Gender Differences in Mapping Points of Interest

Preliminary Results for Jinotega, Nicaragua

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Maps provide a basis to *know* our place in the *universe.*

Background

Maps have always played an important role in our society, from identifying political and economic boundaries to locating points of interest or reference relative to ones position. More recently maps are becoming more of a tool in a social context where we use them to plan our road trips, show real time traffic, plot weather patterns and determine the distance to the nearest restaurant. Mapping technology is continually evolving as more data and visualization tools become available, and with this technology comes more *usability* down to a community level.

Yet, there are still many individuals who do not use maps or know how to read them.

Reasons for the lack of map use or understanding might include:

- Inability to visualize location graphically
- Complexity or simplicity of content on a map
- Lack of exposure to reading maps
- Content bias (leading to irrelevance to certain stakeholders)

We were particularly interested in the last point on this list since different user groups may have different needs for using a map. More importantly, **if maps do not contain certain features, does this shut out different user groups from using maps?**

This question points to the inherent importance of including all stakeholders in the map making process in order to the minimize the biases that might creep into map content as well as to help optimize map usability in a community.

The pursuit of precision is a hazardous affair.

Ken Alder, The Measure of All Things

On a Side: When Street Names & Standards Do Not Exist, *then* Points of Interest/Reference are critical

A number of countries in the world do not conform to the standard street naming and numbering conventions to which we are accustomed in the United States. This highlights the importance of using relevant points of interest or reference in cartography.

A particular case in point is Nicaragua where most towns might have a Main Street but all other street names might be lacking. Instead, one identifies their location from a reference point such as a monument, a gasoline station, or a restaurant. The exact location, then, becomes a lengthy description of how to arrive at the location of interest. For example,

"…from the Esso station, go 300 meters north and 25 meters east." Other challenges include:

Reference Points that Stand the Test of Time
A popular travel guide contains a point of interest on the Managua map as "Where the Bank Was".

Distances and Azimuths are Apparent
The website of a well known bus station indicates that it is 300m to the north of a monument, yet the second page indicates that it is 400m to the north. By the same token, some place names are known to be 25m *above* a street intersection, but it is not clear whether it is north or east.

Distance Units are Non-standard
The meter is the typical standard unit of measure, however local culture also uses the *varra* which is the distance from ones chest to their outstretched hand (which varies from person to person). The *varra* is less than a meter but it is used interchangeably with the meter.

Maps are only as good as their usefulness to a community.

Are there Biases in Mapping Points of Interest or Reference?

Undoubtedly. The "one size fits all" contents in a map will not please everyone. Some maps are produced through foreign intervention without local consultation while others are produced by in-country cartographers without comprehensive stakeholder consultation beyond government needs. In addition, many developing countries do not have the luxury of generating maps with multiple data layers beyond those which are offered by the local government. It is no wonder that many of these maps are never used by a community.

New technologies are now helping to alleviate this problem by letting individuals get involved in the map making process through open source software. This is a huge step towards enabling local communities to design their own maps with their own needs in mind.

However, we cannot be sure that all stakeholders are included in this process when most decision makers in a community are community leaders, predominantly male, or primarily in a position of economic or political power. For example, some of the maps in small communities only contain the location of restaurants who have paid a fee to have their facility included on the map.

Ideally, if we were to have maps that were used by the community, then the community would be enlisted to design the map. The final map would then contain a compilation of all the individual biases of each map maker.

Putting map making bias to the test.

We set out to determine whether we could measure this in a quantifiable manner and the most obvious approach was to take an untrained group of individuals and put them to the test.

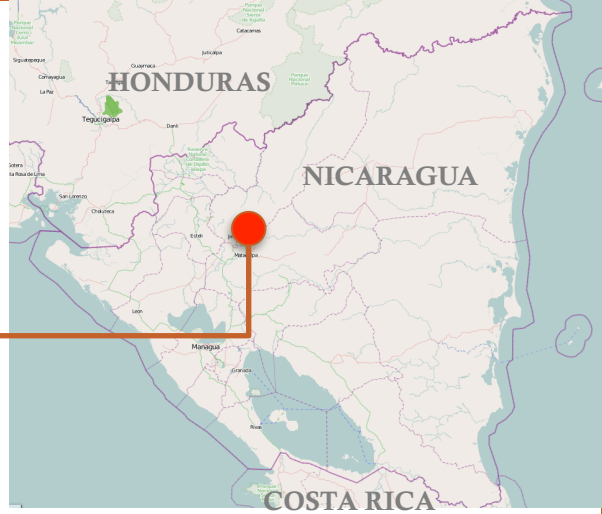
To simplify the problem, **we focused our research on identifying potential gender differences in mapping points of interest between boys and girls**.

Our approach was to not do any formal training for the children in map making since most users were not trained map readers. They were, however, given limited instruction in how to identify where they were in a town through street orientations and geometry, but they were given no information about what points they should log. The idea is to see what the users would create on their own to make the map useful to them.

The outcome of this simple test should help us design more rigorous testing and metrics, as well as expand it across other user groups. It might also **identify shortfalls in map symbols.**

Our Test

Mapping POI: *boys vs. girls*



Methods

The Setting: Jinotega, Nicaragua. Population: ~60,000.

Jinotega sits up at 3,200 feet in the northern highlands and coffee-producing area of Nicaragua. This town was chosen as a pilot site to capitalize on the presence of a non-profit organization that works in the area to keep girls in school. One of the instructors at the organization is a physics major at the national university and is keen to bring this project to the girls in order to stimulate an interest in science, make an important contribution to the community and be part of a global database.

Methods

Mapping teams: Three groups of 4 mappers each were assembled consisting of high school boys, high school girls, and middle school girls. Each team was given the same image of the neighborhood to be mapped (from WalkingPapers.org). They were also shown how to identify bends in the road and features that would help them identify their location.

Methods

Mapping: The teams wandered independently through the same neighborhood and mapped their own points of interest.

These points of interest might include:

- Pool halls
- Beauty salons
- Book stores
- Tortilla vendors
- General stores
- Pharmacies
- Car mechanics
- Churches
- Day care centers

It took about 2 hours to map an area that covered roughly 8 square blocks.

Once the data is analyzed for biases, it is collated and compiled onto a single Walking Paper map that will be uploaded to the website and the points will be mapped into the OpenStreetMap database.

Only one third of the points of interest overlap between all groups.

Results

Not surprising, biases did appear in what each group thought was important. There were only five features in common (purple) to each mapping group. Items in orange highlight common features only to boys and older girls, while items in green highlight those only in common to boys and younger girls. Only one of the beauty salons was common to both girl groupings.

BOYS	OLDER GIRLS	YOUNG GIRLS
Gas Supply Agency	Gas Supply Agency	Gas Supply Agency
Store (Lupita)	Store (Lupita)	Store (Lupita)
Billiards	Billiards	Billiards
Bus stop	Bus stop	Bus stop
Evangelical Church	Evangelical Church	Evangelical Church
Hardware	Hardware	
Bar	Bar	
Mechanic Shop	Mechanic Shop	
Little store		Little store
Little store		Little store
New clothes store		New clothes store
Catholic Church		Catholic Church
	Beauty Salon	Beauty salon
Mercadito	Mill	Store (Doña Reyna)
Book store	Soup Store	Little store (Yorleny)
Store	Vegetable Store	Beauty salon (Sandra)
Store (Isa)	Non-profit building	New house
		New house
		Little store
		Causeway
		New Church construction
		Phone Recharge Store
16	13	19

The purple Points of Interest (POI)

33% of all the POI mapped by *boys* were common to all groups
38% of all the POI mapped by *older girls* were common to all groups
26% of all the POI mapped by *younger girls* were common to all groups

Every major city in developing countries has a marginal area defined by landmarks, not street names.

Results
… continued

Preliminary Map of the *Lindavista Sur* neighborhood. There are no street names in this area but a major landmark that every taxi driver knows is the *Círculo de Amigas* non-profit center. Several additional small store fronts exist between the billiards hall and the bookstore but were omitted for clarity.

Young girls are the most detailed mappers in this study.

Discussion

This case study reveals interesting **differences** in mapping points of interest between genders. Features that were missed by the boys included beauty salons and several small stores where women typical congregate in this community. The young girls were particularly impressed with the construction of new houses which feature in their perception of important landmarks since this construction is visibly noticeable.

Common features to the groups tended to include places where youth congregate (church, a key store, billiards hall, etc.). The exception might be the gas supply agency, yet this was a sole feature on a street. Had there been a multitude of other POIs on that street, it may have been lost in the noise.

There are places where we might expect more common POI such as a book store (for school supplies) yet this did not feature highly on the lists.

Overall, the overlap between all groups was about one third, and a notable statistic was the fact that the young girls logged 46% more points of interest than the older girls.

Hot days may not be so good for mapping, and rain is a show stopper.

Discussion…*continued*

Determinants of Completeness:

There are many reasons to explain the completeness of the surveys and each can be put to the test. Here are some of the more important factors that played into our survey.

Duration of survey. Attention span is a big factor among the young surveyors. Any activity that lasts longer than one hour is threatened with boredom and ambivalence.

Distance covered. As with duration, the distance covered in a survey can play a role in completeness. The older girls tended to not want to walk as much as the boys or young girls. This does not mean that they were not capable.

Interest level. This factor varied across the group. While all the children selected for the survey are good students, not all have the same level of fascination for science or cartography.
In addition, while the project may have appealed to them initially, it is possible that the nature of the required tasks caused the level of interest to vary. A lot of work in science can be tedious, yet the analysis is where the fun lies. We might want to design activities to keep the field work interesting or challenging.

Weather and time of day can also play a role in the energy level of our young surveyors. On the day of our survey, we had overcast weather and a rainstorm cut the survey short after 2 hours.

This will be the most complete map of a rural town in Nicaragua.

Future Work

The groups will continue to map Jinotega throughout the year. The process will remain the same in that all groups will map the same neighborhoods at the same time, yet independently.

An important part of mapping new neighborhoods is that the children use the same key they developed for their first map in order to provide homogeneous data throughout the town.

The points of interest will be compiled and uploaded to the OpenStreetMap database.

Acknowledgment

This project is entirely a volunteer effort. It is now run by Yamilet Rivera who works at *Círculo de Amigas* in Jinotega, Nicaragua. We are indebted to her and the children under her tutelage that are making this important contribution to mapping.

We are not the only ones to see gender differences in mapping.

Additional Reading

There is a whole body of work that shows gender differences and preferences in mapping. Here is some interesting reading material that supports our findings:

Coluccia, E. and G. Louse, 2004. Gender differences in spatial orientation: a review.
http://www.brandimontelab.it/pubpdf/ecol/Gender%20differences%20in%20spatial%20orientation%202004.pdf

Mählck, Paula, (2001). Mapping gender differences in scientific careers in social and bibliometric space.
http://www.jstor.org/discover/10.2307/690191?uid=3739560&uid=2129&uid=2&uid=70&uid=4&uid=3739256&sid=21102183182223

Wilkening, J and Fabirikand, SI (2011). The effect of gender and spatial abilities on map use preferences and performance in road selection tasks.
http://www.geo.uzh.ch/~sara/pubs/wilkening_fabs_ica2011.pdf

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