

- 69 Ibid. The next three objectives remained for him for future development and included: "to serve as criterion and guide in city planning, to assist in evolving new types of architecture and to strengthen the psychological influence of architecture on human values."
- 70 Ibid, p. 146.
- 71 James Sanders, "Art/Architecture: Taking the Memorial Designs for a Test Drive" in *The New York Times*, 30 November 2003: 40.
- 72 These exhibitions include: Ferriss and Corbett's *1925 Titan City Exhibition* held at the New York John Wanamaker department store in 1925 and The Whitney Museum of American Art, May 1942. (Edward A. Jewell, "America's Power Portrayed in Art; Drawings of Great Buildings by Hugh Ferriss Shown at the Whitney Museum" in *The New York Times*, 5 May 1942: 16.) *The Metropolitan Museum of Art: An Architectural History*. Metropolitan Museum of Art, New York City, 1996.
- 73 "Hugh Ferriss, 72, Architect Here: Farseeing Designer Is Dead - Foe of Skyscrapers" in *The New York Times*, 30 January 1962: 29.
- 74 Willis, "Zoning and Zeitgeist; The Skyscraper City in the 1920s" in *Journal of the Society of Architectural Historians*, March 1986, pp. 54-55.
- 75 Ibid., p. 57.
- 76 Claude Bragdon, "Skyscrapers" in *The American Mercury*, 22, 27 March 1931, p. 293.
- 77 Ibid.
- 78 Ibid., pp. 294-295.
- 79 Ferriss, *Metropolis of Tomorrow*, p. 78.
- 80 Ibid, p. 60.
- 81 Ibid, p. 140.
- 82 Paul Goldberger, "Architecture: Renderings of Skyscrapers by Ferriss" in *The New York Times*, 24 June 1986: 13.

2 Graphic Integrity and Mapping Complexity

The Works of Lynch, Wurman and Tufte

The quest for "good" urban form is an ongoing concern for urban designers. Through these efforts, they have searched for concepts of "ideal space," which can be regarded as ideal in terms of form as well as in terms of satisfying human desires to understand the various characteristics of the city. This chapter focuses on the role of visual representation by graphical means for the purpose of investigating peoples' perception of the urban realm, as well as its methods and roles in explaining urban information. Furthermore, the chapter investigates the use of diagramming and mapping as a means of simplifying the complexity of urban flux (changes in urban form, i.e. the development of parks, streetscape, new buildings, etc.), in essence to reveal the complexity of the city. The role of information graphics is vital in somehow staging the complexities of the city in a visually simulating manner. Key theorists of the mid- to late twentieth century who have dealt with these issues include Kevin Lynch, Richard Saul Wurman and Edward Tufte. They were key players in such professions relating to urban design and urban mapping. The first part of the chapter focuses on Lynch's theory of urban form as well as the methods he used, such as cognitive mapping, for proving the theory that he first presented in the 1960s. In particular, Lynch used a specific communicative style to "expose" the "physical" elements that affect our city - "the path," "the edges," "the districts," "the nodes" and "the landmarks."¹ Lynch was a key individual in explaining through mapping and diagramming what was really going on experientially in the city, not just what a designer intellectually supposed. Lynch's book, *The Image of the City* (1960), inaugurated a new science of human perception and behavior in relation to the city, and is still used in architecture and planning courses as a key resource. The second part of the chapter examines the importance of visually communicating graphics in a truthful and telling manner, with references to the well-known information architect

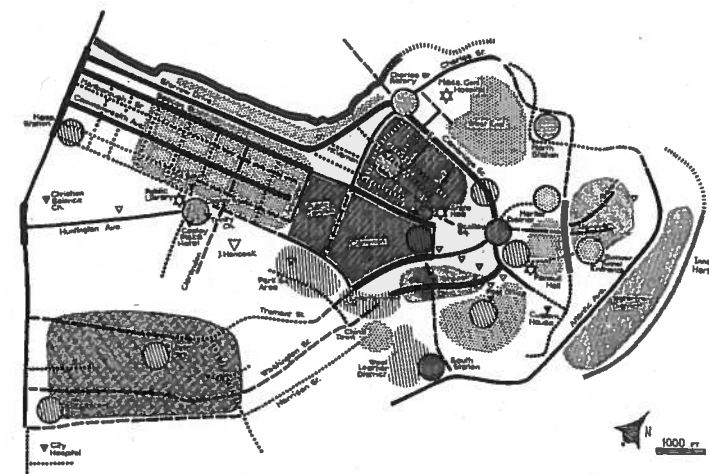
Richard Saul Wurman and to Edward Tufte, Yale University professor emeritus of information graphics and statics. Wurman offers a cognitive organization of geographic information, using mapping strategies as a means to understand urban information. In 1984, he established the famous TED conferences that brought together creative thinkers in the fields of technology information and design. Experts in the field of mapping visualization, including Hans Rosling (who became a regular at TED after 2003) and Stephan Van Dam, presented their research work at these conferences. Finally, the chapter considers Tufte's work and his lifetime goal of visualizing information. For Tufte, the act of arranging information ultimately becomes an act of insight.² His books on information graphics capture a wide range of audiences from the architect to individuals in data and information management. We will look at the recent and current work involving methods of drawing and mapping in order to solve or understand urban information.

Kevin Lynch

In 1960, Kevin John Lynch (1918–1984) profiled three American cities, Los Angeles, Boston and Jersey City, using surveys and diagrams as part of his method.³ He recruited subjects who were mainly middle-class professionals (planners, engineers, architects) and the general public who were familiar with their environment. He asked the subjects to draw sketches of their city based on memory. He identified common elements in these maps. He later defined appropriate symbols to represent these elements, and then synthesized the many subjects' maps into a "main map" for each city. In an attempt to understand the image of a city as it emerged in the perception of its users, Lynch analyzed each urban dweller's diagram of the city he or she inhabited. The notion of *imageability* of the city was very important to Lynch's theory. *Imageability* is the quality embodied in a physical object that gives it a high likelihood of generating a strong image within a given observer.⁴ How easy is it for the user to diagram his or her city? Is a city that is easily mapped a better city?

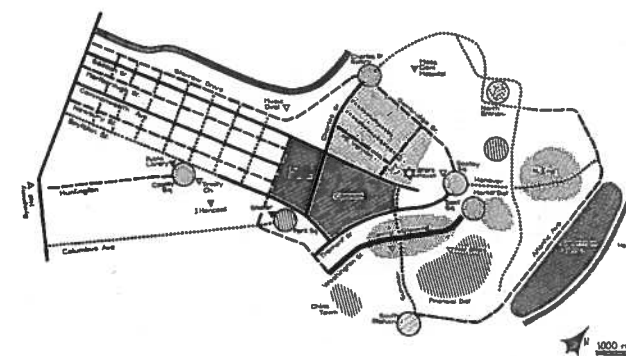
Lynch's office interview covered a series of questions.⁵ One main task was to draw a quick map of the city – in the case of Boston, the area inward or downtown from Massachusetts Avenue. The subject had to draw this map as if he or she were making a quick visual description (a rough sketch) of the city to a stranger, covering all the main features. The interview lasted approximately one and a half hours. As part of his method, the subjects "were taken out in the field to go through one of the earlier imaginary trips: that from Massachusetts General Hospital to South Station."⁶ Six standard trips were selected – to Commonwealth Avenue, the corner of Summer and Washington Streets, Scollay Square, the John Hancock Building, Louisburg Square, and the Public Garden.⁷ Also, Lynch selected five standard points of origin including the main entrance of the Massachusetts General Hospital, the Old North Church in the North End, the corner of Columbus Ave and Warren Street, the South Station, and Arlington Square.⁸ During the subjects' walking trips, an

accompanied interviewer (from Lynch's research team) asked the subject a series of questions which were recorded on a portable tape recorder. Figure 2.1 is Lynch's synthesized map of Boston as derived from the oral interviews. Figure 2.2 depicts Lynch's synthesized map of Boston derived from the sketch maps. Figure 2.1 (the oral depiction) includes more detail and information compared with that of Figure 2.2 (the subject sketch map synthesis). Major elements rarely appear in only one source. Generally, what is not given a visual representation was often referred to in oral terms (or textual notes from the subjects). This observation was most apparent in the case of the Jersey City drawings. The listing of distinctive features proved to have the highest flexibility of all the measures, excluding many elements that appeared on the sketches, which highlighted visual predominance. According to Lynch, well-defined streets are recognized by over 90 percent of the interviewed subjects.⁹



2.1
Lynch's mapping synthesis of the Boston image as derived from the subjects' oral interviews.

Source: Kevin Lynch, *The Image of the City*, p. 146, © 1960 Massachusetts Institute of Technology, by permission of the MIT Press



2.2
Lynch's mapping synthesis of the Boston image as derived from the subjects' sketch maps.

Source: Kevin Lynch, *The Image of the City*, p. 146, © 1960 Massachusetts Institute of Technology, by permission of the MIT Press

Ultimately, the subjects understood their surroundings in ways that are predictable and consistent and, in doing so, form mental maps, which contain five elements.¹⁰ "Paths" include the streets, sidewalks or other channels that people make use of in order to travel. "Edges" are the linear elements that are not used or considered as paths by observers. These include walls, buildings and shorelines and are perceived as boundaries. "Districts" are the medium to large sections of a city that are distinguished by a particular character or identity. "Nodes" are the focal points and intersections, which include junctions, crossings or convergence of paths as well as places where there is a transition. Finally, "landmarks" are objects that are readily identifiable and that serve as reference points for observers, such as buildings, signs, stores or mountains. Lynch found that paths, which are identifiable, continuous and have directional quality, were the most dominant city elements for most of the people who were interviewed. This prominence is linked to the concentration of special uses or activities along a street, as well as the extent to which special façade characteristics define a path's identity. However, their importance varied with the individual's degree of familiarity with the city.¹¹ Edges were stronger in Boston and Jersey City, which included the Charles River and the Hudson River respectively, and weaker in Los Angeles.¹² Though Boston possesses a number of differentiated districts, which people felt made up for the city's rather confusing path pattern, and Jersey City has ethnic and class districts that have little physical distinction, Los Angeles, aside from the Civic Center area, was found to be lacking in strong regions.¹³ Major transit stations as well as areas of thematic concentration, such as Pershing Square in Los Angeles and Louisburg Square in Boston, were identified as nodes.¹⁴ Landmarks were established by their spatial prominence, either by making the element visible from many locations, such as Boston's John Hancock Building or the Richfield Oil Building in Los Angeles, or by forming a contrast with elements located nearby.¹⁵

Spatial pattern

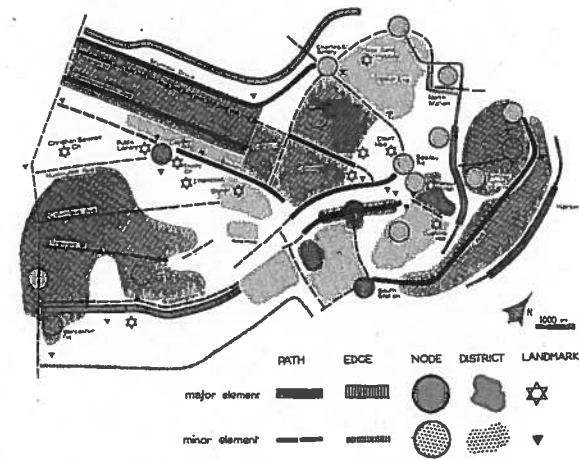
Lynch proposed that three components can be used in order to analyze environmental images. These were "identity," "structure" and "meaning." Identity involves the extent to which an object is recognized as a separate entity making it distinct from others. Structure is the spatial or pattern relation that the object has to other objects as well as the observer. Meaning is a relation, though different from spatial or pattern relation, that reflects the practical or emotional sentiment that the observer has for the object.¹⁶

Based on the results of his interviews and analyses of the sketches made by the subjects, Lynch redrew the maps based on the subjects' testimony. Figures 2.3, 2.4 and 2.5 are images that were derived in this way for Boston, Jersey City and Los Angeles respectively. The symbols created by Lynch were used to represent the same elements for each map. Lynch drew two sets of symbols for each element; one set depicted major elements and the other minor. A major path was represented

2.3

Lynch's mapping synthesis of Boston, depicting Boston's visual form as seen in the field. The symbols, devised by Lynch, represent the five elements: path, edge, node, district and landmark (as major or minor).

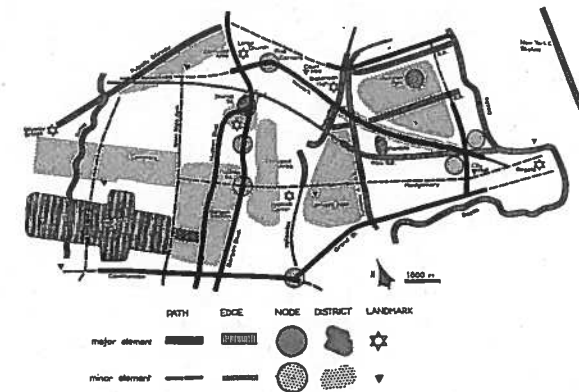
Source: Kevin Lynch, *The Image of the City*, p. 19, © 1960 Massachusetts Institute of Technology, by permission of the MIT Press



2.4

Lynch's mapping synthesis of Jersey City, depicting its visual form as seen in the field.

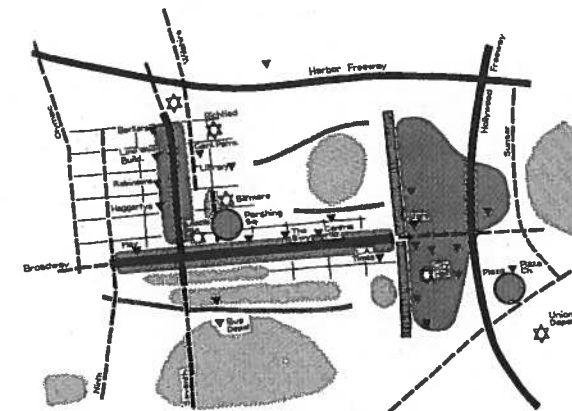
Source: Kevin Lynch, *The Image of the City*, p. 27, © 1960 Massachusetts Institute of Technology, by permission of the MIT Press



2.5

Lynch's mapping synthesis of Los Angeles, depicting its visual form as seen in the field.

Source: Kevin Lynch, *The Image of the City*, p. 33, © 1960 Massachusetts Institute of Technology, by permission of the MIT Press



by a thick black line, whereas thinner dashed black lines depicted minor paths. A thick band (framed by parallel thin lines and filled with a perpendicular line hatch) represented a major edge, whereas a similar thinner band (unframed) represented a minor edge. Nodes are usually represented by circles or asterisks. In this case, a major node is depicted by a hatched filled circle, while a minor node is depicted by a lighter dot-filled circle. An unframed hatch pattern (with the same intensity as the hatch pattern within the circle) symbolizes a major district. An unframed dotted pattern (with the same intensity as in the minor node circle) symbolizes a minor district. Six-pointed stars represent major landmarks, whereas inverted triangles (black filled) represent minor landmarks. For comparative purposes, the symbols used to demark paths, edges, nodes, districts, and landmarks are standardized in the images for all three cities of Boston, Jersey City and Los Angeles in Figures 2.3, 2.4 and 2.5. These images are Lynch's composites of the responses from many individuals. Lynch developed the symbols to represent each element. For example, the subjects drew lines to represent roads and other paths; quickly scribbled circles would represent points of interest or intersection; and an "X" or "*" would depict a landmark. Lynch stylized these symbols to represent the five elements he developed as criteria for the mental map composites. The same scale is also used for all three maps. The results of the field analysis for the Los Angeles and Boston areas proved to give precise predictions of the images derived from the oral interview material. Lynch's interviews were conducted to test his theory of *imageability* to gain an approximation to the public images of Boston, Jersey City and Los Angeles, and to develop a quick method for extracting or drawing out the public image of any given city.¹⁷

In total, paths, edges, districts, nodes and landmarks are the building blocks used to make firm and differentiated visual structures within the urban environment.¹⁸ Lynch believed they are elements by which the city is conceived. A gathering of people in a plaza or square forms a node. Districts are created by neighborhoods, parks or areas. "Every city has its intimate inner pattern: the streets, squares, and other openings that make buildings accessible and livable."¹⁹ This, of course, suggests a number of things about how each of these elements can be utilized, and the relations between elements, as well as how people perceive each of the three subject cities. For example, significant aspects of paths include the visual hierarchy of streets and routes as well as clarity of direction in the line of motion.²⁰ Also, landmarks do not necessarily have to be large objects, but their locations are crucial. More specifically, if a landmark is large or tall, then the spatial setting must allow people to see it, whereas if it is small, then it is important that certain zones, such as floor surfaces or nearby façades, at or slightly below eye-level, allow it to receive more perceptual attention than other objects.²¹

In general, these elements act both independently and in combination. Paths consist of any horizontal physical line of movement. In diagrams, roads are often expressed as simple lines or curves when describing a city. A route is one of the easiest entities to reference visually. Edges can be further defined as barriers between one section of the city and another, such as shorelines, walls, or edges of

different developments. Usually the urban dweller does not represent this type of element as often as roads when describing the city. A road is one of the simplest and most easily recognizable elements to express visual character in the form of diagrams. Districts are identified as large areas with common characters or features, such as Central Park in New York or the Yorkville area in Toronto. Districts are often mapped as blobs or shaded rectangular spaces, and are usually framed or defined by edges. Nodes are often visually expressed as circles, dots or asterisks. The common city dweller does not usually express this type of information as readily as an urban designer. Architects or urban designers used the node as a means to represent a point of change, interest, intensity or junction. Furthermore, landscape features of the cities, such as water or vegetation, were often noted with pleasure and care.²² This is how Lynch's subjects chose to represent such features in their own maps, as opposed to the standard symbols that Lynch himself adopted, as in Figure 2.3. Overall, this suggests something important about cities, and how people interact with these elements as well as with their urban form and planning:

We are continuously engaged in the attempt to organize our surroundings, to structure and identify them. Various environments are more or less amenable to such treatment. When reshaping cities it should be possible to give them a form which facilitates these organizing efforts rather than frustrates them.²³

A large part of Lynch's theory is rooted in the apparent visual quality or "legibility" of the cityscape.²⁴ What is the overall pattern of the city? How easily can this pattern be mapped? These are some of the concerns that shaped Lynch's theory of urban form. Visual sensations such as color, shapes, lights, size and scale are all components for orientation. As parts of a wayfinding system, these visual cues are critical components in the *imageability* of the city. This almost becomes a way for understanding the structure of the city and the development of an environmental image (a person's own image of the city). What are a person's immediate responses to, or thoughts of past experiences of this place? The need to familiarize and map our surroundings is crucial and has such long roots in the past that this environmental image has "practical and emotional" importance to the individual.²⁵ This notion is a strong part of Lynch's theory and research. Lynch was interested in the functional and practical aspects of the mental representation.²⁶ This concept of "imageability" also referred to the capacity of urban elements to imprint the observers' mental map with a vivid image.²⁷ The identity or cultural significance of the image was not the main focus of Lynch's investigation.²⁸

How an individual perceives his/her city can be mapped as a mental image. Cities that can generate clear notions of landmarks, edges, districts, paths and nodes can be diagrammed with appropriate symbols. In Lynch's research, the idea of mental mapping derives from how his subject perceives the cities using mapping as a technique to describe their perceptions. One of Lynch's primary concerns is with

peoples' perception and understanding of their city's form, as well as what this form actually means to them at a practical level. In the creation of the simple plan view maps, Lynch clearly defined these key five elements that "made-up" the city. The circles, the asterisks, the stars, thick line versus thin line to demarcate primary and secondary elements – these markings become part of Lynch's stylistic and communicative measures in depicting these elements.

However, Lynch's "static" diagrams/maps fail to address issues of urban flux, i.e. circulation patterns (vehicular and pedestrian), circulation volume, crime indices and other changing social and demographic parameters. These are other influences that affect *imageability*. Though Lynch touches upon these issues, they are not a prime concern in his research. As part of the sketch surveys of the cities, Lynch found that many of his subjects mapped Los Angeles easily due to its grid system. The Los Angeles grid provided an automatic alignment between downtown streets. It was easy to draw such a basic pattern in a sketch map. Two-thirds of his subjects drew this feature first before adding any other elements.²⁹ In a later survey taken in New York, respondents would draw a grid system of the road network first before adding in any other elements or buildings. New York City's grid pattern is a powerful image that a person recognizes when he or she thinks of this city. People's perception or constructed image of the city, according to Lynch, is based on the Gestalt principles of cognitive organization, which takes fragments or parts of the city and organizes them in a hierarchy of configurations and remembered experiences.³⁰ Overall, Lynch found that the way that an individual perceives the city results from an interactive process.

Cognitive mapping

More specifically, perception is based upon what the observer sees and how he or she interprets and analyzes their city. What captures their attention? Do any of the elements within the city evoke an emotional response? Forming this mental image is the process of mental mapping or cognitive mapping. A person's perception of their city or a specific place can be described as a mental map. A mental map is an individual's own map of their known city. Mental maps of individuals can be investigated by asking specific questions based on qualitative reference. During Lynch's experiments, in which he asked people specific questions about their lived environment, he would ask individuals for directions to a landmark or some other location, and ask the person to draw a sketch map of their city or parts of their city, in addition to what they recalled. A central issue that Lynch examined was how people organize or structure their surroundings mentally as well as how they begin to identify them visually. His research examined the visual quality of the city. This reflects the ease with which its parts can be recognized and can be organized into a coherent pattern. The objective organization is the physical geometry and structural pattern of the city. These are some of the concerns that form part of his research and theory of urban form. New York City's structural pattern is based on

a grid system with Central Park located in the middle of the city. This park is a landmark for the city. Other key landmarks (such as The Empire State Building), key paths or roads (such as 5th Avenue), districts (such as Upper East Side) and nodes (such as Times Square) are the physical elements or the objects of the city that collectively help define the city as a visual whole. By this I mean these objects become the urban ingredients through which one understands or begins to perceive the city as a subject matter and create a mental image of the place. How are the elements of the city positioned, and what is their spatial hierarchy? Answers to these questions play a vital role in an individual's perception of the city. These questions become the potential framework for an image of the city. Respondents begin to associate major landmarks in the city as points of reference, e.g. the Charles River in Boston. For example, many tourists visiting the city of Toronto use the CN Tower as a reference point for navigation in the downtown area. Lynch claims that his experiments, summarized in his book *The Image of the City*, have to do with

the look of cities, and whether this look is of any importance, and whether it can be changed. The urban landscape, among its many roles, is something to be seen, to be remembered, and to delight in. . . . Looking at cities can give a special pleasure, however commonplace the sight may be. Like a piece of architecture, the city is a construction in space, but of a vast scale, . . . perceived only in the course of long spans of time. . . . Nothing is experienced by itself, but always in relation to its surroundings, the sequences of events leading up to it, the memory of past experiences. . . . Every citizen has had long associations with some part of his city, and his image is soaked in memories and meanings.³¹

Referring to Gestalt principles of perception, the viewer is able to retain fragmented images of the city. Usually these elements become predominant within the image of a city, such as notable landmarks or key nodes. In general, Lynch used two key methods to explore the basic concept of *imageability*. One of these was the interview process, which used a small group of citizens with some regard to their view of their environment. The second looked at a systematic "examination of the environmental image evoked in trained observers in the field."³² According to Lynch, a city that can be easily mapped is a good city. However, as within any type of mapping system, there is some level of abstraction.

Lynch's own maps synthesized from the drawings of many respondents were not precise nor were they a true representation of reality. They were created by eliminating, reducing, arranging, rearranging, adding and subtracting parts. However distorted the maps, the images remained broadly true to the topology of the city.³³ There is a complex set of relations between three entities: the city itself; a Lynch-type map of the city made by an individual; and that individual's mental image of the

city. The individual's mental images are of course different from the city itself. As mentioned previously, the mental image is an interpretation of the city; it will abstract, neglect, select and symbolize, in essence distorting reality. The real maps made by Lynch's respondents seemed stretched, with roads twisted or pulled, often changed in scale, but the sequence of road layouts was usually correct. It seems as though the road order was a permanent fixture in the mind of these individuals. Sometimes individuals formulated strong mental images of buildings that included color, shape, form and material, and at other times building images were abstract and noted by their relative location on a street. Some mental images could be described by their structural organization. Some elements seemed to stand alone with gaps and disconnected elements. This usually involved disjointed places, places that stood alone, such as predominant landmarks. In other drawings, some elements were in juxtaposition to each other. Some images included landmarks that were placed in close proximity to each other while other drawings described landmarks on a relative path. But mostly the image of the urban structure (the physical layout of the city) was quite flexible. Elements were linked as if by rubber bands. For example, a park might be connected to the corner store, which is connected to the main street, which, in turn, is connected to the school – creating a number of focal points along the way. When the urban form becomes in reality more organized and buildings become interconnected, then the image structure becomes more firm. When streets are well connected with other paths to plazas and districts, and when a node is clearly defined (whether it be surrounded by key buildings or a tree-lined space or plaza), then the mental image is easier to develop.

The Lynch map is an attempt to capture the mental image. He basically polished the results from his subjects and redrew the maps with clear symbols to represent major and minor elements. These drawings, which were rendered more neatly and clearly than the ones composed by the subjects directly, would then be used for his book. As such, even the Lynch-type map (the redrawn map) differs from the reality of the mental image, which in turn, differs from the reality of the actual city itself. And of course, the Lynch-type maps differ from a conventional map of the same area. His subjects would tend to jot down what they remembered in the layout of the city, more specifically the layout's hierarchy of importance. They omitted the less important things. If, for example, there are two major paths leading to a distinctive landmark only one may be drawn. One path is clearly more valuable (to the subject/observer) than the other and the second is therefore omitted from the map. A conventional map is highly detailed and also selects and emphasizes city layouts. Obviously, given lack of time, drawing skills and detailed mental recollection, the interviewee cannot draw a fully detailed map. Priority is given to key elements that are highlighted in the subject's brain. These elements may be places that the individual sees or has experienced repeatedly, for example the subject always takes one path rather than another to get to the same destination.

The sketches provide a visual survey. They convey a subjective picture of the general character of the area but are directed by Lynch towards identifying:

- those visual qualities thought to be valuable and worth conserving;
- those qualities thought undesirable, which require changing;
- those qualities which are changing, and whether that is for the better or worse;
- those qualities which are most vulnerable to change;
- an overall exposure of distinctive features of the city.

Lynch found visual character to be linked to other sensory qualities of a place that people live in and use, and to a set of journeys by which those people move through the area, and experience it. With Lynch's method, the survey sketch maps did not use quantitative data but rather qualitative data experienced by the interviewee. Many of the sketches presented a much more intuitive level of drawing.³⁴ In general, the subject divided the elements into categories of major or minor significance. Major elements are those that were quite vivid, and the individual would ask himself why this element was strong or weak in identity. The observer also looked at the types of elements, how they were put together, and what gave them a strong identity. Another objective was to create a method or technique for a visual analysis of a city, which could predict the possible public image of the city as well as other characteristics or qualities. For urban designers, Lynch's innovative use of graphic notation to link abstract ideas of urban structure with human perceptual experience liberated them from the previous strictness of the physical master plan. Lynch's research helped to establish a tool for better urban design and normative design practice. By using the subjects' mental maps as a means to reveal the city's pattern or lack of it, these maps exposed the imperfection of the city's urban structure or one might say the lack of a well-defined urban design. The maps established an analytical tool to scrutinize the city's urban form. Lynch is also concerned with how we locate ourselves within the city, and how we find our way around the city. To know where we are within the city requires the individual to build up a workable image of each part.³⁵ Each of these images will comprise the subject's recognition of its "individuality or oneness" within the city as a whole; the subject's recognition of its spatial or pattern relationships to other parts of the city; and its meaning (both practical and emotional) for each subject/observer.³⁶

Much of Lynch's analysis focuses around one fundamental question; namely "What makes a good city?" Interestingly enough, a number of years later, Lynch acknowledged why this might seem to be an unanswerable question. "Cities are too complicated, too far beyond our control, and affect too many people, who are subject to too many cultural variations, to permit any rational answer. Cities, like continents, are simply huge facts of nature, to which we must adapt."³⁷ But there have been many attempts in the past to document this complexity visually, whether by mapping or diagramming. What Lynch tried to do was to attempt to understand the city's form and organization through his categorized elements of paths, edges, districts, nodes, and landmarks, as well as how people understand these elements visually and mentally. These elements become determinants of the image of the city. "There seems to be a public image of any given city which is the overlap of many

individual images. Or perhaps there is a series of public images, each held by some significant number of citizens."³⁸ These images are important for recognizing people's perceptions of the city that they inhabit. This perception is closely linked to people's understanding of their city. Lynch also helped visually show this through the simple markings and diagrammatic notations that identified these elements to the common viewer.

Lynch also believed that the idea of drawing attention to the question of what makes a good city was significant for other reasons:

Decisions about urban policy, or the allocation of resources, or where to move, or how to build something, *must* use norms about good and bad. Short-range or long-range, broad or selfish, implicit or explicit, values are an inevitable ingredient of decision. Without some sense of the better, any action is perverse. When values lie unexamined, they are dangerous.³⁹

Essentially, answering the basic question of what makes a good city not only results in an assessment of urban form and structure, but also reveals the values that underlie this particular process of assessment. Though values are an inevitable part of decision-making, there is also a need to understand and express such values. In this respect, the seemingly simple question of what makes a good city can be clearly linked to a great deal of significance as well as complexity. But Lynch also showed that this is definitely a question worth asking.

Richard Saul Wurman

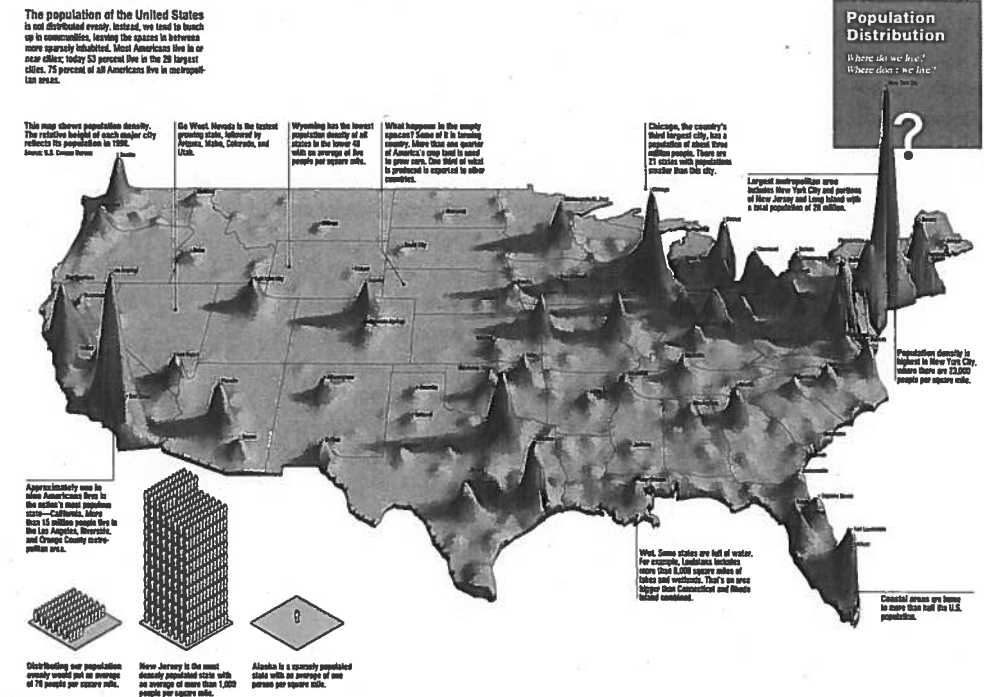
Among individuals who have attempted to display urban information in a visual form, it is difficult to ignore the figure of Richard Saul Wurman (1936-) and his contributions to this area of work. As an architect, academic and graphic designer, he has spent most of his life solving urban problems through visual means and has continually displayed a passion for communicating visual information clearly.⁴⁰ Much like Lynch, Wurman finds the mapping process as a means to visually help understand elements and factors of the city. He is probably best known for his *Access* book series, such as *NYC Access* and *London Access*, where he claims to have developed easy-to-follow visual guides to those cities. In 1991, Wurman received the Kevin Lynch Award from MIT for his creation of the *Access* guides.⁴¹ Wurman's publication *Understanding USA*, which is also accessible on the internet, was developed from his journey towards understanding urban issues or, more specifically, urban data.⁴² In this work Wurman, for example, expresses population density across the USA, showing that NYC and LA are the two most populous cities, and other cities along the coast have more population than the interior states (Figure 2.6). He carefully portrays this urban data in a method that ordinary people, as well as professionals

such as architects, can easily comprehend. His computer-generated and digitally altered images stand as both works of art and visual instruments intended to guide the viewer into the country's unacknowledged urban issues. The map was created using the 1990 US Census data loaded into MapInfo GIS software as a base. Wurman and his team produced a grayscale of this map. "Light tones represented high populations and dark values sparse populations."⁴³ The team then converted the grayscale image into a 3D model using FormZ (3D modeling software). The team applied image modification touch-ups using Adobe Photoshop and drew state boundary lines and city labels using Adobe Illustrator. Wurman's team applies digital artistry to make the map not only an informative image but an artistic one. A great deal of Wurman's work has focused and built upon issues that relate to disorientation, or the unknown that he has encountered in his own life.⁴⁴ He creates maps to reveal things he otherwise did not know previously.

Understanding USA is filled with public information about the USA, from population density to health funding. Wurman has made this publication available on his website.⁴⁵ In a more general sense, his ideas stemmed from a very important force and dealt with a significant, yet fundamental, question: How could he make America more understandable to Americans? Public information deals with everything that

2.6 Richard Saul Wurman's map of the USA's population density (map drawn by Don Moyer, art direction by RSW).

Source: Richard Saul Wurman, Reed Agnew and Don Moyer, "Population and Becoming President," Richard Saul Wurman, *Understanding USA*, (2006) <http://www.understandingusa.com/>



we agree should be available to the political body, but making information public is somewhat less common, and difficult to achieve.⁴⁶ For information to be public it must be presented and structured in a way that is accessible and understandable to the public. Wurman takes information and attempts to make it more understandable for the public through visuals, such as diagrams or maps. His work also reflects on the concept of "information anxiety." Information anxiety is caused by the gap between what we understand and what we think we should understand. This gap is constantly widening. In short, it is the black hole that exists between data and knowledge and it occurs when information does not tell us what we want to know or what we need to know.⁴⁷ However, information is largely used to make decisions with the hope of succeeding.⁴⁸ Hence, overcoming information anxiety is crucial to the promotion of understanding. "To Wurman, content design is about creating understanding."⁴⁹

Even though we are surrounded by information which impinges with various degrees of immediacy in our lives, these degrees can be roughly divided – according to Wurman – into five rings. The first of these is *internal information* (the messages that run our internal systems and enable our bodies to function). Although we are most affected by this level of information, we have the least control over it. Successive levels include *conversational information* (formal and informal exchanges and conversations that we have with people around us); *reference information* (information that runs the systems of our world, such as science and technology, and the reference materials that we turn to in our daily lives, such as textbooks or telephone books); *news information* (information that is transmitted by the media about people, places and events that might not directly affect our lives but that can influence our view of the world); and *cultural information* (information about history, philosophy and the arts, which is the least quantifiable form of information).⁵⁰

With his creation of the TED (Technology Entertainment and Design) conferences, in 1984, Wurman in a way, has continually tried to look at communicative methods (maps) through new technologies, graphics and design to bring forth the "unknowns." These conferences have become vehicles to disseminate information through graphical means and have been described as a global community of remarkable people and remarkable ideas. The conferences gather individuals with a similar mission, namely the goal of making information available through new technologies and visual means.

Clearly, Wurman's work reveals that he, like Lynch, believes that urban information needs to be mapped in some visual form. Wurman met Lynch once and shares Lynch's premise of understanding information about urban conditions and making sense of them through visual documentation, i.e. mapping. Furthermore, Wurman feels that most urban information has not been presented in the past in the form of detailed maps that guide the individual to specific answers. In a direct response to this, a group of individuals, whom Wurman calls *information architects*, act to make life forces more understandable. Wurman coined the term in 1976 in reaction to a society that had reached the point of creating massive amounts

of information but with little care for or order in dealing with such information. Wurman's *Access* travel guidebooks firmly established his role and responsibility as an information architect.⁵¹ Wurman has also examined how to make information less threatening.

At its most fundamental level, the main issue that concerns Wurman is how can you empower your audience to use the information you provide them? How are you going to show information? When communicating information we do not always know that the picture in our head is the same as the pictures in other people's heads. When we instruct people, we hope that the image in their head is the same as ours, but this is not always the case. A good map can instruct people. Wurman lists three means of description: words or text, images and numbers. Generally, the best instructions are dependent on all three, but in some situations one should predominate, while the other two support. The key to providing good instructions lies in the ability to select the appropriate means.⁵² Individuals are always seeking intelligent means to exchange information. Also, mapping information through images is a creative way of conveying information visually, especially if this information pertains to or is related to urban conditions or forces. In general, a map provides people with the means to share the perceptions of others; they are the metaphoric means and the tools by which we can understand and act upon information from outside sources.⁵³

In conversations with Wurman,⁵⁴ several questions arose about his mapping viewpoints:

Nadia Amoroso (NA): How are your city guides organized and visually presented?

Richard Saul Wurman (RSW): Every city is different, of course. Therefore, every city is treated differently. I establish the city limits based on the core of interest. Where is the heart of that city? I erase the legal city limits and create my own based on my own experiences, and what I believe are the places of interest. My guides are therefore very personal, and created through an intuitive approach. It is ironic. I rarely receive public feedback, and my guides are designed in the first place for myself. They are personal guides, which in turn, I produce for the public. The popularity of these guides and the large number of people buying them and using them is good to know and a compliment.

NA: What makes your guides more attractive than others on the market?

RSW: My guides are simple to use, easy to navigate, as though "the guides talk to you." I did not like any of the guides out on the market at that point. They were difficult to follow and did not work for me personally. I use good judgment to produce good maps. A change in page is a smooth transition from one area to another. The *Access* guides of Tokyo, Paris, London, Rome and New York City are my best works. The *Tokyo Access* is definitely drawn from my personal experience. I use the Imperial Palace as my reference point for orientation. In my *New York Access* guide, I focus on Manhattan rather than the other Boroughs of the city. I also exclude Harlem, claiming that not many

individuals like tourists visit that area. For *Hawaii Access*, I create a map for the five islands. In the *Rome Access* guide, I draw maps for individual regions including "along the Tiber, the Spanish Steps, Ancient Rome, the Vatican City and the Borgo, Piazza Navona, etc." My architectural background is a great asset to these *Access* guides. The buildings on the plan are drawn in 3D (extruded plan). The architectural history, design and creation of the places and the building are in great detail compared to other commercial guide books. I follow my interest, and maps help me understand things I once did not know. My *Access* guide maps were a special interest of mine. Always follow your interests; your work will be much more personal and stronger at the end.

NA: Your passion for architecture is clearly evident in your *Access* guide books. Do you follow or create a set of principles of making information – especially spatial and urban information – more accessible and comprehensible? Can you briefly comment on your mapping abstraction, about what you omit and what you include, about color, about exaggeration, and about how symbols work and don't work?

RSW: As part of my mapping principles, I use different colors to refer to different categories. For example, hotels may be marked in purple whereas open spaces and parks may be marked in green. This is a very important point. "When and why" to use different colors are critical issues in mapping information visually. Many cartographers are incorrect in their use of color. Cartographers have had it wrong. They use different colors to represent the same category such as temperature change. In a weather map, for example, high temperature readings are usually colored in red, which is fine. However, higher temperatures should still be shown in red but in richer intensities. Lower temperature readings should be rendered using the same color but with a moderate to lighter intensity such as lighter shade of red. Often a blue is used, which is wrong. Different colors should only express different categories. For example, the popular USA weather maps that are found in *USA Today* and many other American newspapers have many colors to represent temperature ranges across the states. For the summer months, extreme hot temperatures are colored in red; milder temperatures are marked in orange; and cooler temperatures are marked in yellow. The map should use just red (or some other color) in different shades. The same color will allow people to understand that the same type of information is repeated. This principle should be applied for maps representing population density and others. One color should be used throughout; various degrees of color intensity can symbolize more or less populous areas. Also another principle that contributes to making my guides successful is that not all information is crammed into one map. Putting everything in one map can make things too complex to understand. You want clarification. I use only the required information. The less information expressed, the more understandable it is for individuals. In creating a map, I use a pattern that is easy to understand and "visually pleasing" to read. My

maps are personal guides, directing individuals to the points of interest of the city.

Wurman argues:

You cannot perceive anything without a map. A map provides people with the means to share in the perceptions of others. It is a pattern made understandable; it is a rigorous, accountable form that follows implicit principles, rules and measures. Maps provide the comfort of knowing in that they orient us to the reality of place.⁵⁵

Wurman's work also reflects a particular approach or outlook. He maintains that people hunt for information in terms of its nature or topic, not by its alphabetical listing. With this in mind, it is not surprising to find that *USAAtlas*, another popular Wurman publication, follows this logic. People travel by car geographically, not alphabetically. For this reason, adjacent states are placed on adjacent pages. Furthermore, pages have driving time/distance grids.⁵⁶ This is not unusual; of course, many other map books apply this principle. Wurman also notes that the discovery of a structure makes accessibility possible.⁵⁷ But real and meaningful knowledge of almost anything is only useful when it is taken in relation to something else that we know.⁵⁸ This idea is captured in what Wurman refers to as "Wurman's First Law": "You can only understand something new relative to something you already understand."⁵⁹ At the same time, dividing a subject into understandable parts can be used to conquer its complexity, and this is particularly true if the parts are enhanced by the structure of the design.⁶⁰

Wurman also claims that maps can be metaphors – tools that can allow the individual to perceive information in a different way. "Maps are the metaphoric means by which we can understand and act upon information from outside sources."⁶¹ For example, air-pollution maps can be depicted using smoke or fog-like analogies. "Mapping implies systems of ordering and surveying, of creating correspondence, pattern and place and is a powerful form of symbol making. The map is also a metaphor for journey, and for locating ourselves in the interstices of time and space."⁶² Maps can also take many different forms. For example, a CAT scan is a map of the human body whereas a GPS system may mark the individual's personal destination. Furthermore, ideas and concepts as well as physical places can be mapped.⁶³ They provide a visual means or a pattern that is made understandable. Maps provide the comfort of knowing in that they orient us to the reality of a place.⁶⁴ Maps have also been associated with representing visually the "invisible" elements of the city.⁶⁵ These include factors that are part of the city's environment, but not specially tangible elements such as a road or a building. Some examples of the "invisible" elements include population density, economic indicators of the city, and pollution readings. Throughout history, maps have been associated with power and politics, whether they depicted military sites, the location of hidden treasure,

hunting grounds or trade routes; maps give the viewer a sense of perception and perspective on the information they are trying to disseminate. Comparable maps allow the viewer to draw different information from various sources, such as cities drawn at comparable scales. Figure-ground maps, first well-conceived in the 1748 Nolli map of Rome (by Giambattista Nolli), are a great means of visual comparison for cities, if drawn at the same scale. The figure-ground drawing is a simple black and white drawing, in which the footprints of buildings are blocked in black and everything else (streets and open spaces) remain white on the paper (or vice-versa).

Underlying this is an understanding of the ways that information can be organized. These ways are infinite and information can be organized by category (e.g. goods in a retail store that are organized by different types), time, location, or alphabetically.⁶⁶ Examples of time organization include organization based on events that happen over a fixed duration, such as presentations in museums. Examples of location include organization of information that comes from diverse sources or locales, such as the distribution of industries around the world or the different locations in the body in the study of medicine. When referring to the alphabet, examples of organization may be based on the twenty-six letters, which is an intelligent way for organizing large bodies of information, such as words in a dictionary. An atlas may have an overall organization by category, such as by type of map (e.g. city or regional) whereas information within these sections may be organized on the basis of location.⁶⁷ Though the traditional format for guidebooks involves a division of neat categories, such as restaurants, hotels and stores, each with their own chapter, Wurman's guides do not contain restaurants in one section and hotels in another section, but rather they are ordered by district. Consequently, these details in Wurman's *Access* guidebooks are jumbled together and divided by neighborhoods, which is the way cities are laid out and experienced. In this respect, the guidebooks are an attempt to mirror cities and to capture the fabric of urban life.⁶⁸

Maps as the source to discovery

Wurman has maintained that his main struggle has been to discover the road or the pattern that leads to memory. A map is a visual document that "maps out" his journey to discovery:

The junctures of road to road and path to path celebrate that connection. That connection is learning, and learning is remembering what you are interested in. The delight of trivia that touches on curiosity, which is the *Velcro* of learning, makes me smile. The quality of my work depends especially on the many wonderful individuals who make my thoughts and ideas even better.⁶⁹

In a more general sense, Wurman's work reveals his commitment to filling the empty buckets of ignorance with things he understands.⁷⁰ Thoughtful and

effective management and presentation of information, which includes an understanding of how information can be organized as well as how additional knowledge can build on what is already known, can go a long way towards dealing with the issues of ignorance as well as information anxiety.

Wurman definitely shaped the notion of mapping and the visual portrayal of information throughout the latter half of the twentieth century. His passion for making information understandable and exposing the invisibles of the city was inaugurated in his first book at the age of 26, *Cities: A Comparison of Form and Scale* (1963) and later in *Making the City Observable* (1971). He has made a significant contribution to the field of design, technology and information understandable through his TED conferences. He is interested in using maps not only to understand cities but for all kinds of information, from healthcare, to business relationships, to processes, to city typologies. His work has influenced many individuals in the field of visual representation and design as it relates to urban mapping and understanding information. This can be seen in the mapping visualization works of Joel Katz, Stephan Van Dam, Massimo Vignelli, and Don Moyer, to name a few.⁷¹

He still continues to push to the forefront urban issues in some kind of mapping form, with the collaboration of leading architects and cartographers in the fields. The next major project Wurman is producing involves mapping at a new level – the 19.20.21 project, which examines 19 cities in the world with populations over 20 million in the 21st century:

While some say the world is flat, supercities are rising – vast, intensely urban hubs will radically redefine the world's future macroeconomic and cultural landscape. Most of the world's population right now lives and works in cities . . . the rise of supercities is defining megatrends of the 21st century. . . . No two cities in the world, or even cities within the same country, ask the same questions that result in the data that describes themselves. . . . In 1800, less than 3% of the world lived in cities . . . today more than half the people on earth now live in cities. . . . By 2050, it will be more the two-thirds of us.⁷²

It is important to understand cities. The 19.20.21 project will focus on globalization patterns and explanations that will become key tools for mapping and understanding our future city. This global mapping project focuses on visually portraying key urban issues through web, publication and media sources. This would be one of Wurman's newest mapping endeavors. For more information on this latest work, please visit www.192021.org.

Edward Tufte

Like Wurman, Edward Tufte (1942–) is a key figure in advocating the importance of visually communicating information in a truthful and telling manner. For Tufte, the act of arranging information ultimately becomes an act of insight.⁷³ According to him, "what we see is always what we get," meaning that individuals comprehend images at face value. Therefore, what you see should be clear and understandable. Tufte has made the visual representation of information his life's work. Furthermore, he believes that the packaging of information is something that ultimately determines how much is accepted and used by other individuals.⁷⁴ He maintains therefore that a major goal for creators of graphical displays should be the achievement of graphical excellence and the promotion of graphical integrity. "The world is complex, dynamic, multi-dimensional; the paper is static, flat. How are we to represent the rich visual world of experience and measurement on mere flatland?"⁷⁵

Information graphics: the principles

Tufte believes that graphical displays should show the data; encourage the viewer to think about the substance rather than methodology, graphic design or something else; avoid distorting what is being communicated by the data; make large data sets coherent; and present the data at several levels of detail, ranging from fine structure to a broad overview. Furthermore, graphical displays should serve a purpose, such as description, or exploration that is reasonably clear to the user.⁷⁶ Overall, Tufte regards graphical excellence, which is a matter of substance, statistics and design, as the well-designed presentation of interesting data. It consists of presenting complex ideas with clarity, precision and efficiency while always telling the truth about the data.⁷⁷ In addition to these principles, Tufte believes that graphical excellence should give the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space.⁷⁸ It should tell the truth about the data it tries to portray visually.

Graphical integrity is maintained when the visual representation of the data is consistent with the numerical representation.⁷⁹ If not, then Tufte suggests that some form of graphic misrepresentation is likely to have occurred.⁸⁰ He claims that two main principles aim towards the individual perceiving the correct information through proper visual communication, and hence leading towards graphical integrity. The first principle is that: "The representation of numbers, as physically measured on the surface of the graphic itself, should be directly proportional to the numerical quantities represented."⁸¹ The relative size of the symbol is critical. Size applies to all dimensions involved. For example, circles may be used to represent the populations of cities, such that the diameter of each circle is proportional to population. But when we look at circles, we tend to read their "sizes" by the area (two-dimensional) and not by the diameter which is one-dimensional. As the diameters are increased linearly, the areas of the circles increase by the squares of the radii, hence at a much

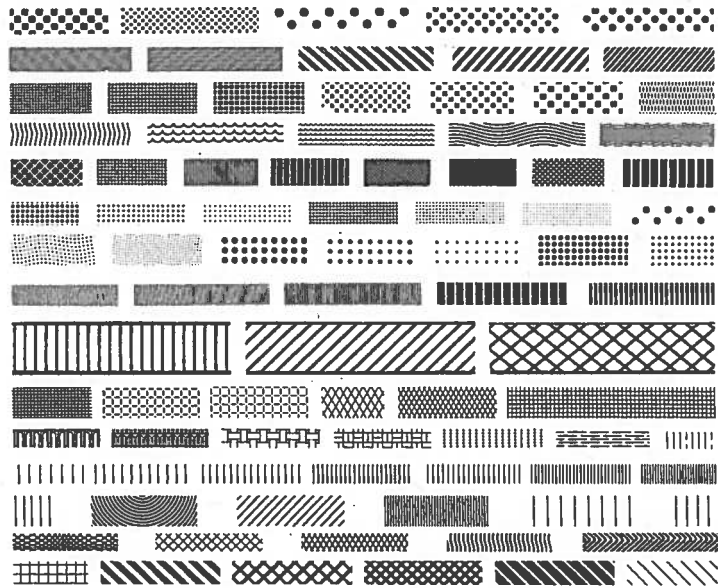
faster rate. Thus the larger circles visually exaggerate the relative population sizes of the bigger cities. If circles are to be used, it would be much better to make the *areas* of the circles proportional to population. If the proportion is incorrect (larger or smaller) then the visual representation is presenting a lie, thus miscommunicating the correct data. The second principle is that: "The use of two (or three) varying dimensions to show one-dimensional data is a weak and inefficient technique, capable of handling only very small data sets, often with error in design and ambiguity in perception."⁸² Using Tufte's principles, lines (one-dimensional) that are drawn in proportion to size of population (one-dimensional) may be a more appropriate way to depict this type of data. This may be true, but in exposing the hidden factors of the city, other measures should be examined. Should data be treated as space? How do you represent the spatial resultants of information (in particular the ones that affect our city structure)? How do we begin to register information as architects, landscape architects and city planners as spaces that have an influence on our design decisions? Tufte's principles in the case of exposing the forces that affect our city, should be taken at a fundamental level. We need to use modes of representation that architects and designers of the site can relate to, yet still hold true (as much as possible) the empirical value of the data. Perhaps the exaggeration of representing certain information may be the way to convince city planners of the parameters affecting our city, such as levels of crime, air quality, ozone levels, population settlements, etc.

All this sheds light on the possible sources of graphical integrity and sophistication as well as the various conditions that cause graphical mediocrity. Overall, a number of conditions may exist that can promote graphical mediocrity and result in the presentation of graphics that lie, make use of only the simplest designs, or fail to communicate what is contained in the data. This can perhaps be traced to the lack of skill of the illustrator, a dislike of quantitative evidence or contempt for the intelligence of the audience.

The "chartjunk"

We should not add decorative elements such as unnecessary hatching or borders or the incorrect use of multi-colors, as what Tufte calls "chartjunk" (Figure 2.7). There needs to be a careful balance between selecting the appropriate means in visually communicating information and the aesthetic means of portraying this information. In particular, when it comes down to exposing the hidden factors of the city, two-dimensional chart-like graphics are often not an appropriate choice to seduce your viewer. In the final chapter, we will look at the art and logic in exposing the hidden factors of the city through the use of multidimensional maps that resemble landscapes or spatial forms.

In his ideas about graphical integrity, Tufte agrees with Wurman's principles of portraying urban information correctly. Maps should not be cluttered with information. Not all data need to be included in the map. Maps should show a selective amount of information that needs to reveal particular answers. The effectiveness of



2.7
Samples of hatching patterns
causing moiré effects.

Source: Reprinted by permission,
Edward R. Tufte, *The Visual Display
of Quantitative Information* (second
edition 2001), Graphics Press LLC,
p. 111

the map is a consequence of this selectivity and the careful graphical integrity of the map. Tufte concurs with Wurman's principle that different colors should represent different categories and that a change in color intensity not a change in hue should be used to represent the same category of data. Tufte not only has a great deal to say about the significance of achieving graphical excellence as well as how graphical integrity can be promoted, but also he identifies graphs and maps as powerful tools for the presentation of complex information. However, this must be done in a manner that promotes clarity, correctness and coherence. This, of course, touches on the idea that while graphical images can be an excellent means of presenting information, this is not to say that all graphical images are capable of achieving this goal. Hence, not only should an effort be made to promote graphical excellence, but professionals and users must be aware of how and why graphical integrity might be compromised. This in turn emphasizes the importance of not only creating but also examining and assessing graphical displays with a critical eye.

Clearly the works of Kevin Lynch, Richard Saul Wurman and Edward Tufte reflect important similarities and differences. While all three are concerned about the information that can be presented through graphical images such as maps, both Wurman and Tufte focus a great deal of effort on how information might be communicated more effectively to users in order for them to better understand various topics of concern, such as cities. Lynch's seminal work dealt with the impressions that cities left on their inhabitants as well as what was revealed about these cities through what people communicated about them in their interviews and sketches.

However, all three of these theorists overlap in one important way when dealing with the topic of the role of visual representation in communicating information about cities. More specifically, diagrams and maps are indeed able to simplify the complexities of urban statistics, but they must always be used with a certain amount of care and caution.

Through his work, Lynch showed that maps and sketches were able to not only communicate rich information about cities, which likely would not have been available through oral or textual expression, but they also revealed something important about the quality of urban form. In his efforts, Wurman has been able to create more effective and meaningful maps for people and, in a more general sense, show how it is possible for "information architects" to reduce the "information anxiety" that people are more likely to experience in this day and age, which, of course, is something that has become a topic of increasing importance as computerization and other digital technologies have continued to create rapid growth and change. Tufte, who has also been identified as an "information architect," is involved with work that is more closely related to what Wurman has done, and continues to do. Through his series of books including *Envisioning Information*, *Visual Explanation* and *The Visual Display of Quantitative Information* he provides detailed analyses and instructions for creating maps and other graphical images that are more meaningful to users, by avoiding problems that relate to graphical integrity, such as the presentation of chartjunk.

Maps allow people to find their way and this fact allows mapmakers to communicate information to users about a particular topic or environment, which can often be unfamiliar and/or rather complex. In this respect, maps play a useful, if not vital, function in simplifying the understanding of complex urban changes through visual means. However, it is equally important to consider the complexity that is associated with maps, which not only relates to how they can be created and presented, but also how they are often, if not invariably, embedded within a broader social, political, cultural, geographic, technological and economic environment. This, of course, urges mapmakers and users to try to achieve a deeper understanding of what maps can and do say.

Lynch took the view that paths, edges, districts, nodes and (of course) landmarks constitute the building blocks from which a differentiated visual depiction of any urban space can be conceived. Beyond that, Lynch always maintained that each city has its own intimate inner pattern and that the five components determine the rhythm, hierarchy, and foci of the urban space; in other words, the best way to really "see" the city's true nature is by looking at these items and at how they are arranged – for these things will reveal much about local power dynamics, relationships between and amongst people and between and amongst different locations, and in what ways (in what directions) the city is evolving.

In many ways, Wurman is less rewarding to discuss than Lynch because he offers information and insight that is not particularly insightful. Be that as it may, he is correct to point out that maps exist to help people order information; furthermore,

they do provide three means – text, images and numbers – by which the artist can convey information to the uninformed. Needless to say, it is up to the artist or artist/cartographer to find the best means by which he or she can metaphorically communicate urban data. For his part, Tufte is adamant that maps should not be cluttered; this is wholly unacceptable in his view. Instead, he feels that data should be introduced selectively – it is not necessary to have a map that incorporates everything. The key is to devise a map that gives just enough information to answer certain pertinent questions.

While maps can deal with issues that relate to complexity they are also a source of their own complexity. Maps seemingly exist on many different levels and their visual representation can be influenced by many factors – including change over time. A mapping strategy to help simplify complexity could perhaps be that of layering and sorting intricate information through diagramming. Nonetheless, because of their multidimensional nature, maps which endeavor to illustrate longitudinal change or phenomena involving a number of different factors or variables will also be difficult things to make – and difficult things for people to understand.

The next chapter will examine the concept of “datascaping,” specifically that devised by Dutch architect Winy Maas of MVRDV, and will examine mapping as it enters new modes of visual representation using digital technology. The chapter further speculates on the positive contributions that digital visual expression has made in the realm of mapping urban phenomena, and visualizing information beyond portraying the existing conditions. The chapter will conclude with an interview with Winy Maas on the topic of his datascares and the future applications of the datascaping concepts.

Notes

- 1 Lynch, *The Image of the City*, p. 46.
- 2 Jensen, *Simplicity*, p. 140.
- 3 Three disparate cities of Boston, Jersey City and Los Angeles were chosen and a central area of about 2½ miles by 1½ miles was taken for the study. Thirty people were interviewed in Boston and fifteen each in Jersey City and Los Angeles for information such as descriptions, locations and sketches and also for the description of imaginary trips. Boston was selected because it was vivid in form and full of “locational” difficulties. Jersey City was selected because of its apparent formlessness and because, at first glance, it would appear to have a very low order of *imageability*. Finally, Los Angeles represents a new city that has a central area with a gridiron plan (Kevin Lynch, *The Image of the City*, pp. 14–15). The central peninsula within the line of Massachusetts Avenue, which because of its age, history and European flavor is rather unique among American cities, was the area of Boston that was selected for analysis. Though observers noted that their favorite views were often those across the Charles River, which with its bridges also made a strong edge, the city's image was characterized by confusions, floating points, breaks in continuity as well as a lack of character or differentiation (Lynch, *Image of the City*, pp. 16–25). Jersey City was defined by Journal Square, which is one of two main shopping centers, yet the maps sketched by the observers were often fragmented and contained large blank areas. Also, the city did

not have a defined center and was typically regarded as a collection of many hamlets. Furthermore, the most prominent symbol in this city was actually the sight of the New York skyline across the Hudson River (Lynch, *Image of the City*, pp. 25–29). The central business district and its fringes were examined in Los Angeles and observers regarded it as heavily charged with meaning and activity as well as having the basic pattern of a regular grid of streets (Lynch, *The Image of the City*, pp. 32–33). Descriptions of the city included references to the extent to which Los Angeles is spread out, spacious and formless (Lynch, *The Image of the City*, p. 40).

- 4 Lynch, *The Image of the City*, p. 9.
- 5 Refer to Appendix B, p. 141, Lynch, *The Image of the City* (1960).
- 6 *Ibid.*, p. 142.
- 7 *Ibid.*
- 8 *Ibid.*, p. 143.
- 9 *Ibid.*, p. 145.
- 10 Lynch, *The Image of the City*, pp. 47–48.
- 11 *Ibid.*, pp. 49–54.
- 12 *Ibid.*, p. 62.
- 13 *Ibid.*, pp. 66–67.
- 14 *Ibid.*, pp. 74–75.
- 15 *Ibid.*, p. 80.
- 16 *Ibid.*, p. 8.
- 17 *Ibid.*, p. 140.
- 18 *Ibid.*, p. 95.
- 19 Banerjee and Southworth, eds., *City Sense and City Design: Writings and Projects of Kevin Lynch*, p. 45.
- 20 Lynch, *The Image of the City*, p. 96.
- 21 *Ibid.*, p. 101.
- 22 *Ibid.*, p. 44.
- 23 *Ibid.*, p. 90. Quotation by Kevin Lynch.
- 24 *Ibid.*, p. 2. *Legibility* and *imageability* are sometimes used as interchangeable terms. *Legibility* deals with the ease with which the parts of the city or its whole can be recognized and can be organized into a coherent pattern.
- 25 *Ibid.*, p. 4.
- 26 Willem A. Sulsters, “Mental Mapping, Viewing the Urban Landscapes of the Mind” (conference paper) in www.tudelft.nl, p. 2.
- 27 *Ibid.*
- 28 *Ibid.*
- 29 Lynch, *Image of the City*, p. 57.
- 30 “Gestalt” is the German term for pattern, shape or configuration. The gestalt theory addresses issues of how we organize parts of our perceptual field and try to unify them as a meaningful whole. The whole vision is greater than the sum of the parts. (R. E. Smith. *Psychology*, p. 21).
- 31 See <http://libraries.mit.edu/archives/exhibits/lynch/index.html> for Lynch's thoughts.
- 32 Lynch, *The Image of the City*, p. 140. Some interview questions that Lynch used in the process were: What first comes to your mind? What symbolizes the word “Boston” for you? How would you broadly describe Boston in a physical sense? Draw a quick sketch map of central Boston, as though you were to describe the city to a stranger. Give complete and descriptive directions for the trip that you normally take going from home to where you work. Do you have emotional feelings about various parts of your trip? What are the most distinctive elements of central Boston to you? Other questions were asked. The interview process lasted about one and a half hours.
- 33 *Ibid.*, p. 87.

- 34 Trained observers (architects and planners) mapped the areas' presence, visibility, and the interrelations among the landmarks, nodes, paths, edges and the districts, and marked the strength and weakness of these elements.
- 35 Ibid., p. 115.
- 36 Ibid.
- 37 Kevin Lynch, *A Theory of Good City Form*, p. 1.
- 38 Lynch, *The Image of the City*, p. 46.
- 39 Lynch, *A Theory of Good City Form*, p. 1.
- 40 Bill Jensen, *Simplicity: The New Competitive Advantage in a World of More, Better, Faster*, p. 142.
- 41 Richard Saul Wurman, "Introduction" in *Richard Saul Wurman's UnderstandingUSA*, <http://www.understandingusa.com/wurman.html>.
- 42 Wurman claims his books are the products of the solution of the problems he wished to resolve, not really for the people but for himself. He shares this information through his publications (personal communication, 16 April 2006).
- 43 Wurman, "Population & Becoming President" in *UnderstandingUSA*, <http://www.understandingusa.com/chaptercc=3&cs=42.html>.
- 44 In 1980, Wurman moved to Los Angeles and after realizing that he was disoriented and unable to find his way around he decided to produce his own guidebook, which accessed everything he wanted to know about the city. The result was *LA Access* (Richard Saul Wurman, *Information Architects*, p. 28). Beginning with *LA Access*, *Access Guides* have been published for more than thirty cities. "The book *Medical Access*, which is about diagnostic tests and surgical procedures, explains 32 common surgical procedures using a system of anatomical schematics on many layers. . . . The nature, preparation, procedure, and recovery stages of each operation are described on one tightly structured page. The book also answers common questions, explains 120 diagnostic tests, and shows an operating room." (Wurman, *Information Architects*, p. 29). The underlying reasons for doing *Medical Access* were similar for Wurman's reasons for doing *LA Access*. Wurman was due for a physical, but couldn't find any literature that could provide him with the appropriate questions to ask his doctor and any good medical illustrations. The photographs he found on the subject matter made him ill. *Medical Access* consists of three sections, which include diagnostic tests, surgical procedures as well as questions and answers (Wurman, *Information Architects*, p. 29).
- 45 Wurman, <http://www.understandingusa.com/>.
- 46 Wurman, *Information Anxiety2*, p. 139.
- 47 Wurman, *Information Anxiety*. New York: Doubleday, 1989, p. 34.
- 48 Thomas H. Davenport and Laurence Prusak, *Information Ecology: Mastering the Information and Knowledge Environment*. New York: Oxford University Press, 1997, pp. 116–117.
- 49 Bill Jensen, *Simplicity: The New Competitive Advantage in a World of More, Better, Faster*, p. 142.
- 50 Wurman, *Information Anxiety2*, pp. 160–161.
- 51 Wikipedia, *Richard Saul Wurman*. 2006.
- 52 Wurman, *Information Anxiety2*, p. 109.
- 53 Ibid., p. 157.
- 54 My discussions with Wurman on the topic of mapping began in August 2006 and continue on an ongoing basis.
- 55 Richard Saul Wurman, *Information Anxiety: What to Do When Information Doesn't Tell You What You Need to Know*, p. 260.
- 56 Wurman, *Information Architects*, p. 31.
- 57 Thomas Davenport and Laurence Prusak, *Information Ecology: Mastering the Information and Knowledge Environment*, p. 119.
- 58 Richard Saul Wurman, *Making the City Observable*, p. 62.

- 59 Wurman, *Information Architects*, p. 23.
- 60 Ibid., p. 27.
- 61 Ibid., p.263.
- 62 Clark University, *On Mapping Projects*. See <http://www.clarku.edu/offices/publicaffairs/news/press/2005/mapping.cfm>.
- 63 Wurman, *Information Anxiety*, p. 263.
- 64 Ibid., p. 155.
- 65 Ibid.
- 66 Wurman, *Information Anxiety*, pp. 59–64.
- 67 Ibid., p. 62.
- 68 Ibid., p. 48.
- 69 Wurman, *Information Architects*, p. 35.
- 70 Ibid.
- 71 Some of RSW's publications are available online through his website, www.wurman.com. Joel Katz is a graphic designer and information architect specializing in way-finding, cartographic and diagrammatic explanations, and environmental graphic designs. Stephan Van Dam, of VanDam, Inc., is a well-known NYC-based map publisher and cartographic designer, who invented and patented the best-selling UNFOLDS® series of pop-up maps which are in the permanent collection of the Museum of Modern Art (MoMA) in NYC. Van Dam stated, "Richard Saul Wurman has played a significant part in my life." (August 2009). Massimo Vignelli is a well-known Italian designer based in New York City; he designed the iconic 1972 New York City subway map (of Richard Saul Wurman's NYC/ACCESS subway map, Vignelli wrote it "is the best solution by far to the complex problem of representing one of the most complicated rail networks in the world"). Don Moyer is a graphic designer and one of the founders of Thought Form Inc. Moyer stated, "I've known Richard Saul Wurman since 1967 when I was lucky enough to find myself in a class that he was teaching. He's been a significant influence on many people, including me." (August 2009).
- 72 In a conversation with Richard Saul Wurman (2009) and detailed information from Wurman's website, www.192021.org.
- 73 Jensen, *Simplicity*, p. 140.
- 74 Davenport and Prusak, *Information Ecology*, p. 145.
- 75 Edward Tufte, *Envisioning Information*, p. 9.
- 76 Edward Tufte, *The Visual Display of Quantitative Information*, 1997, p. 13.
- 77 Edward Tufte, *The Visual Display of Quantitative Information*. Second edition, 2001, p. 51.
- 78 Ibid.
- 79 Ibid., p. 55.
- 80 Ibid., p. 57.
- 81 Ibid., p. 56.
- 82 Ibid., p. 71.