen convincingly parallels the evolution of the city itself.

Such graphic layers, if produced on translucent paper or its digital equivalent, may be recombined or superimposed upon each other or upon the original image, as seen in the following examples. The act of superimposition further removes the resulting document from a predefined hypothesis and heightens the possibility of discovery from accidental graphic relationships.

A successful method for making sense of a set of such overlaid layers depends first on one's ability to describe, in precise terms, exactly what is seen (in terms of tone, line, texture); second, on internalization, that is, an ability to describe how what is seen defines a structure for thought; and third, most critically, on an ability to propose a very specific action (e. g. a new layer, or a reconfiguration of layers) which strengthens a particular reading of the evolving document.

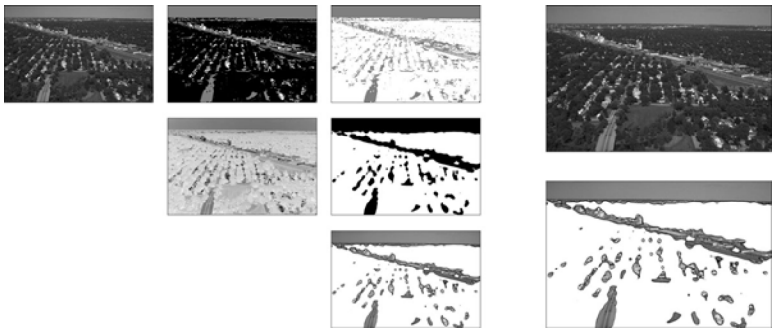


Fig. 5. (Original image copyright Regents of the University of Minnesota. Used with the permission of Metropolitan Design Center.)

Fig. 5 illustrates the graphic analysis of a mid-level aerial photograph of Hiawatha Avenue in Minneapolis; the original image is at top left. The street (the diagonal running across the image) is a pre-urban artifact connecting two significant points along the Mississippi River (visible at the horizon in the original image): to the southeast, the ca. 1820s Fort Snelling, built at the confluence of the Minnesota and Mississippi Rivers, and to the northwest, the Falls of St. Anthony, which as a natural source of power became the nucleus for downtown Minneapolis. The street forms a supporting component of the citywide freeway system, connecting to Interstate 94 at the downtown end and reaching to the Interstate 494 end past Fort Snelling.

The graphic analysis shown here begins with the original image and proceeds through a series of digital manipulations including contrast adjustment and inversion in the middle column and blurring in the right column. The large images on the right are the original image and a “masked” image resulting from superimposing an inverted contrast-adjusted image atop a blurred copy of the original (e. g. two specific pseudo-automated image manipulations). While no longer perceived directly as an aerial photograph, the final image contains distinctly discernible patterns: a continuous gray bar across the top one-fifth of the image, white space in the lower four-fifths, these two areas separated by a narrow graphically animated area; the white space is interrupted by a prominent and blurred diagonal (itself sharing much of the graphic characteristics of the narrow graphically animated area), and by smaller, discontinuous, though still apparently directional and convergent gray shapes. A careful graphic description of this final image may be used in turn as an aid to read the original image, as it serves to structure thought in particular ways: the diagonal strip of Hiawatha Avenue is seen to have characteristics in common with the Mississippi River at the horizon; the small gray clumps in the foreground, while like Hiawatha, clearly appear as subsidiary. The image could be read as suggesting the persistent force of the grid subsumed by the persistent force of the diagonal road.

Fig. 6 illustrates the graphic analysis of a government-produced high-level aerial photograph of downtown Minneapolis; again, the original image is at top left. Downtown is visible at the lower left of the original image and the Mississippi River is the dark patch at upper right. The analysis includes a range of manipulations: the first two rows of images include adjustments of tones, from high-contrast dark to high-contrast light; in the next row, stratified selections of dark tones, midtones, and highlights; the fourth row is a graphic inversion of the third row. The image at lower right “masks” the original image using a combination of images from the second and fourth rows. At least three of the images (particularly the middle image in the third row) suggest a visual affinity between a solid area of color at upper right, interrupted by thin lines of opposite color, with smaller areas of solid color at lower left, themselves also interrupted by thin lines of opposite color. Could such a reading suggest spatial or systemic affinity between the *river*, crossed and divided into segments by bridges, with the overall mass of *downtown*, divided into segments by thin streets? Which takes precedence in such a reading: the volume/mass of the river and the city, or the circulation systems which penetrate and cross those volumes and masses? Other

images perhaps more strongly suggest the persistence of the river as a city-shaping force, as they repeatedly emphasize the connection between the grid shift and the shape of the river.

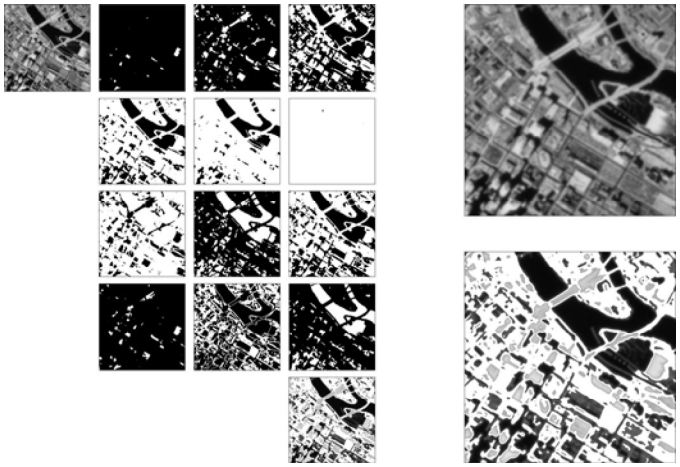


Fig. 6

6. SUMMARY AND CONCLUSIONS

As we as designers seek to act within cities, a graphic analysis of images as described here is seen to generate promising questions about urban form and relationships, questions which are invigorated by accidental relationships yet are clearly bounded by the capabilities and limitations of media (in particular, by maps, photographs, and digital manipulation).

Questions which emerge from a careful description of abstract graphic pattern are seen to productively inform interpretation of an original image of specific form or place; patterns within a composite image, or within a series of images placed in juxtaposition, are seen to hint at the presence and interrelationship of persistent city-making forces. The purpose of defining this methodology is reiterated: it does not promise an everywhere- applicable means of categorizing every possible observation; instead, it suggests a productive means of *asking questions visually* as an aid toward understanding and acting within the city. As we seek to understand the city through image, the approach outlined here proposes a way to extend the range of observations we can draw from images.

Sources

(1) Attoe, Wayne and Donn Logan (1989): American Urban Architecture: Catalysts in the Design of Cities. Berkeley: University of California Press.

(2) Bacon, Edmund N. (1967): Design of Cities. New York: The Viking Press.

(3) Bone, Kevin (1997): The New York Waterfront: Evolution and Building Culture of the Port and Harbor. New York: The Monacelli Press.

(4) Bourne, Larry S. (1971): Internal Structure of the City. New York: Oxford University Press.

(5) Christenson, Mike (2005): Productive Accident in Student Analysis of Urban Form and Space. Unpublished (scheduled for presentation at ARCC-2005).

(6) Kane, Lucile M. (1987): The Falls of St. Anthony: The Waterfall That Built Minneapolis. St. Paul, Minnesota: The Minnesota Historical Society Press.

(7) Kostof, Spiro (1991): The City Shaped: Urban Patterns and Meanings Through History. London: Bulfinch Press.

(8) Unwin, Simon (1997): Analysing Architecture. London: Routledge.

Endnotes

[1] Here, I make exception for pre-nineteenth century central cities which assume forms more typical of European cities; such places may be said to owe their seemingly idiosyncratic forms to forces such as those described by Kostof.

[2] Examples of the first are observed in Manhattan, San Francisco or Salt Lake City. When viewed at the map-scale, these cities can appear uniform and indiscriminate as to topography, but the ground-level view (as of San Francisco's Lombard Street) strongly suggests the imposition of one system atop another. Examples of the second include Minneapolis's historic Milling District, St. Louis's Laclede's Landing, and other areas in which fragments of abandoned structures built to serve expired purposes compete for attention with newer systems, efficiently designed for new purposes (e. g. tourism and entertainment).

[3] See Kostof (7) and Bacon (2). Kostof and other authors in the *systemic* stance as defined by Attoe & Logan (1) have attempted formulations for urban analysis which attempt to determine causal foundations for urban subsystems after the fact. Kostof writes of *causalities* – i. e. the natural landscape, pre-urban land division, synoecism, and social order; Bacon attempts to define a methodology of motivations or *design ideas* (his term) which guide and shape the development of cities.

[4] See, for example, Kane (6) on Minneapolis, Bone (3) on New York, or Attoe & Logan (1) on Milwaukee and others.

[5] Other examples might include Rome's arterials under Pope Sixtus V or Baron Hausmann's reinventing of Paris.

[6] The persistence as a force of the national freeway system is due in part to the circumstances surrounding its origin in a time of perceived national crisis as a federally funded and mandated public works project with ostensible ties to national defense, and in perhaps larger part due to its enabling of out-migration from the central cities at a time when existing housing stock was available at a premium relative to newer housing in outlying areas.