

a grid-based space

Cognitive Mapping in Fargo, North Dakota

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12.17.2010



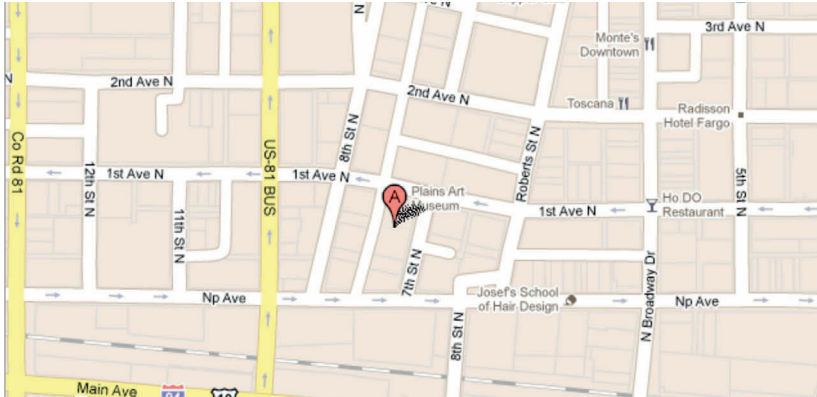


fig. 1: Google map of the location of the Plains Art Museum, as displayed by the museum's website

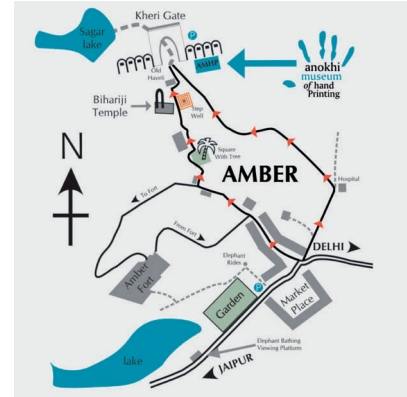


fig. 2: Map of the location of the Anokhi Museum of Hand Printing, as displayed by the museum's website

We all navigate the city. We give directions to strangers and friends. We sketch out maps on bar napkins and the backs of our hands. Addresses are scribbled in margins or printed distinctly at the top of letterhead. These documentations of urban spaces tell not only of specific directions within space, but also of how we perceive the space around us. In the midwest, specifically Fargo North Dakota, the documentation users create of spaces exemplifies a grid-based perception of the urban environment.

Diagrams, or drawn abstractions of these environments, are capable of describing things that we cannot articulate with other means. It is for this reason that we have come to the cultural norm of representing buildings through the typical architectural drawings. While we can never physically see a plan or section, it is through these diagrams that designers are able to articulate the placement of walls, locations of doors and the necessary information to communicate our mental image of a built environment to a client or contractor. All diagrams represent information, but the type and way in which it is represented differs based on cognition and its causal factors.

Consider two museums and their maps: the Plains Arts Museum in Fargo, North Dakota and the Anokhi Museum of Hand Printing outside of Jaipur, India. The Plains Art Museum directs users of its website to the Google map via a linked image. This map shows the location of the museum in relation to other businesses, but mostly relies on a system of streets, each with a name. Its address of 704 First Avenue North, indicates its location within a larger

numbered grid. The map from the Anokhi Museum of Hand Printing, shows landmarks and streets, but the streets are each labeled with a direction toward a landmark. Its address of Kheri Gate, Amber, Jaipur reinforces the idea of a landmark-based space through its description of the location in proximity to a gate rather than a numbered system.

These two examples point toward the availability of signage or other infrastructure to those seeking the museums, but they also relay the mental and physical organizational systems that we use to navigate a city; through them we are able to identify the way people perceive space. Differences in our perceptions of the city are evident in the way we choose to map it. These differences are culturally accepted because the nature of maps is to communicate to a wider group of people the location of entities within a larger whole.

Seeing a need for further research of the relationship between diagramming and opportunity to incorporate new ideas, this study took on the task of gathering hand-drawn maps of the city of Fargo from its inhabitants and analyzed them for the presence of similar organizational pattern. What quickly emerged was a reliance on the grid and a grid-based perception of space.

testing method

The downtown district of Fargo, ND was chosen for several reasons. Being an urban space, the downtown area is prone to pedestrian traffic that could be easily approached and requested to participate in the study. A small, specific region--such as the one chosen--would be more manageable for participants in the study to draw and a smaller scale would increase the likelihood that subjects would include landmarks and buildings other than just streets in their maps.

Potential subjects were approached on Broadway Drive in downtown Fargo, the street most heavily populated with pedestrian traffic. In addition to having many potential subjects

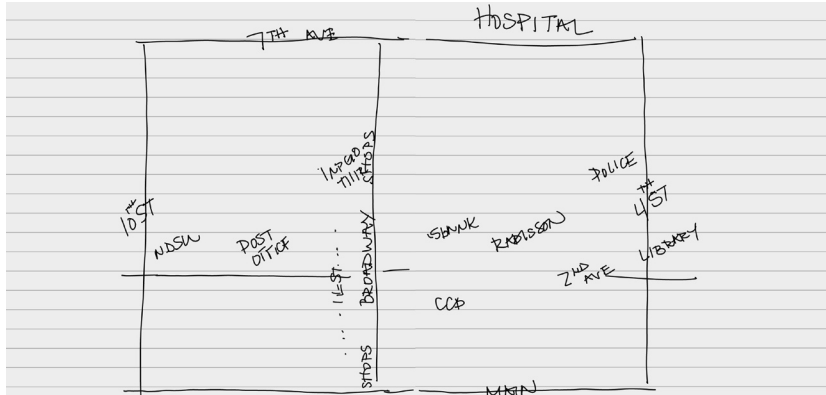
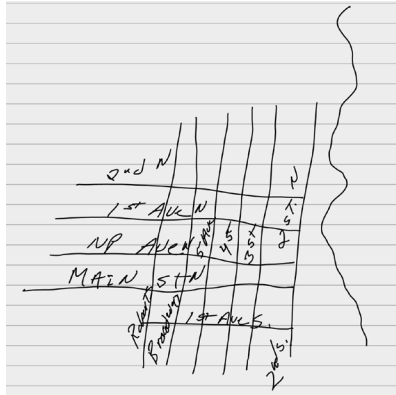


fig. 3 and fig. 4: hand drawn maps of the downtown area of Fargo, ND collected as part of this study

to divert, the street is also considered by most residents to be the heart of the downtown area. The participants were approached directly in order to find a sample that had a daily interaction with the district and would therefore know it well.

After recording an informed consent and filling out a brief demographic questionnaire, subjects were asked to draw their map of the downtown area using an Echo Smartpen. If he or she questioned what items should be included on the map, the researcher responded that the participant should include anything he or she felt was important. At the end of the interaction, participants were presented with information identifying the study and contact information for its researchers and the institutional review board. These samples were gathered between October 6 and November 1 of 2010.

As alluded to earlier, the study used an Echo Smartpen to record the data for the research. The pen works as a typical pen, but serves as a recording tool for both the audio of what is being said during the drawing and the order in which the strokes were made, resulting in a video of the sketch being produced with the correlating audio. Through this tool the participants were able to not only draw in the traditional method, but the pen also recorded the order in which the marks were made in a sort of video playback. The video and audio recording allow a better understanding of the thought process of map making and the cognitive repercussions of the map.

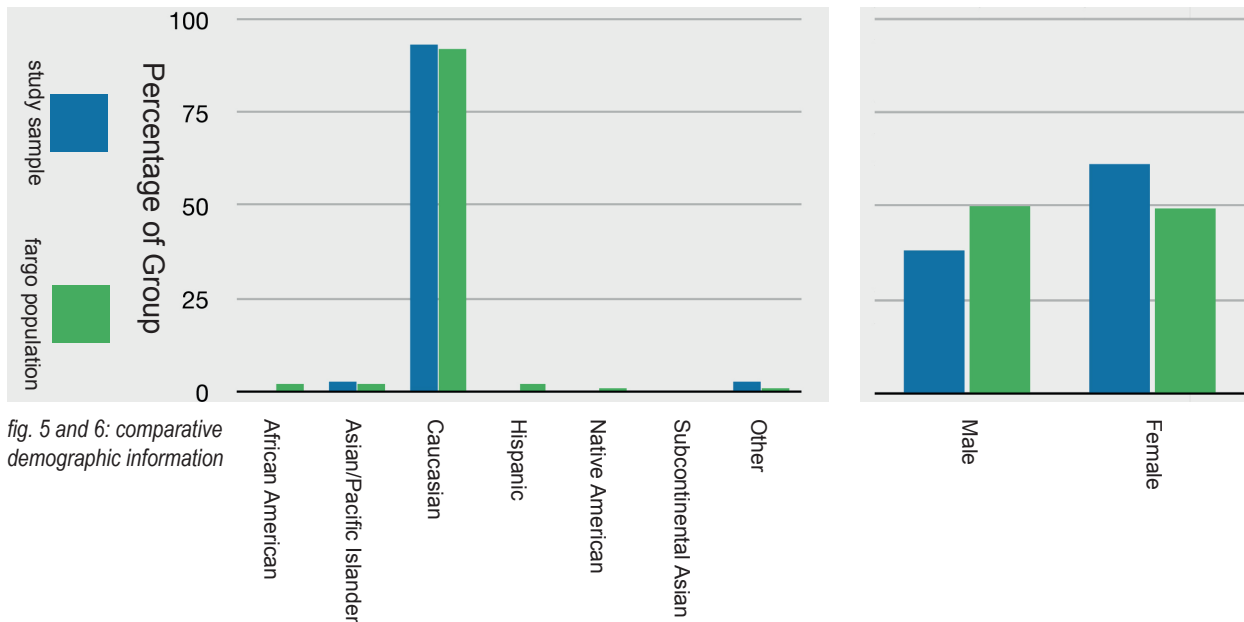


fig. 5 and 6: comparative demographic information

The advantage of this type of recording is that it allows for analysis of the order and things are drawn as well as the content without relying on the memory of the researcher or additional recording tools. Not all participants were unhesitant in their ability or inclination to make a drawing. By recording the audio, it allowed information that would have been lost due to hesitant participants or those who chose not to label elements within the map. The role of order came to play a large role in the comparisons drawn at the end of the study.

The method did have its disadvantages. The pen requires all writing and drawing to be done on a specific type of paper that is sold by the maker of the pen. This limited participants to a two page spread that was divided down the center by the spine of the book, with each page measuring approximately 5 1/2 by 8 1/4 inches. While they were offered a full two page spread on which to do the drawing, 77.4% of participants chose to use only one page of the spread. The required paper also contains lines, which automatically establish horizontal guidelines on the page.

Given that this study acknowledges the variations of spatial perception across cultures, a small amount of demographic information was gathered from the 31 individuals who chose to participate in order to compare the sample to the overall demographic information for Fargo, ND. A sample that was representative of the city was desired and the final pool of participants

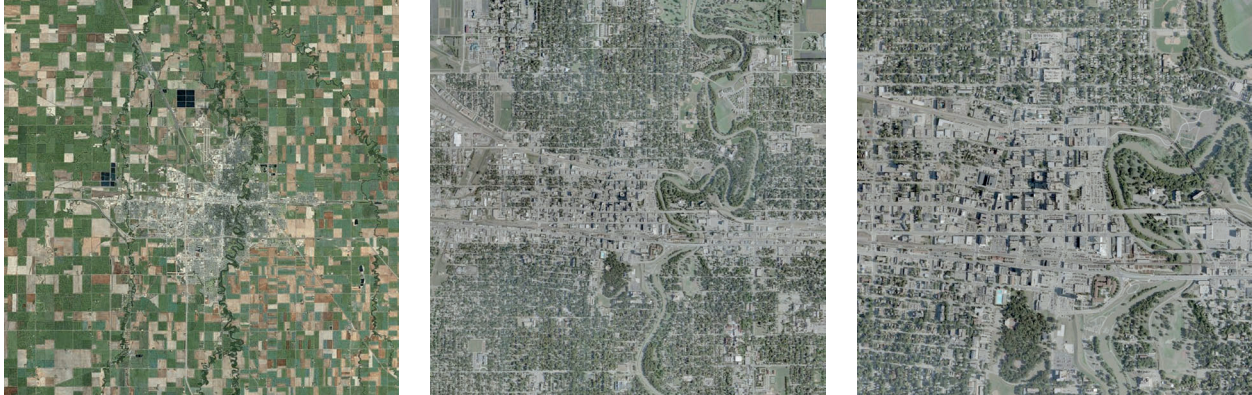


fig 7-9: a progression of aerial photographs showing the effect of the Jeffersonian grid on the organizational system of Fargo and the surrounding agricultural land.

had a similar ethnic makeup of the overall city. The sample group was made up of 93.55% Caucasian subjects, 3.23% Asian or Pacific Islander subjects and 3.23% of other ethnic identities. By contrast the city is made up of 2.5% African Americans, 2.2% Asian or Pacific Islander, 92.4% Caucasians, 2.1% Hispanic, 1.3% Native American or Alaskan Native, 0.4% Subcontinental Asian and 1.3% of other ethnic makeups (U.S. Census Bureau, 2008). The median age of the city is 30.4 years (U.S. Census Bureau, 2008), while the study's median age was 26.5. In each demographic some differentiation between the sample and the city population information is acceptable because exact data for this specific neighborhood is unavailable.

a gridded space

The urban organization of streets and buildings in Fargo, like much of the United States, is based on the Jeffersonian Grid. Established by the Land Ordinance of 1785, this system allowed a young nation a rational method of surveying a vast amount of land by applying a grid to the land (U.S. Congress, 1785). It was especially applicable to the agricultural production that was a major industry in the nation by neatly dividing land into farmable parcels. In many cases, the system's major demarcations became major roads within a city's network. While

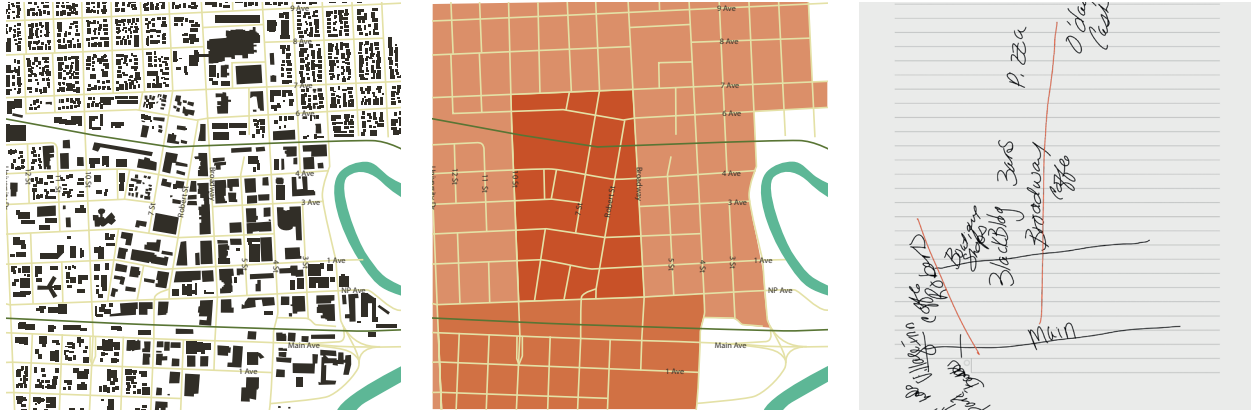


fig. 10: a figure ground diagram of the area that served as a site for the study; fig. 11: analysis of grid shifts within the downtown area of Fargo; fig 12: the single map from this study that acknowledges the presence of grid shifts with pertinent streets highlighted in red

orthogonal development is prone to take place in areas with little topographic change, this framework was laid over many American cities, regardless of their landforms. San Francisco might serve as the best example of the Jeffersonian grid laid on extreme inclines. This organizational system has since pervaded our sense of space, particularly in areas that have a pronounced grid layout, such as the midwest.

Fargo's flat topography and agricultural traditions of the area allowed for a fairly regimented grid to be laid over the landscape, While the grid is prevalent, it is not without its deviations. A ravine between Robert and Broadway Drive once bisected the downtown area into an eastern and western sections and buildings in relation to this diagonal landform resulted in a shift in grids between these two streets. The shifts within the urban grid are notable in space and diagram form because they deviations from the whole that is so severely regimented. From an inhabitant's perspective, they create a segmented series of vistas, rather than a completely open, linear view along the cardinal directions of the city. It would follow that these anomalies in street planning and the resulting buildings would be particularly memorable to an inhabitant for this same reason; their deviation allows distinction.

The variations that exist in within fargo's grid were generally ignored by the participants in the study. Only a single participant of the whole sample or 3.23% made any reference to the shift in grids during the mapping exercise and in this case the tilted orientation of Robert Street was mirrored in the incorrect direction. We mentally and physically diagram the streets of Fargo

as a perfect grid as a way of organizing the space within our minds and wayfinding within the city. Remembering Fargo's street system as a perfect grid is more efficient than remembering its small nuances and still allows an individual to navigate without major error.

In order to organize information, we must subdivide a larger whole into smaller categories or sections. Within the city of Fargo, the inhabitants first organize space through the street system. By analyzing the order in which the elements of the maps were drawn, it was determined that 87.10% of the participants chose to begin their mapping exercise by drawing a street first and adding landmarks later, if at all. Roads are a major part of how we perceive the city or our cultural understanding of what a map should be; 22.60% of participants chose to represent only streets when they mapped the downtown area.

The way in which people drew maps of the downtown area began to fall into two major categories. Of the samples, 80.65% exhibited a drawing sequence where they labeled the streets as they drew them, most of them adding landmarks after establishing some kind of street grid. Another 16.13% chose to first draw a perfect grid and later determine what the streets should be after completely drawing, showing an extreme reliance on an idealized version of the orthogonal street system as a mental map of the downtown area. These two categories accurately describe 96.77% of the participants.

This thinking associated with the second methodology is extremely relevant to the position of this study. Without provoking, these individuals graphically represented an ideal grid and then applied their knowledge of street names or landmarks to the grid, many times having trouble reconciling the incongruences between their idealized drawing and their knowledge of streets. While a minority, this group does still hold a significant group of the participants.

These diagrams and the resulting analysis tell of our collective understanding of the urban space through the process of personal cartography. Within the downtown district of Fargo this sense of space is distinctly related to the Jeffersonian street grid, as referenced by the participants' acceptance of an ideal grid, reliance on streets as a means of subdividing the larger whole and application of knowledge onto an overly consistent version of the street

pattern. Designers are responsible for creating environments to be perceived by its users; a further understanding of the relationship between mind and space can only benefit the quality of space they are able to provide.

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