Stranger Searching in a Strange Land: The Impact of Familiarity on Local Search

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ABSTRACT

Local search entails looking for places, such as restaurants or hotels, in a geographically-constrained region. Within local search, it has been observed that an individual's familiarity with their environment (i.e. how well they know the area in a query of the form "{places} in {area}") impacts which places they are most interested in visiting. Less well-understood though is how people's information preferences differ during 1) different phases of the search process and 2) based on their level of familiarity. Through a series of surveys in the domain of dining, we explore how familiarity moderates what level of information is useful to an individual about restaurant location when choosing a place to visit. We further examine how these preferences vary between regions and phases of local search (deciding on a restaurant or determining how to go). We contribute an understanding of people's information preferences during search, building on prior research of how offline context impacts online needs.

Author Keywords

Local search; dining; familiarity; localization.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

INTRODUCTION

Though exact numbers vary, local search queries (e.g., "restaurants near me") comprise a large proportion of search volume at major search engines [15,17]. For queries such as "restaurants near me", it has been shown that whether an individual is interested in going to a quick chain restaurant or a bustling, well-known place that serves a local specialty is mediated by characteristics such as the individual's familiarity with the area in which they are searching for restaurants [6,12]. Familiarity also has been shown to

mediate the aspects of an area (e.g., parks, streets, neighborhoods) that an individual can recall [2].

Missing from our understanding of how familiarity impacts local search though is *how the varying needs and recall patterns of users with different levels of familiarity translate into different information preferences*. We focus on the domain of dining and conduct a series of surveys that explore an important information need in local search, the restaurant's location. For example, while specific, actionable information like the address of a restaurant might be most useful to a long-term resident who already knows the area, a restaurant's proximity to a well-known park might be more useful to an unfamiliar individual despite the lack of information that it provides about the specific location.

Because there are multiple phases to local search with different goals [5,8], we also examine how the type of information needed regarding a restaurant's location varies between two phases of local search: 1) deciding upon a restaurant, and, 2) determining how to get to a restaurant. Finally, we target our surveys at seven different cities because it is known that there are regional differences in how people orient themselves [11].

In summary, we focus on two primary research questions:

- **RQ1:** How does an individual's familiarity with an area impacts their information preferences regarding a restaurant's location?
- **RQ2:** How does the phase of local search impact these information preferences?

FAMILIARITY AND LOCAL SEARCH

Local search online covers a wide variety of topics [17] and is impacted by many characteristics of individuals and their offline context [1,12,14,15]. There can be multiple phases to this decision-making process online [8], individuals can have very different needs [5], and, in many cases, the decision-making process is followed by a visit to the place that is found [15].

An individual's familiarity with the area is known to be highly important not just in local search but in general for how one relates to the places around them. Wu et al. [13] showed that the salient landmarks to an individual in an area differ greatly depending on that individual's familiarity with the area. Locals (i.e. presumed high familiarity) tend to focus on restaurants and places that are associated with more daily

Q1: Have you heard of The Feisty Lamb restaurant in Portland, OR? [Single-response]

The Feisty Lamb
4.8 ★★★★★ $$
2174 W Burnside St

- Yes, and I have been there
- Yes, but I have never been there
- No

Q2: Each answer below accurately describes the location of The Feisty Lamb in different terms. Which is most useful in determining whether you **would want to go**? [Single-response]
- At W Burnside St and SW King Ave [Cross-streets]
- 0.4 miles from Providence Park MAX Station [Transit Station]
- Near Washington Park [Landmark, Area-based]
- 2174 W Burnside St [Address]
- In Goose Hollow [Neighborhood]
- 0.8 miles from the Portland Japanese Garden [Landmark, Point-based]
- Other [open-text]

Q3: Why was that description the most useful? [Open-ended]

Q4: How many times have you been to the **Goose Hollow** neighborhood in Portland, OR?
[Single-response]
- Never
- Once or twice
- Several times
- Many times
- Other [open-text]

Figure 1. Example survey questions. Details in brackets are for annotation and were not in the actual survey. Q2 answers randomly ordered. Q1, Q4 randomly reversed.

needs while non-locals (i.e. presumed lower familiarity) focus on tourist attractions and shopping areas. Bentley et al. [2] found that the aspects of cities that a person can recall vary based on their familiarity, with long-term residents mentioning neighborhoods while tourists tended to focus on landmarks. Salimian et al. [9] found that more familiar individuals explored larger areas in a map-based news visualization while less familiar individuals zoomed into the few areas that they knew.

Furthermore, we see different patterns in the search and visit behavior of locals as compared to non-locals. White and

Buscher [12] examined Microsoft Bing logs and found that locals tend to reserve tables at higher-rated restaurants and have different cuisine preferences from non-locals. Han and Yamana [6] found in an analysis of Foursquare check-ins that individuals with high familiarity tend towards less popular restaurants and "slower" food while low-familiarity individuals tended towards trendier restaurants and chains.

LOCATION INFORMATION SURVEY
We developed a survey to determine whether there are differences in what types of location context (e.g., street address, proximity to a landmark, neighborhood) are useful to an individual based upon their familiarity with an area. We built 14 variants of this survey to cover seven cities and two contexts for each city as described below. We focus on the domain of restaurants, a common domain in which to study local search [e.g., 7,12] that comprises a significant proportion of local search volume [16].

Each survey followed the same basic structure (see Figure 1 for an example). The respondent was shown a restaurant and asked whether they had heard of the restaurant and had ever been. They then selected which of six location descriptions (or in two cases, seven, when the restaurant was contained in a named building) was most useful to them. Respondents then described in an open-text field why they had selected that location option to provide insight into what information needs their choice fulfilled. Finally, they were asked how many times they had visited the neighborhood in which the restaurant was located to estimate their familiarity with that area.

We localized the survey to seven cities (one restaurant per city) across four countries and distributed it to Android mobile users through the Google Consumer Survey (GCS) platform because GCS provides the ability to easily target a survey at different regions in a variety of countries (e.g., individual states within the United States). We deployed local language surveys in Washington, DC, Portland, OR, Chicago, IL, Manhattan, NY, London, UK, Tokyo, Japan, and Brasília, Brazil. We also varied the intent, providing them either with the task of *deciding whether they would want to go to a restaurant* or *determining how to get to a restaurant*. These two intents correspond with a decision-making phase (i.e. "Decide", similar to informational queries [3]) and action phase (i.e. "Go", similar to transactional queries [3]) in local search. The GCS platform has been shown to provide representative sample populations comparable to large-scale survey panels [10]. Each survey received approximately 100 responses for a total of 1405 respondents (respondents were given only one survey each).

Restaurants were chosen by searching "restaurants in <city>" on Google and selecting a result that was near a few landmarks but was neither overly expensive nor a large chain. Attempts were made to choose restaurants in neighborhoods that were also not the most touristy or visited neighborhoods in the city, though some degree of arbitrariness was unavoidable.
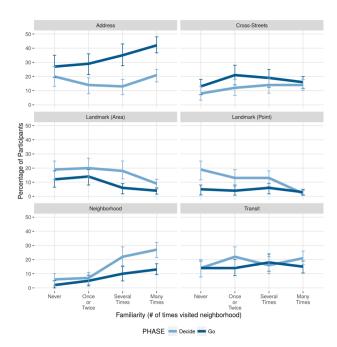
Figure 2. Percentage of respondents who selected each location text option (with 95% CI for proportions), sliced by familiarity and search phase. If the two lines in a graph do not intersect, phase likely is important. A monotonic trend indicates that familiarity likely is important.

The types of location strings shown as options in the survey have all been observed as important in prior research or are found in common restaurant search apps. We used the address (e.g., Google Search, Yelp, [4]), cross-streets (e.g., Yelp, Foursquare, [4]), proximity to a larger transit station (e.g., TripAdvisor), proximity to a landmark such as a park (i.e. POI that is a large area) [11], proximity to a landmark such as a building (i.e. POI that is a point) [11], and neighborhood (e.g., Yelp, Zomato).

Survey Analysis

We first examine broad trends from the survey. We then model each type of location response with logistic regression to determine which factors actually have a significant effect on selection of location text response after controlling for region and demographic factors. We run a regression for each location text option (e.g. Address) where each model includes the following independent variables: neighborhood familiarity (ordinal variable), search phase (binary variable), city (nominal), gender (binary), age (ordinal), and population density (ordinal). Wald's test is used to test for significance of ordinal variables. Finally, one researcher used an open-coding procedure to identify key themes from the open-ended text responses to better understand what information needs the selected location text options fulfilled.

The GCS platform estimates demographics based on respondents' browsing histories, and we find a good balance in age, gender, and income of respondents across all surveys. We see respondents skew towards being familiar with the

restaurants' neighborhoods, with the following distribution: 18% (*Never*), 19%, 21%, and 41% (*Many Times*). Respondents most often had never heard of the specific restaurant (69%), while 22% had heard of it and 9% had been there.

RESULTS AND DISCUSSION

Several trends are apparent when examining Figure 2, which depicts the percentage of respondents across all cities who selected each type of location text when sliced by search phase and familiarity. Overall, respondents vary greatly in which type of location text is preferable. The importance of familiarity can be judged by examining whether the percentage of respondents who selected an option changes monotonically as familiarity increases on the X-axis from "*Never*" to "*Many times*". The importance of search phase can be judged by examining whether the type of location text is consistently preferred in one phase over another (i.e. there is a complete gap between the two lines in a graph).

Impact of Familiarity

For both types of landmarks, increased familiarity corresponds with decreased preference by respondents. This is verified by the logistic regressions, which show that an increase in neighborhood familiarity (e.g., from "*Never*" visited to visited "*Once or twice*") decreases the odds of a respondent selecting a landmark as the most useful description by 30% ($p<0.01$). Inversely, with neighborhoods, increased familiarity leads to an increased preference for this type of location information (66% increase in odds with each step up in familiarity, $p<0.001$). Address, cross-streets, and transit stations all have mixed responses to increased familiarity in the graphs.

The tendency for landmarks to be favored by low-familiarity individuals is also supported by the open-text responses. We see that lower familiarity respondents, despite never or rarely having visited the neighborhood, often mention being familiar with the landmark. Responses like "*Landmark everyone is familiar with*" and "*Near tourist site im familiar with*" indicate that landmarks can provide context even to those who have not visited the area. Unfamiliar respondents also often spoke about the opportunity to pair the landmark with eating out (e.g., "*Because the museum is somewhere I would visit and its nice to know what is close*"). Equally common among all respondents was viewing the landmark not just as a chance for additional activities but as a reference point for the restaurant's location (e.g., "*I know the museum and gives me an indication of where the location is*").

Among those who chose the neighborhood, familiar respondents often mention the additional context the neighborhood provides (e.g., "*Because it gives an indication of the character of the restaurant as well as a description of the location*") and that neighborhoods matched up with their mental map of the city (e.g., "*I live in DC and neighborhoods are the most useful geographic marker for me*"). References to mental maps were also made by familiar individuals for

transit stations (predominantly in London, which we return to later) and the road network.

These results also provide evidence that the differences in recall [2,13] and needs [5] between individuals of varying familiarity do translate into different preferences for what information is presented.

Impact of Search Phase

For addresses, user preference is consistently higher in the *Go* phase as opposed to the *Decide* phase (per regression, odds of selecting address are 183% higher, $p<0.001$). Cross-streets follow a similar pattern, but the effect is smaller (odds increase by 46%, $p<0.05$). Both types of landmarks as well as neighborhoods are preferred in the *Decide* phase (for each, odds of selecting them in the *Go* phase is 60% less likely, $p<0.001$). Transit is not clearly preferred in either phase.

Examining the open-text responses provides insight as to why these trends emerge. For address and cross-streets, a large proportion of respondents mention that they are precise or clear descriptions and could be used to get directions (e.g., "*Specific and can put it into GPS*"). Respondents who selected cross-streets also note that this information allows them to picture where the restaurant is whereas the address itself meant little to them (e.g., "*Those are two streets that I recognized. I do not have any clue where it is if you give me the number.*"). For individuals who chose the neighborhood or landmarks, they often mention that this provides context about the area in which the restaurant is located (e.g., "*Because I know what it's by*"), which would be more useful when deciding whether to go to that particular restaurant.

It would seem surprising that the usefulness of transit stations is not considerably higher in the *Go* phase. Some respondents mentioned that their mental map of the city corresponded with the transit station (e.g., "*I use tube stops to orientate myself*"), or that the transit stations acted as reference points to figure out the area in which the restaurant is (e.g., "*Distance and known landmark*"). More common though was some mention of the transit stations as being useful for deciding whether it would be easy to get to the restaurant and therefore they would like to go (e.g., "*I knew how easy it would be to get there + more less where it is*"). As such, transit stations can be used as reference points in different ways, some that support getting to a place, and some that support deciding whether to go there.

In the *Decide* version of the Manhattan survey, 29% of respondents selected "*Near Central Park*" despite the fact that this description could refer to a very large area of the city. An additional 10% of respondents selected "*In the Upper West Side*", which is a neighborhood that stretches 51 blocks north-to-south. This illustrates that for many people, it is not the specific location but the surrounding area that is the primary information need when deciding on whether to go to a particular restaurant. When an initial choice has been made though and an individual is determining how they might actually get to the restaurant, their information needs

change from broader, contextual information to specific details about the location upon which they can act.

Localization

Though our survey results cannot support robust conclusions about how information needs vary by city, they do offer some insight into how large the differences can be. For instance, with transit stations, 41% of Tokyo respondents chose the transit station followed by London at 28% and Washington, DC, at 20%. Large city effects are also seen for cross-streets, where 33% of respondents in the Manhattan survey chose them, while Portland was next highest at 19%. Other studies have also seen city-specific effects on what is considered important by people when they navigate their city (e.g., [11]). This suggests that future work should continue to explore how the structure of cities can impact people's information needs throughout the local search process.

LIMITATIONS AND FUTURE WORK

Respondents' familiarity was observed and correlates with residency and demographics. Further research could directly manipulate an individual's familiarity to better isolate the effects of familiarity. Because this was a survey, the tasks are contrived and lack some of the context and motivation usually part of local search.

Future work could explore other types of context about a restaurant's location that would best support varying information needs in local search. Other user contexts (e.g., size-of-group) and common aspects of the local search experience (e.g., types of photos, important aspects of reviews) could also be explored.

CONCLUSION

In summary, through a series of surveys, we examined how familiarity moderates information preferences regarding restaurant's location in local search. We found that while all individuals are looking for location descriptions that they recognize, familiar individuals tend to prefer references to the area (e.g., neighborhood name) whereas unfamiliar individuals tend towards landmarks that are recognizable and also provide ideas of other activities in the area. We also demonstrated that the phase of local search matters greatly, with broader information being important when deciding on a restaurant but specific information such as the address or cross-streets being the most helpful for deciding how to get to the restaurant. These findings suggest that information preferences of individuals during local search vary depending on their familiarity with the area and intent.

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