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ABSTRACT

SHARING THE BIG APPLE: A SURVEY STUDY OF PEOPLE, PLACE AND LOCATABILITY

Samer Nadim Karam

Over the past half century social trends and new technologies have weakened local social ties and thus, the fabric of civil society itself. Mobile location-aware community systems offer one path to redress these problems by enhancing community cohesion and the formation of social capital by helping people to meet each other and coordinate their actions. However, little is known about the general population's desire and attitude towards these systems.

The design space described by the People-to-People-to-Geographical-Places Framework (P3-Framework), was used to guide a survey study of the impact of 'place' on people's social information needs and their willingness to share personal location data. At fourteen different place types (Restaurant, Post Office, etc.) in Manhattan, New York, 527 individuals were surveyed over a 4-week period. At least 77% of all respondents were willing to share personal location data with others, and over half desired to know one or more types of information about the people that came to the survey sites.

However, the effect of place – one of the core hypotheses – was found to be a weak predictor of willingness to share personal location data and interest in seeking others'. Demographics, particularly age, combined with place specific variables (i.e. frequency of visit and type of place) proved to be the leading predictors of people's willingness to be located within an absolute frame of reference.

**SHARING THE BIG APPLE: A SURVEY STUDY OF PEOPLE,
PLACE AND LOCATABILITY**

Samer Nadim Karam

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APPROVAL PAGE

SHARING THE BIG APPLE: A SURVEY STUDY OF PEOPLE, PLACE AND LOCATABILITY

Samer Nadim Karam

Dr. Quentin Jones, Thesis Advisor
Assistant Professor of Information Systems, NJIT

Date

Dr. Marilyn Tremaine, Committee Member
Chairperson of the Department of Information Systems, NJIT
Professor of Information Systems, NJIT

Date

Dr. Fadi Deek, Committee Member
Dean of the College of Science and Liberal Arts, NJIT
Professor of Information Systems and Mathematical Sciences, NJIT
Director, Information Technology Program, NJIT

Date

BIOGRAPHICAL SKETCH

Author: Samer Nadim Karam

Degree: Master of Science

Date: May 2005

Undergraduate and Graduate Education:

- Master of Science in Information Systems,
New Jersey Institute of Technology, Newark, NJ, U.S.A., 2005
- Bachelor of Science in Computer Science,
University of Balamand, El-Koura, Lebanon, 2003

Major: Information Systems

Presentations and Publications:

Sukeshini A. Grandhi, Quentin Jones and Samer Karam,
“Sharing The Big Apple: A Survey Study Of People, Place And Locatability,”
Conference on Human Factors in Computing Systems (CHI 2005),
Portland, Oregon, U.S.A., April 2005.

Samer Karam, Sukeshini A. Grandhi, Quentin Jones, Loren Terveen and Steve Whittaker,
“Putting Systems into Place: A Study of Design Requirements for Location-Aware Community Systems,”
The 6th International Conference on Ubiquitous Computing (UbiComp 2004),
Nottingham, England, September 2004.

to Emmanuelle

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CHAPTER 1

INTRODUCTION

People dynamically structure social interactions and activities around their environments in specialized types of ‘places’ such as the office, home, coffee shop, museum, and school [14, 23]. Mobile location aware systems can potentially utilize the existence of physical places to support the management of social information and interactions [1]. However, to effectively realize this potential, what is required is an understanding of 1) how place-types relate to people’s desire for place-related awareness of and communication with others, and of 2) what information people are willing to provide about themselves to enable place-related communication and awareness.

The thesis is divided into six chapters: 1) Introduction, 2) Background, 3) Research Questions, 4) Method, 6) Results, and 6) Discussion.

1. Introduction: The introduction begins with a brief overview of the thesis as a whole, allowing for a preemptive structuring of the train of thought prior to becoming immersed in the core writings.
2. Background: This begins with an overview of the concept of community, its subcategories (virtual, networked, and proximate) and supporting ‘social software’. Technology that facilitates the digital community is then introduced, leading into the notion of ‘digital locatability’. In combining community and locatability, the P3-Systems Framework is thus introduced as a guide and blueprint for the research questions and the general direction of the study.
3. Research Questions: In compiling the background of the study, questions arose concerning the effect of certain variables (such as place, age, gender, etc.), on people's interest in social information and their resultant privacy concerns.
4. Method: In the method section the development of the instrument (questionnaire), the selection and scheduling of the survey sites, the subject sampling techniques, the kind of ethnographic data recorded, the fieldwork protocols implemented, and the type of analysis conducted, are outlined.

5. Results: Results are provided through the presentation of descriptive statistics, data cross-tabulation, and logistic regressions, as well as interesting correlations and relationships between data variables therein.
6. Discussion: The questions proposed at the beginning of the study are ‘answered’ according to the results and accompanying analysis. From this outcome, a discussion ensues as to the implications of the findings.

CHAPTER 2

BACKGROUND

2.1 Synopsis

The notion of a virtual community is examined, along with the interactions arising between persistent links between virtual and physical communities. The existing ‘social software’ that would enable such interactions is presented to help define initial requirements and possibilities for a superimposed virtual community. The technology infrastructure necessary for this software and these interactions is then explained, with an emphasis on mobile technologies as humans are rarely motionless as they go about their daily, weekly and monthly affairs. The mobility aspect leads to issues of locatability and privacy, which when combined with the ‘community’ in the P3-Systems Framework, form the structure from which the research questions are derived.

2.2 Community

Wellman defines community as “networks of interpersonal ties that provide sociability, support, information, a sense of belonging, and social identity” [34]. This definition, popular amongst social theorists, carries over well from the physical community to the virtual community, facilitating the concurrent conceptualization of these two community types required for the design of mobile location aware community systems.

2.2.1 Virtual Communities

Wellman states that virtual communities are essentially computer-supported social networks [33, 35]. The initial incarnations of these ‘supported’ social networks, such as MUDs (Multi-User Dimension) and Newsgroups, have evolved into massive congregations of people (i.e. Everquest¹ and Orkut²), rivaling physical communities in numbers, persistence, and other variables that have been argued to define a community [9, 21]. While the definition of a community, and thus virtual community, remains elusive [5], their existence is beyond contention, and their growth / spread has been highlighted by the presence of the high profile, extremely effective Open Source Software³ (OSS) and Blog⁴ communities.

The emergence of pervasive computing infrastructure, where computing is embedded into the environment [32], could further augment virtual communities to include networked and proximate virtual communities that exist as ‘layers’ transposed over physical communities (as per Carroll’s perspective on community networks [7]), complementing and supplementing real-life interactions, events, actions, and activities.

¹ EverQuest (EQ) is a 3D fantasy massively multiplayer online role-playing game (MMORPG) released in March 1999. The original design is credited to Brad McQuaid, Steve Clover, and Bill Trost. It was developed by Verant Interactive (which had recently parted from 989 Studios) and published by Sony Online Entertainment (SOE). SOE runs and distributes EverQuest currently. (WikiPedia.Org)

² Orkut is a virtual community designed to help users meet new friends and maintain existing relationships. ...orkut goes a step further by permitting "communities" of users. It is also invitation-only: Users must be invited to join the community by someone already there. (WikiPedia.Org)

³ The open source movement is a large movement of programmers and other computer users that advocates unrestricted access to the source code of software. (WikiPedia.Org)

⁴ “Blog, noun — short for Weblog (1999): a Web site that contains an online personal journal with reflections, comments, and often hyperlinks provided by the writer.” (Merriam-Webster Dictionary)

2.2.2 Network Communities and Community Networks

Communities are inherently intricately networked, with members sharing similar but rarely unique social networks that are the basis for the infrastructure of the community. The community can thus be visualized as a network of social networks.

With the widespread availability and adoption of the Personal Computer (PC), Ethernet, and eventually the Internet, physical communities began enhancing the social networks therein by establishing and manifesting virtual communities that facilitated person-to-person interactions (e.g. E-mail) and group interactions (e.g. Internet Relay Chat). Carroll labeled these, community networks [7]. While network communities do not require a physical counterpart [7] (i.e. MMORPGs), the interest of this thesis lies in the aforementioned community networks that do, particularly in the interactions between the physical community and the virtual community networks.

Many proximate communities have established community networks, but primarily in niche groups such as the elderly and local community activists, to compensate for an incapacitation or simply facilitate interaction. TeleWindow, for example, uses existing home-infrastructure to expand social opportunities and maintain interpersonal relationships for the mobility impaired and the geographically separated [17]. The next step – the evolution of community networks – is expected to deal with the ‘crisis of community’ [8], where present day communities have become increasingly individualistic and detached (declining social capital) [26], where people consider their own community as something to which they do not belong [6].

This crisis inspired the thesis's focus on studying the general population as a whole, to enable a broad understanding (avoiding the niches) of how to regenerate the social capital within communities and societies.

2.2.3 Proximate Virtual Interactions

As the pervasiveness of computing grew, so did the possibilities for proximate virtual interactions. Mobile (cell) phones and other portable wireless devices further extended this pervasiveness to the point where over one in six of the entire human population [3] now carry a 'computer' on themselves in the form of a cell phone. This extensive adoption, along with the extended geo-temporal reach of such portable devices has provided the infrastructure necessary for the expansion of community networks to encompass the majority of everyday activities; whereas in the past one had to seek a networked computer to access a community network, today it is possible to do so while on the move, between activities, through diverse environments.

Early examples of such systems include the Active Badge System [4] and the ActiveCampus System [18]. These were used for facilitating group work by enabling the locatability of their users when in proximity of one another and on an absolute geographical basis within the geographical scope defined by the organization [31].

2.3 Emerging Pervasive Computing Infrastructure

Ubiquitous computing, also known as pervasive computing, "enhances computer use by making many computers available throughout the physical environment, while making them effectively invisible to the user." (Weiser, M. [32]) The technologies driving this trend have been WiFi, 3G, Bluetooth, RFID, GPS, and numerous breakthroughs in the

fields of nanotechnology and fuel cells – the former enabling miniaturization, the latter providing for ‘always-on’ mobile devices. Due to the nature of ubiquitous computing systems (pervasive computing systems), some are able to perceive and become aware of situations of a user and/or device unobtrusively, and adapt to accommodate this change; these systems are known as context aware systems [13].

2.3.1 Wireless Fidelity (WiFi) Networking

WiFi, which stands for Wireless Fidelity, has garnered mainstream acceptance as the standard wireless internet technology for internet and network access, with nodes residing in many homes, shops, businesses, and even in telephone booths on streets of major metropolises such as New York City [10]. This, along with the constant evolution of the technology to adopt faster and more secure protocols / modulations (i.e. the jump from the 802.11b standard to the 802.11g standard resulted in a 5-fold increase in bandwidth at any given node), has enabled a mesh of nodes that spans cities / communities with adequate capacity for all to use effectively. Thus a virtual network layer is born, into which people and devices are connected at all times.

2.3.2 3G Cellular Networking

3G, or third generation cellular network technology, is being deployed across many countries, with a growing number of active 3G networks in South East Asia and Western Europe. 3G provides blanket cellular coverage that is capable of data speeds within the broadband range of 256 kbps and more. This enables a breadth of services such as video calls and broadband internet access anywhere there is reception, which by most accounts exceeds the pervasiveness of WiFi by a significant margin. Furthermore, this ‘broadband

on the go' facilitates the effective interaction of mobile devices with systems that provide intelligent content through the added bandwidth afforded. With telecoms betting the future on 3G [29] and mobile phone subscribers exceeding 1.5 billion [3], the emergence of the pervasive computing infrastructure is well under way.

2.3.3 Bluetooth Wireless Networking

Bluetooth, a personal area networking (PAN) technology, is reinforcing the concept of personal networks that connect multiple devices within the immediate range of a user by allowing these devices to interact wirelessly and in an ad hoc manner. Thus, by simply wearing the devices on the person, or bringing them within one another's vicinity, a network is established, dubbed a Piconet. With low power requirements, Bluetooth has made its way into a large percentage of cellphones, PDAs, laptops, cars and related accessories such as headsets, mice, keyboards, and GPS receivers. This proliferation has established an infrastructure for extending pervasive networks through simple, oftentimes 'dumb', device add-ons.

2.3.4 Radio Frequency Identification

RFID, or Radio Frequency Identification, bears the promise of unique identification for every particle in the universe (extrapolating from the bit length capacities of the ID). This, alongside their microscopic proportions and passive / active flavors, enables a whole new class of wireless, non-intrusive identification. RFIDs could facilitate the location awareness of devices and users (see Active Badge [4]), which in turn would enhance the effectiveness of context aware systems. RFID equipped national ID cards /

passports are already in development in some Western European countries as well as the United States [11].

2.3.5 Global Positioning System

GPS, or Global Positioning System, is a global satellite system that has provided highly accurate location information for use in the military since the 1980s and more recently by civilians [30]. The accuracy varies, but is usually within ten meters. Since its inception, GPS has enabled many devices to become location aware, such as cars equipped with OnStar⁵, cellular phones with integrated GPS⁶, and other devices. With advancements in miniaturization and improved algorithms, GPS technology is reaching mass market penetration, and should within five years become truly ubiquitous⁷.

2.3.6 The Science Behind the Technologies

Reinforcing these, and similar technologies, are new breakthroughs in the scientific fields of miniaturization – through the development of nanotechnology⁸ – and fuel regeneration (leading to greater longevity) – through the invention and advancement of fuel cells⁹. All these developments lay the infrastructure for all-embracing, unobtrusive mobile location aware community systems that connect the virtual world with the real-time physical

⁵ OnStar is a General Motors (GM) feature available in all GM cars that uses GPS tracking and Cellular Network communication to provide emergency and support services. (WikiPedia.Org)

⁶ AccuTracking is a Free GPS Tracking Service that turns certain GPS-enabled Motorola phones into tracking devices. (www.accutracking.com)

⁷ The activation of the civilian satellite radio navigation programme, known as Galileo, is expected to bring navigation to the masses. (Europa Press Release)
<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/704&format=HTML&aged=0&language=EN&guiLanguage=en>

⁸ WikiPedia.Org: “Nanotechnology comprises any technological developments on the nanometer scale, usually 0.1 to 100 nm. (One nanometer equals one thousandth of a micrometer or one millionth of a millimeter.) The term has sometimes been applied to any microscopic technology.”

⁹ WikiPedia.Org: “...in fuel cells, reactants flow in and reaction products flow out, and continuous long-term operation is feasible virtually as long as these flows are maintained.”

world. Table 2.1 [27] lists some of the current location identification platforms along with their pros and cons.

Table 2.1 Mobile Network Platforms for Identification [27]

Type	Methodology	Pros	Cons
Cell Identifier (Cell ID)	Base station uses radio frequency signals to track mobile device	Relatively widespread infrastructure	Hard to pin down user's exact location to a few meters
Global Positioning Systems (GPS)	24-satellite network	Outdoor precision within five-meter range	Expensive User device must be in direct line of sight Device needs special embedded chips
Assisted Global Positioning Systems (aGPS)	Enhancement over GPS Perpetually locates device and coordinates data flow, unlike GPS	No "cold starts" Faster fix on location	Expensive User device must be in direct line of sight Device needs special embedded chips
Broadband Satellite Network	Relies on low-earth-orbit satellite architectures to create a global network	Lower signal latency with user devices	Complex to maintain

2.4 Locatability

When implementing community networks, certain synchronization is necessary between the virtual world and the physical world. If the two worlds were to be superimposed, they would have to share a set of variables, primarily environmental variables. These can be defined as the context, which is constructed from the variables that exist within the immediate sensory environment of the person / device. This context shapes behavior by giving values to variables such as time of day and location. Using only time and location, one can determine a person's availability and to some extent what activity he / she is partaking in as a result of notions of environmental psychology [24, 14]. This

knowledge, if accessible in the virtual world, would accommodate the user by effectively mirroring his physical status in his virtual status.

Due to the limitations of the available technology, the variables accentuated in this paper are those that determine locatability, in that geo-temporal state is sufficient to determining a mostly accurate overall context. This explains the previous emphasis on GPS, RFIDs, and WiFi technologies, all of which provide some level of locatability in real-time.

2.5 Social Software

Social software is defined as software that supports group interaction [2]. While it has just recently become popular, social software's history extends back to the mid-forties and has been known over time as Augmentation, Groupware, and Computer Supported Collaborative Work Systems [2]. Of particular interest to this thesis is social software borne of the coming together of 1) Computer Mediated Communication (CMC), and 2) Social Network Visualization Systems.

2.5.1 Computer Mediated Communication

CMC is any form of communication between people (individuals or groups) that employs computers as the medium for exchange. Computer mediated communication has naturally grown with the growth and adoption of personal networked computers, but the real exponential growth has taken place in the recent years to-date, with ubiquitous computing fueling the boom. This is particularly the result of the unprecedented increase in cellular phone adoption, which has reached 1.5 billion of the world's current population, with some countries forecasting a full 100% active usage proliferation within

a couple of years [3]. Carrying on this growth, short messaging service (SMS) has become a popular, if not ubiquitous, CMC medium that demonstrates the first signs of the reality of mobile, pervasive computer mediated communication. The interoperability of SMS with the Internet and Intranets has further increased its adoption. Today, SMS has become one of the most popular forms of personal communication, with the United Kingdom alone sending over 1.7 billion messages each month [20].

2.5.2 Social Network Visualization

In 1999, Marc Smith published a paper [28] titled, “Invisible Crowds in Cyberspace: Measuring and Mapping the Social Structure of USENET.” In this paper he presented a ‘mapping of Usenet’ that highlights what social network visualizations can achieve in terms of simplification of vast raw data; Figure 2.1 [28] highlights this achievement.

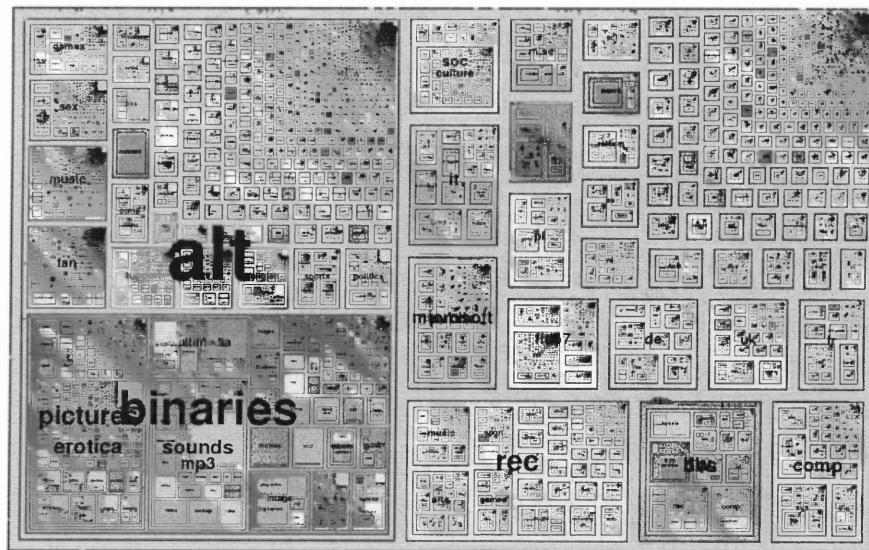


Figure 2.1 Mapping Usenet [28].

2.5.3 CMC Through Social Network Visualizations

By integrating a CMC layer atop social network visualizations, the first notions of mobile location aware community systems arise. These are interactive visualizations of social networks within the confines of a geographical location or place, through which users can participate in direct and indirect social interactions.

GeoNotes [12], ACTIVEMAP[25], and ActiveCampus [18] are all pioneering implementations of such systems. The differences in their implementations highlight their versatility, a versatility that would be necessary to accommodate the diversity of the general public. ActiveCampus, for example, makes use of personal digital assistants (PDAs) to render the social networks on the campus of a university / college. Through this visualization, users can locate each other and communicate directly as with instant messaging (IM) applications. GeoNotes, however, investigates the use of place-linked virtual notes as a means of place-specific communication within a community / workgroup. ACTIVEMAP is similar to ActiveCampus, but limited in scope to buildings as it is geared towards workgroups rather than open-ended social networks.

While these systems have seen healthy adoption in their limited implementations, this thesis investigates the requirements and interest of the general populace in the services that they enable, to better understand how to design them for uncontrolled environments.

2.6 Community and Locatability

The P3-Systems (**P**eople - to - **P**eople - to - **G**eographical - **P**lace Systems) conceptual framework organizes the design space of location-aware ‘community’ systems into a 2 x 2 matrix [15]. The rows characterize the user interface, which are divided into *people*-centered and *place*-centered techniques. *People*-centered techniques use location information to support interpersonal awareness, enable informal communication, and identify previously unknown affinities between users. *Place*-centered techniques link virtual spaces to physical locations, using social information to aid place-based navigation and decision making.

The columns characterize the synchronicity of the design space by use of the traditional Human-Computer Interaction (HCI) distinction between synchronous and asynchronous systems. The distinction is extended, however, beyond communication to include user location information, thus the reference to synchronous and asynchronous “location awareness”. This distinguishes techniques that provide information about current user location or activity within a place from those that provide historical information.

People-centered systems are further subcategorized into those that represent absolute user location and those that operate in terms of user proximity or co-location. The distinction here is between systems that can tell you where coworkers are vs. those that can only tell you which are close to you now. *Place*-centered systems are further subcategorized by the representation type. Some *place*-centered systems represent current or past user activity relative to a location, e.g., showing something about who is on a university campus now. Others associate virtual spaces with a physical location.

Table 2.2 P3-System Techniques and Services (Framework) [16]

P3-System Design Approaches		Synchronous Communication or Location Awareness	Asynchronous Communication or Location Awareness
<i>People-Centered</i>	Absolute User Location	(1) Utilizes remote awareness of current user location	(2) Utilizes people's location histories
	Co-location / Proximity	(3) Utilizes real-time user co-location for the exchange of social information	(4) Utilizes co-location history to enable future interactions.
<i>Place-Centered</i>	Use of Physical Spaces by People	(5) Utilizes online representation of user's current use of physical spaces.	(6) Utilizes history of people's use of a particular space
	Use of Matching Virtual Places	(7) Utilizes synchronous online interactions spaces related to physical location.	(8) Utilizes asynchronous online interactions related to physical location.

People-centered systems are further subcategorized into those that represent absolute user location and those that operate in terms of user proximity or co-location. The distinction here is between systems that can tell you where coworkers are vs. those that can only tell you which are close to you now. *Place-centered* systems are further subcategorized by the representation type. Some *place-centered* systems represent current or past user activity relative to a location, e.g., showing something about who is on a university campus now. Others associate virtual spaces with a physical location.

While this framework is valuable, other studies [23] have suggested that the following considerations should be made when designing P3-Systems:

- Personal characteristics of the people, including general attitudes and interests, current activities and disposition.
- The relationship between the people and the place, including things such as whether they have a distinct role (employee vs. supervisor, customer vs. employee) and their familiarity with the place.
- The relationship between people in the place, including whether they already know each other, whether they have mutual acquaintances, whether they belong to the same external communities, etc.

Adjusting the framework to incorporate these variables has permitted a more comprehensive structure for data collection, from which the instruments have been created and the survey locations chosen.

CHAPTER 3

RESEARCH QUESTIONS

3.1 Focal Concepts

It was necessary to decide on focal concepts through which to limit the scope of the investigation. On combining the P3-Systems Framework with an understanding of social networks and the variables affecting social information needs within these networks, three areas of focus were selected to accommodate the mobile, location, and community aspects of the study:

3.1.1 Demographics

Demographic information on subjects: age, gender, and home zip code. These variables provide valuable data to answer questions primarily related to psycho-socio-cultural effects.

- a. Does gender affect willingness to share personal location data due to possibly differing privacy concerns? Does the perceived increased security (i.e. stalker) threat to females present itself in the findings?
- b. Are there significant variations in social information sharing according to age? For example, would the youth of today, brought up in a more digital ‘open’ society, be more willing to share information than others? How do the elderly feel about locating others and being located?
- c. Does living in the same area as the survey site create a significant impact on the responses provided due to the effect of being part of the community?

3.1.2 Relationship to Place

People's relationship to the place in which the survey was conducted, such as frequency of visits and the reasons for their current visit. This data would provide insight into answering questions primarily of socio-cultural nature.

- d. The frequency of visits to a place determines the familiarity of the place, which can impact the relationship to place. Does the resulting impact affect people's social requirements therein?
- e. Does scheduling of the visit affect the respondents' relationship to the place, in that it defines the activities to be undertaken prior to arrival? Would, for example, visiting a place on a scheduled visit limit one's interest in partaking in other activities?

3.1.3 The Impact of Place

Participants' location specific social information needs and willingness to share personal information – of the P3-Systems Framework.

Through environmental psychology [24], places can be classified into categories: Services, Institutions, Daily Necessities, Socializing, Entertainment, Leisure, Cultural, Physical, and Residential. Does this classification appear in the data, do places belonging to the same category have similar relationships to the dependent and independent variables, such as social information needs and willingness to share personal information? More specifically, does the place-type have an effect on people's interactions with P3-Systems?

CHAPTER 4

METHOD

4.1 Questionnaire Design

It was decided to conduct a survey at various place-types in order to obtain an understanding of the nature of social data related to place-type of interest to the general public, and to obtain a better understanding of what information people would be willing to provide about themselves to enable place-related communication and awareness.

Previous studies [23] have been based on a small number of informants (20 individuals). Further, the informants' responses were not situated in the "place" and were made "after the fact". The thesis addresses these shortcomings by collecting data in situ. It also has the advantage of quantitatively expanding on the findings from the previous qualitative and conceptual research.

Being a survey study, the instrument of choice was a questionnaire. The questionnaire design consumed a significant portion of the overall study duration, since it was necessary to develop a thoroughly tested and concise version that could be completed within five minutes by any member of the public in Manhattan. The length of completion time was restricted to five minutes, bearing in mind what would be acceptable for randomly selected individuals who were not recompensed for their time.

4.1.1 Medium Selection

The design process began with the investigation of a medium for data collection prior to the actual choice of questions and structure. The initial proposals were:

- Paper survey that would be submitted to participants for filling out on location. This has the benefit of 1) allowing for multiple surveyees per surveyor, thus increasing the data collection per man-hour; 2) maintaining a physical backup of the survey data (the surveys themselves), which could always be sought when the need arises to verify the digital data; and 3) accounting for cultural, linguistic and mental differences by allowing surveyees to fill out the survey at their own pace and comfort. Furthermore, one of the risks of potential bias in data collection is reduced if the surveyor is not present during the filling out of the surveys. The problem with this approach, however, is that it relies on the honesty and patience of the unsupervised participants. This can be adjusted for in the analysis to some degree.
- Paper survey, in which the surveyor would record the data on paper during a five minute face-to-face interview with close-ended questions. This approach was considered valuable as it increased the integrity of the data collected when compared to having the surveyees act on their own. However, primarily due to the constraints of time and the limited numbers of surveyors in the team, (maximum of four at a time), it was deemed inefficient. Furthermore, it increased the risk of bias through multiple surveyors.
- Digital questionnaires completed on Tablet PCs by surveyees. It was thought that the number of participants could be increased through the attraction of using high tech gear. However, this option was discarded due to 1) the inherent dangers of handing out lightweight, expensive machines to strangers on the street; 2) the learning curve entailed in the use of the technology, even if it directly mimics paper and pencil; 3) the limitations of the technology itself, as with battery life, software bugs, and data persistence; and 4) the bias created by the increased interest of 'tech-savvy' people in the devices, thus affecting the validity of the sample.
- Digital questionnaires completed by surveyors on Tablet PCs whilst interviewing participants: The limitations of the hardware, primarily battery life, were key to rejecting this option. Furthermore, application development was seen as an unnecessary obstacle that would return little benefit.

After much deliberation, the decision was taken to use paper based surveys that would be distributed to participants, with the option of filling it out for them if their circumstances required doing so (i.e. encumbered by eating, carrying bags, etc.).

4.1.2 The Questionnaire

The brainstorming for candidate survey questions led to a large selection of questions, which far exceeded the calculated 5-minute threshold estimate for the average individual. A few test runs with over 50 questions were conducted. The average time per question was found to be around 15 seconds. Using this estimate, the optimal number of questions to include in the survey was calculated to be 20 questions (+/- 5). A number of questions were eliminated through multiple prototypes administered to faculty, students, and staff at the New Jersey Institute of Technology, as well as friends and family through online submittals. The result was a 30 question, three-page questionnaire. The questionnaire was IRB certified prior to use.

At 30 questions, there was still considerable speculation about participants' willingness to complete the survey, let alone opt for it. Thus a realistic run was conducted, including high quality color printouts – 3 pages per questionnaire – at an Information Systems (IS) Seminar [see Appendix A]. There, the survey was distributed to some 30 attendants, ranging from undergraduate students to tenured professors, and requested that they time themselves as they fill in the blanks. Once completed, they were asked to take a few minutes to note issues that they may have encountered such as difficult-to-read questions, problems with the linear flow, and so on.

The result was a six-question reduction (to 24), a slight reorganization, and partial rewording of some questions [see Appendix B]. This effectively dropped the

questionnaire to one page, double sided, which brought us to the final draft and within the set time requirement. After a final test run, the final draft was established as fit for publication for use in the field. The survey was constructed as follows:

- **Section 1** - The survey collected demographic data in questions 1 through 4.
- **Section 2** - Participants were asked to note down where they were (e.g. “parking lot of supermarket, “platform of train station”, “bar in restaurant”), where they came from, and where they were going to next. These were questions 5, 6, and 7, which were to validate the chosen denotation for current place.
- **Section 3** - Questions 8, 9, and 10 collected data on frequency of visit, randomness of purpose, and purpose of visit, respectively. These established the surveyee’s relationship to the place.
- **Section 4** - This section is grouped with Section 3, as the answers would logically follow from one’s relationship to the place. Interest in place characteristics is queried (questions 11, 12, 14), as well as willingness to contribute to this data by being counted in the tally for the number of persons currently at the place (question 13).
- **Section 5** - Here, questions are more diverse than in the previous sections as a result of the variety of cells within the P3-Systems Framework (see Table 2.2). The answers to all the questions therein are set as checkboxes of types of people defined by social networks (i.e. friends, family, colleagues, subordinates, superiors, offspring, customers, and strangers), as well as the option to add one’s own (as in other). Each question below is answered by checking all of the types that apply to the question.

Questions 15 is derived from cell #4, providing asynchronous data of co-location to enable future interactions and a better understanding of how participants’ social networks relate to the place. For example, do people who have seen friends, family, and / or their children at a particular place have different privacy expectations than others who have not?

Question 16 derives from cell #3, using real-time co-location data to determine the requirements for social information exchange. If a person is meeting someone at a particular place, translating to deterministic real-time co-location, does his / her social information requirements differ from others who are not?

Question 17 derives from cell #5, where the participant would want to know who is in a particular place. This information is place-centric, and if available would provide a means of, say, avoiding a certain person.

Question 18 stems from cell #1, where a person would seek to know the particular location of an individual. This is person-centric absolute user location, and can accommodate locating an individual for a rendezvous.

Table 2.2 P3-Framework Question Derivation

P3-System Design Approaches		Synchronous Communication or Location Awareness	Asynchronous Communication or Location Awareness
<i>People-Centered</i>	Absolute User Location	Questions 18, 19	N/A
	Co-location / Proximity	Question 16, 20, 21	Questions 15
<i>Place-Centered</i>	Use of Physical Spaces by People	Question 17	N/A
	Use of Matching Virtual Places	N/A	Questions 22, 23

Question 19 brings to surface the privacy considerations of P3-Framework derived systems. This is similar to question 18, but in reverse, asking the surveyee to state his willingness to let others query his location information.

Question 20 is similar to question 18, except that the scope is limited to co-location (cell #3). Does the participant want to know if a friend is nearby?

Question 21 reverses question 20, as with the relationship between questions 19 and 18, thus asking the surveyee to denote his preferences for sharing his location information with others, but only in his vicinity (co-location / proximity).

Question 22 builds on cell #8 in querying people's interest in partaking in asynchronous online interactions related to their current place. This included posting comments for persons in their social networks.

Question 23 builds on cell #8, as with question 22, but deals with the reading aspect of the interaction, rather than the posting aspect. Are people interested in reading comments left by persons within / without their social networks?

Question 24 is an open-ended question which provides space for comments.

Please check the box for Yes or leave it unchecked for No.

NJIT

#	Who have you seen here previously?	People You Don't Know	Friend	Boy/Girlfriend/Spouse	Your Child	Colleague	Superior/Your Boss	Subordinate/Employee	Customer	Other:
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 4.1 Section 5 answer format and design.

4.2 Data Collection

The survey was conducted in Manhattan, New York City, throughout the month of November (in 2004). Surveying was considered at other locations in the Tri-State Area (New York, New Jersey, Connecticut), including small towns, shopping malls, strip malls, and residential areas. However, limiting the study to one urban center was expected to increase the value of any observed differences between place-types. Further, Manhattan was preferred for pragmatic reasons such as a wide range of potential survey sites within walking distance of each other.

The data collection was aided by Sukeshini Grandhi and Morgan Benton's Honors class students [see Acknowledgements].

4.2.1 Place Selection and Scheduling

The places for the survey were chosen to fit into an adaptation of the classification of places set forth by Kramer in the "Classification of Generic Places" [24]. These were: Services (e.g. train stations), Institutions (e.g. banks), Daily necessities (e.g. supermarkets), Socializing (e.g. café), Entertainment (e.g. cinema), Leisure (e.g. park), Cultural (e.g. museum), Physical (e.g. gym), Residential (e.g. apartment units).

With these classifications a list of 17 generic and specific places was developed, at which the survey would be conducted [see Appendix C]. However, after six weeks of seeking permission, due primarily to corporate rules and regulations by which most places were bound, permission to conduct the survey was only acquired at the following places [see Appendix D]:

- A BP Gas Station (*services*) on West 36th and 10th Avenue, in Hell's Kitchen. Data collection took place outdoors and indoors, but primarily outdoors around the petrol pumps.
- Grand Central Station (*services*) of 42nd Street. Data collection took place indoors, primarily in the Main Concourse and adjoining wings.
- United States Post Office (USPS) (*institutions*) of West 43rd St. The data collection took place outside, targeting people walking out of the post office.
- The Mid-Manhattan New York Public Library (NYPL) (*institutions*) on 5th Avenue. Data collection took place outside as people were coming out of the library.
- Gourmet Garage (*daily necessities*), a supermarket in Greenwich Village. Shoppers were surveyed outside, as they were coming out or going in.
- Gray's Papaya (*daily necessities*) a hotdog fast food joint in Greenwich Village (6th Avenue). Surveys were conducted inside.
- Trattoria Spaghetti (*daily necessities*) a restaurant in Greenwich Village. Surveys were conducted outside as people were going in and coming out.
- Café Ari (Greenwich Café) (*socializing*) in Greenwich Village on 6th Avenue. Data collection took place inside.
- Loews Cineplex (*entertainment*) in Times Square. Surveys were conducted under the cineplex sign's overhang as people were either waiting for their shows to start, or coming out after their shows.
- A Greenwich Village nightclub area (*entertainment*) on Bleecker and McDouglas. This was highly unsuccessful as most of the sample population were either drunk, or simply unwilling to be serious about filling in the questionnaire.
- Central Park (*leisure*) of New York City as people were walking about or sitting around

- The Rockefeller Center Plaza (leisure), between 5th and 7th Avenue. The surveying took place outside, in the plaza, around the Rockefeller Ice Skating Rink.
- The Guggenheim Museum (cultural) on 5th Avenue. Data collection took place around the museum, either as people were enjoying the art displays on the sidewalk, or as they were coming out of the Guggenheim.
- St. Patrick's Cathedral (cultural) on 5th Avenue. Surveys were conducted outside, on the steps leading into the cathedral, with people coming out.
- The New York Sports Club (NYSC) (physical) in Greenwich Village on 7th Avenue South. Questionnaires were distributed to people coming out of the gym.

The table below displays the places organized along an adaptation of Kramer's categories. As can be noted, the residential category was omitted in the final tally, as the relevant location (for conducting the survey) could not be 'secured' in time.. Thus, the surveying area spanned eight categories and 14 places therein. All but two categories had more than one place attributed to it.

Table 4.1 Final Survey Places Organized Along Kramer's Categories

Kramer's Categories	Place 1	Place 2
Services	BP Gas Station	Grand Central Station
Institutions	New York Public Library	United States Post Office
Daily Necessities	Gourmet Garage	Gray's Papaya / Trattoria
Socializing	Café Ari	
Entertainment	Loews Cineplex	Nightscene
Leisure	Central Park	Rockefeller Center Plaza
Cultural	Guggenheim Museum	St. Patrick's Cathedral
Physical	New York Sports Club	

Figure 4.1 (see below) maps the places surveyed on the map of the borough of Manhattan, in New York City. As can be noted from the map, the surveying schedule was determined by location groupings – Greenwich Village was tackled as one entity, Midtown as another, Upper East Side as yet another, and Central Park as the last. Midtown was further divided into east and west due to the place spread in that area. These groupings provided for better scheduling, where more than one place was tackled within the same timeframe to accommodate the four-week set duration of the surveying.

Table 4.2 Survey Schedule and Information

Date	Day	Time 1	Place	# in Group	Surveys	Time 2	Place	# in Group	Surveys
11/4/04	Thu								
11/5/04	Fri	4-6PM	Rockefeller	3	20				
11/6/04	Sat	4-6PM	Gourmet	2	17	4-6PM	Trattoria	1	4
11/7/04	Sun	12-1PM	Rockefeller	1	3	2-5PM	Central Park	1	13
11/8/04	Mon	2-4PM	US Post Office	2	22				
11/9/04	Tue	3-5PM	US Post Office	1	20				
11/10/04	Wed	9-11AM	BP Gas Station	1	13				
11/11/04	Thu	11-1PM	BP Gas Station	1	18	4-6PM	Trattoria & NYSC & Gourmet	4	15
11/12/04	Fri					4-7PM	Grand Central	3	63
11/13/04	Sat	3-6PM	Grand Central & Central Park	3	46	11-1AM	Greenwich Nightscene	1	2
11/14/04	Sun	3-5PM	Grays & NYSC & Gourmet	4	26				
11/15/04	Mon	10-1PM	Rockefeller & CentralPark	2	31	12-2PM	Gray's Papaya	1	25
11/16/04	Tue	11-1PM	St. Patrick's	2	8				
11/20/04	Sat	3-6PM	Café Ari	1	18	7-9PM	Loews Cineplx	2	50
11/21/04	Sun	4-6PM	Guggenheim & Café Ari	4	32	8-10PM	Loews Cineplx	2	25
11/23/04	Tue	10-1PM	NY Public Library	2	42	2-6PM	Café Ari	1	14
11/24/04	Fri								

The survey scheduling was designed to provide us with data from peak and off-peak hours at the places in question. This was to encompass the different socio-psychological dispositions that could arise during different times. So, for example, in the afternoon of a weekday, one would expect rush-hour at Grand Central Station, which could provide a different sample set than at the same time on weekends. By targeting different times, the survey was expected to capture a more representative sample of the population.

Table 4.2 depicts the time-slot on a particular day-of-week, as well as dates, number of surveyors, location and number of surveys collected. As can be noted, most places were targeted during peak and off-peak times.

4.2.2 Subject Sampling and Estimates

Survey respondents were recruited through a random, stratified sampling technique. Stratification was based on 1) place-type, and 2) sampling time at each location, either weekdays / weekends, or at peak / off-peak times of occupancy, as noted previously in the explanation of scheduling.

Furthermore, in places of high traffic the following techniques were used to maintain the randomness of the sample:

- The surveyor remains stationary in a given position and queries all those who come within his immediate vicinity. This was particularly necessary at Grand Central Station at peak hours when hordes of people came through at any given time, and standing one's ground provided for a random sample of the incoming.
- The surveyor approaches every other person who passes him by, rather than every person, to accommodate his / her limitations during peak hours. This was useful in Central Park, where each surveyor occupied a particular path.
- Where the venue was larger than could be covered by one surveyor, it was divided in half / third / quarter accordingly, and all within that sector would be approached.

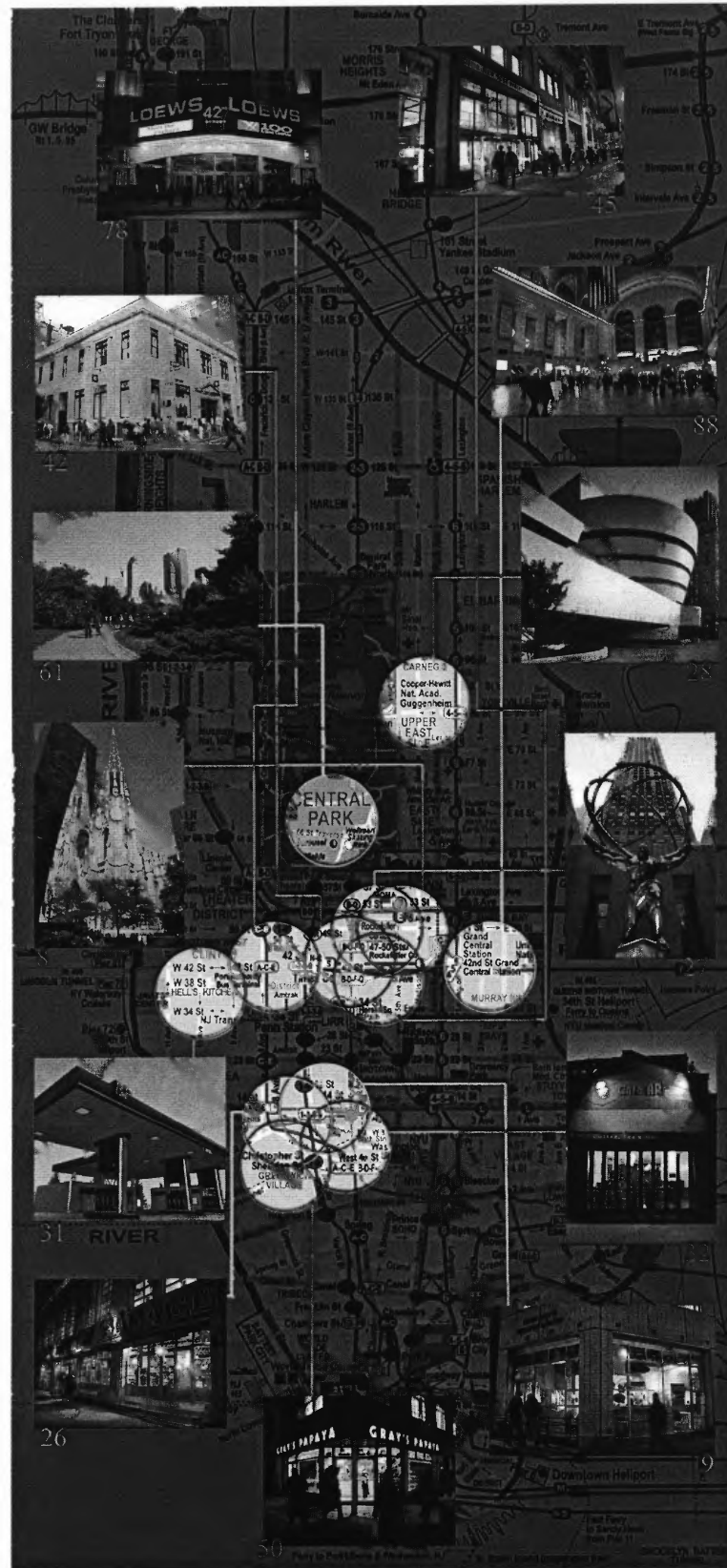


Figure 4.2 Survey locations and surveys collected per location.

Figure 4.2 provides photographic previews of the survey places, linking each venue in question with its image, and providing a clear delineation of the groupings and number of surveys collected at each location.

Surveyors were graduate and undergraduate students who had completed the Human Subjects Assurance Training to qualify for fieldwork.

In the end, 527 individuals completed the survey, 525 of which (the nightscene was omitted due to a mere 0.4% contribution) are represented in Figure 4.2. This value (525) is the tally taken prior to any analysis and assessment of data.

4.2.3 Recording Ethnographic Data

To aid the analysis of the survey data, a ‘Prompt Sheet’ [see Appendix E] was formulated to record ethnographic data (state) of the survey places, and the on-site researchers took photos of the venues [see Appendix D].

The ethnographic data was recorded every hour, as long as the surveying was taking place, and included information on:

- The name of the surveyor, to identify bias within surveys. However, none of the surveys showed signs of the such.
- The number of ‘refusals to take the survey’. Any person who refused, walked on, ignored, and the like, was noted down as a refusal. The tallies would be used to determine data discrepancies resulting from an abnormally high (significantly different from the other locations) number of refusals.
- The time and date, to help chronologically organize the surveys, and make up for any missed temporal notations on the surveys themselves. This was the primary source of temporal information.
- The current place-type, prescribed in a table for specific categorization. This would aid in filtering the many different place-types noted by the participants. This was the primary source for place, place-type, and place-category information.

- The perceived state of the place. This question provided for a qualitative assessment of the state of the place. The answers only provided for ironing out 'odd' results from the analysis.
- The 'crowdedness' of the place. This helped assess the accuracy of the predictions for peak / off-peak times / dates, and thus reinforce claims pertaining to these differences.
- Whether the place was 'noisy'. In a similar manner to the above, this helped assess predictions for peak / off-peak, but also provided environmental data to possibly help understand discrepancies in the analysis.
- The similarities of the activities undertaken by the occupants of the place. If a large variation of activities was noted, better assessments of unpredicted correlations would be possible.
- The extent to which one age group dominates the scene. This was a backup for the possibility of a mass non-notation of age on the survey. Such an incident did not occur.
- The fit of the activities to the place. This is born from the aforementioned citation that place is partially defined by activities taking place therein, therefore, if the activities do not 'fit' the place, the place-type may not be that which was noted. The only such incident that arose was the occurrence of a wedding at Grand Central Station during one of the survey sessions. However, on revising the surveys completed in that timeframe, none of the respondents had been there for the wedding.
- Whether it was raining at the time. This could explain an unexpectedly high unwillingness to complete the survey when approached outside. However, the rain did not come at such times.
- Whether it was cold outside. This could explain, as with the rain question, an unexpectedly high unwillingness to complete the survey when approached outside. However, a notable change in the ratio of persons willing to complete the survey versus those unwilling to was not observed when temperatures changed.
- Whether the temperature inside was comfortable. This applied the previous question to when surveying indoors. All indoors sessions had a 'comfortable' temperature.

4.2.4 Fieldwork Protocols

Due to the Human Subjects type of study, it was necessary to define specific protocols, including scripts for the surveyors and usage constraints for the data. As the questionnaire was IRB certified by the New Jersey Institute of Technology, the kind of data collected was approved upfront.

All the field-researchers developed their approach style along the lines of a prescribed Script [see Appendix F]. The script provided a base for professionalism, courtesy, and respect in dealing with prospective participants, supervising their work, and ending the interaction. In addition to the Script, when permission to survey inside the place was not granted, the researchers were advised to approach the prospective participants just as they were coming out of the place, and ask them to fill out the questionnaire as per the state of mind that they employed on the inside. This was deemed appropriate as the surveyees were to be approached prior to having entered a completely new environment, and thus mindset.

Consent was established verbally as the survey did not pose physical, psychological, or other types of danger, per IRB specification. The surveying was entirely on a volunteer basis, and no recompense was provided other than the option for further information about the research being conducted through an available-for-distribution Information Sheet [see Appendix C].

The Information Sheet, the Field Research Protocols [see Appendix G], the Final Survey, and an in-depth survey description (consisting of a previously published extended abstract) [see Appendix H], were provided to owners / managers / administrators of prospective survey venues. These explained the study in question, and

explicitly noted the requirements of the researchers, and the data to be collected. The Field Research Protocols provided a detailed notation of 1) how the subjects would be selected; 2) the type of non-survey data to be collected (via the Prompt Sheet); 3) the permission requirements of each venue; and 4) the mannerisms of the researchers. This enabled the hosts to predict what to expect, and avoided all potential conflict with the management.

4.3 Analysis Methods

The surveys were manually entered into SPSS®13, and identified uniquely by a key consisting of two initials from the surveyor + a number from 1 to the number attained. This key was entered on every paper survey received from a participant, upon receipt. As such, all data was traceable back to its original counterpart. The accuracy of the data was qualified by random cross-checking of ~100 surveys with their digital counterparts.

The analysis was divided into two parts, 1) the descriptives and 2) the regression models. SPSS®13 was used for all the analysis.

- 1) Descriptive statistics provided an overview of the data. By organizing the data into meaningful sets and spaces according to the variables therein, a clear glimpse of what to investigate through tabulation and regression models arose. [see Appendix I]
- 2) Logistic Regression analysis was performed as the last step to test key hypotheses regarding the potential management of potential P3-System services through the use of place-data. Due to their complexity and the quantity of data, the models are limited to extracting the necessary information to carry the research forward, rather than mining the data for all possible leads. [see Appendix J]

4.4 Limitations of Study and Ethical Considerations

4.4.1 Limitations

The study is limited by the fact that the survey was conducted in an urban center; rural areas were not included, nor were other urban centers, which could have provided an interesting basis for comparison. Furthermore, the number of people interviewed, although more than in previous studies, was still small in comparison to the size of the centers. The limited numbers of surveyors was an additional constraint, since it restricted the numbers of surveys that could be conducted. Another limitation was the short length of the survey, which did not permit the study to gain as much information as was desired. The surveyors had received permission in many cases to only survey outside the venue, which might have affected people's attitudes and willingness to share information.

4.4.2 Ethical Considerations

Every attempt has been made in this study to protect the participants of the study. This has been done by 1) obtaining IRB consent for the study and for the questionnaire used; 2) developing fieldwork research protocols; 3) obtaining voluntary consent at all times; and 4) providing participants and management of place-types with appropriate information and feedback.

Scientific integrity has been maintained through appropriate acknowledgements of published and unpublished assistance and bibliographic references.

CHAPTER 5

RESULTS

5.1 Demographic Profile of the Survey Respondents

Prior to any analysis, the data collected from St. Patrick's Cathedral, the New York Sports Club, and the Nightscene, was omitted due to the low numbers leading to what was felt to be a non-representative sample of the population. This brought down the data points to 508. This was then further reduced to 490, by filtering out respondents that provided spurious information (i.e. inappropriate answers) or incomplete surveys. With the final 490 data points, the following demographic information was established:

- **Gender Distribution:** Gender was fairly evenly distributed (52.9% males).
- **Age Distribution:** Most respondents (64.1%) fell into two main age brackets, 18-25 and 26-35, years of age. The majority of the remaining respondents were greater than 35 years of age. See Table 5.1 for complete age distribution.

Table 5.1 Age Distribution of Survey Respondents

Age Group	No. Of Respondents	Percentage
Under 18	24	4.9%
18 to 25	150	30.6%
26 to 35	164	33.5%
36 to 50	86	17.6%
51 to 65	55	11.2%
Over 65	11	2.2%
Total	490	100%

- **Place of Residence:** The majority of respondents, 74.7%, were New York Tri-State area residents. Another 13.3% lived in the United States but outside of the Tri-State area and 7% of respondents lived outside of the United States. Twenty three respondents or 4.7% of the sample did not provide details of their place of residence.

Other demographic information could not be quantitatively assessed, but was nonetheless used during the analysis for insight into the 1) socio-economic background and 2) occupation of the respondents in question.

5.2 Place and Category Distribution of Surveys

The greatest percentage of surveys (16.5%) was collected at Grand Central Station (see Table 5.2 below), while the least was shared between the Gourmet Garage Supermarket and the Rockefeller Center Plaza at 5.3%.

Table 5.2 Distribution of Surveys Completed per Place

Place	No. Of Respondents	Percentage
BP Gas station	30	6.1%
Grand Central Station	81	16.5%
United States Post Office	41	8.4%
New York Public Library	42	8.6%
Gourmet Garage Supermarket	26	5.3%
Gray's Papaya + Trattoria	48	9.8%
Café Ari	32	6.5%
Loews Cineplex	75	15.3%
Central Park	61	12.4%
Rockefeller Outdoor Plaza	26	5.3%
Guggenheim Museum	28	5.7%
Total	490	100%

When distributed according to the previously defined place-categories the greatest percentage of surveys (22.6%) went to the Services category (see Table 5.3 below). The smallest percentage went to the Cultural category at 5.7%.

Table 5.3 Distribution of Surveys Completed per Place-Category

Place-Category	No. Of Respondents	Percentage
Services	111	22.6%
Institutions	83	17.0%
Daily Necessities	74	15.1%
Socializing	32	6.5%
Entertainment	75	15.3%
Leisure	87	17.7%
Cultural	28	5.7%
Total	490	100%

5.3 Respondents' Relationship to Place

While the majority of respondents (57%) came to the location with the expectation of meeting somebody, only 28.6% of respondents came to the location in question for a scheduled activity.

Furthermore, the greater part of respondents stated that they had come to the survey location for reasons of entertainment (37.8%), with only 25.9% having come for either work or study (see Table 5.4 for full distribution of reasons for visit). This emphasis on entertainment and unscheduled activity is obviously related to the types of places at which the survey was conducted, and the choice of New York City (a tourist venue) as the urban center within which these places lie.

Table 5.4 Distribution of Reasons for Visit

Reason for Visit	No. Of Respondents	Percentage
Work	84	17.1%
Study	43	8.8%
Errands	71	14.5%
Entertainment	185	37.8%
Other	107	21.8%
Total	490	100%

The frequency with which the respondents visited the survey location is described in Table 5.5. The responses were fairly evenly distributed between the preset frequencies. Interestingly, 22.9% were visiting the location for their first time (also could be extrapolated to meaning visiting less often than ‘Every 6 Months’), which could be attributed to the types of places surveyed and the touristic nature of New York City.

Table 5.5 Distribution of Frequency of Visit

Frequency of Visit	No. Of Respondents	Percentage
First Time	112	22.9%
Every 6 Months	71	14.5%
Every 3 Months	47	9.6%
Monthly	87	17.8%
Weekly	79	16.1%
More than Weekly	94	19.2%
Total	490	100%

5.4 Descriptive Statistics

This section is divided into three parts, 1) descriptive statistics of respondents' desires for place-linked social information; 2) descriptive statistics of respondents' willingness to share their personal location data; and 3) descriptive statistics of respondents' attitudes towards posting and reading place-linked comments.

5.4.1 Desire for Place-Linked Social Information

The majority of respondents, 57.5%, listed one or more types of information (about the people who came to the survey site) that they would like to know about. These included: Age 18.8%; Income 11%; Hobbies 22%; Music 12.2%; Religion 5.3%; Ethnicity 9.8%; Political opinions 12%; and Other 4.5% (ranging from art tastes to dating availability to occupation).

Table 5.6 Questions on Desire for Occupancy Information

Question	Positive Responses
Would you like to know how many people are nearby now?	21.7%
Would you like to have known how many people were in this place before you came here?	29.0%

As per interest in occupancy of said place, Table 5.6 describes the responses to two Yes / No questions regarding desire for occupancy information. It is notable that both questions approximate to a quarter (~25%) of respondents showing interest in occupancy information.

Table 5.7 below best describes respondents' interest in place-linked social information in terms of three all inclusive relationship-categories, Friends and Family, Work / Service Related, and Strangers; these types were simply a grouping of the relationship-types listed in the survey. A high proportion of respondents were interested in some location information of at least one category (up to 44.5%). In general the respondents were more interested in knowing the location of family and friends, which is not surprising considering the finding that only 17.1% of respondents were at the various locations for work purposes. The most interesting contrast, however, lies in the data to follow, which offsets the high percentages of respondents that desired the location information of others with an even higher percentage (seen in Table 5.8) that were willing to share their location information with others.

Table 5.7 Desire for Place-Linked Social Information

Question	Yes to Any	Family & Friends	Work / Service Rltd	Strangers
Before you came here, would you have liked to know if any of these people were here or not?	42.0%	31.0%	12.7%	10.0%
Would you like to know where a person/s from any of the following categories is/are right now?	44.5%	33.5%	14.3%	9.2%
Would you like to know if a person/s from any of these categories is/are nearby now?	56.3%	48.6%	20.2%	8.0%

5.4.2 Willingness to Share Personal Location Data

Respondents were quite willing to have their personal location used to provide information for others and to inform family and friends of their location. Key to the importance of this finding is that the survey locations were fairly public (i.e. Main Concourse of Grand Central Station).

Table 5.8 highlights the extent to which respondents were willing to share some form of personal location information.

Table 5.8 Sharing Location Data for Occupancy / Crowding Metrics

Question	Positive Responses
Would you let yourself be counted as one of the people in this place now?	84.3%

Table 5.9 describes respondents' willingness to share personal location data with others (listed by relationship-categories).

Table 5.9 Sharing Personal Location Data with Others

Question	Yes to Any	Family & Friends	Work / Service Rltd	Strangers
Who would you allow to know that you are in this place now?	77.1%	68.6%	32.0%	16.5%
Who of these people would you let know that you are nearby now?	71.4%	64.3%	22.9%	9.2%

5.4.3 Attitudes Towards Posting and Reading Place-Linked Comments

The proportions within the distributions in Tables 5.7, 5.9, and 5.10 appear fairly consistent, indicating similarities in responses to P3-Framework-derived questions. However the notable exception, and as expected from the analysis of the P3-Framework in terms of privacy [22], was that respondents were less concerned about sharing place-linked comments than personal location data with strangers. Also, they appeared more interested in reading the comments of strangers than knowing about their location.

Table 5.10 Posting and Reading Place-Linked Comments

Question	Yes to Any	Family & Friends	Work / Service Rltd	Strangers
Would you like to be able to READ comments about this place or events that happen here from the following people?	54.3%	42.2%	23.7%	21.4%
Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	65.9%	63.7%	22.4%	18.6%

5.5 Observed Relationships

Throughout the analysis of the descriptive statistics, relationships were observed that provided insight into the outcome of the study. These were the stepping stones from which the Logistics Regressions were conducted. Each of the independent variables, 1) Age, 2) Gender, 3) Place-Category, 4) Survey Site, 5) Frequency of Visit, 6) Scheduled

Visit, and 7) Place of Residence, was investigated and surfacing relationships were noted. Only question 18-23 were included as dependent variables in order to focus on the constructs of mobile location aware community systems: 1) willingness to share personal location data, 2) interest in others' personal location data, and 3) interest in reading/posting place-linked questions.

5.5.1 Age

Age produced the most distinct outcome throughout the thesis, but along a different classification than the standard distribution adopted in the survey. In Table 5.11, respondents are grouped into four age ranges (under 18, 18 to 25, 26 to 35, and 36 to 50) together, then '51 to 65' in another, and the final one (over 65) on its own. Apart from the somewhat divergent behavior of the '36 to 50' age range, the outcome followed through consistently (see Figure 5.1) across the new groupings.

Table 5.11 Age Group and Responses to P3-System Services Questions

	Under 18	18 to 25	26 to 35	36 to 50	51 to 65	Over 65
Q18: Would you like to know where a person from any of the following categories is/are right now?	62.5%	52.7%	47.6%	32.6%	23.6%	45.5%
Q20: Would you like to know if a person/s from any of these categories is/are nearby now?	62.5%	64.7%	60.4%	50.0%	32.7%	36.4%
Q19: Who would you allow to know that you are in this place now?	79.2%	84.7%	75.6%	77.9%	56.4%	90.9%
Q21: Who of these people would you let know that you are nearby now?	79.2%	80.7%	72.6%	67.4%	47.3%	63.6%
Q22: Would you like to be able to READ comments about this place or events that happen here from the following people?	66.7%	61.3%	56.1%	52.3%	29.1%	45.5%
Q23: Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	54.2%	53.3%	49.4%	51.2%	21.8%	45.5%

The above table depicts the percentage of positive answers to the questions listed, of the total respondents per age group.

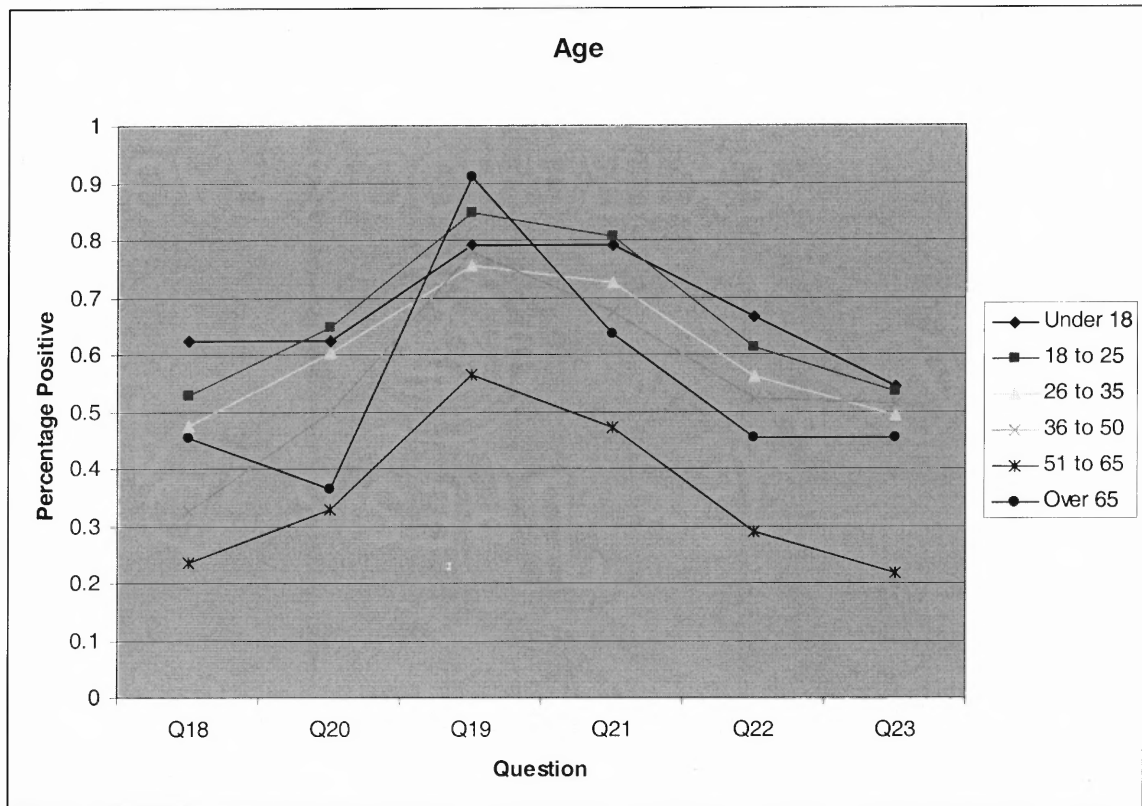


Figure 5.1 Line chart of observed age and responses to P3-System services questions.

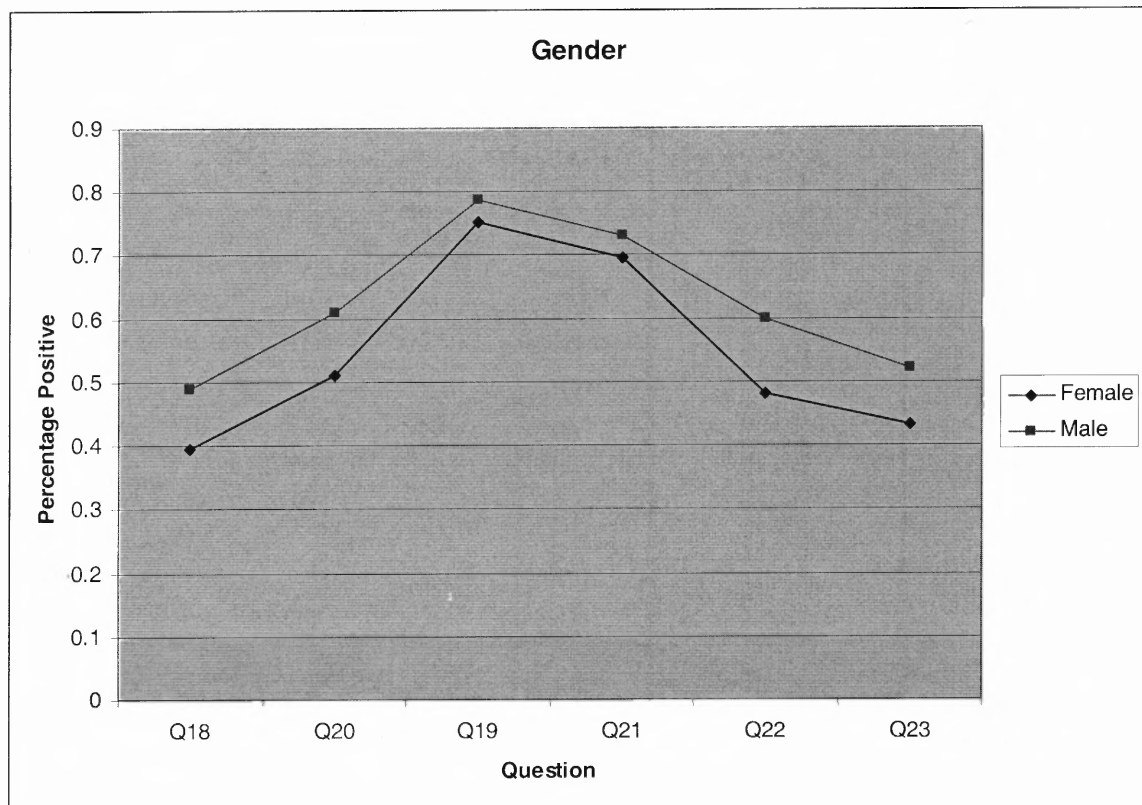
5.5.2 Gender

Males came in at a consistent ~10 percentage points above females in all but questions 19 and 21, where only four percentage points marked the difference. Most notably, albeit the difference in overall interest, both genders exhibited the same relationship across the questions (see Figure 5.2).

Table 5.12 Gender VS Questions 18-23

	Female	Male
Q18: Would you like to know where a person from any of the following categories is/are right now?	39.4%	49.0%
Q20: Would you like to know if a person/s from any of these categories is/are nearby now?	51.1%	61.0%
Q19: Who would you allow to know that you are in this place now?	75.3%	78.8%
Q21: Who of these people would you let know that you are nearby now?	69.7%	73.0%
Q22: Would you like to be able to READ comments about this place or events that happen here from the following people?	48.1%	59.8%
Q23: Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	43.3%	52.1%

The above table depicts the percentage of positive answers to the questions listed, of the total respondents per gender group.

**Figure 5.2** Line chart of observed gender and responses to P3-System services questions.

5.5.3 Place-Category

Willingness to share, and interest in others', location data appeared to change randomly across the place-categories set by Kramer. Even with further examination place alone could not be used to determine people's preferences. More 'public' places, such as places for socializing, did exhibit a significantly greater positive response than more 'private' places (i.e. institutions). On a separate note, willingness to share personal location data varied less than the other questions, indicating a possible independence of that preference from place-categories.

Table 5.13 Place-Category VS Questions 18-23

	Services	Institutions	Daily Necessity	Socializing	Entertainment	Leisure	Cultural
Q18: Would you like to know where a person from any of the following categories is/are right now?	47.7%	37.3%	35.1%	50.0%	53.3%	44.8%	46.4%
Q20: Would you like to know if a person/s from any of these categories is/are nearby now?	63.1%	47.0%	44.6%	75.0%	58.7%	59.8%	50.0%
Q19: Who would you allow to know that you are in this place now?	83.3%	77.1%	75.7%	78.1%	76.0%	70.1%	78.6%
Q21: Who of these people would you let know that you are nearby now?	79.3%	67.5%	62.2%	75.0%	77.3%	67.8%	67.9%
Q22: Would you like to be able to READ comments about this place or events that happen here from the following people?	49.5%	47.0%	50.0%	75.0%	58.7%	54.0%	71.4%
Q23: Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	43.2%	43.4%	39.2%	59.4%	52.0%	49.4%	75.0%

The above table depicts the percentage of positive answers to the questions listed, of the total respondents per place-category.

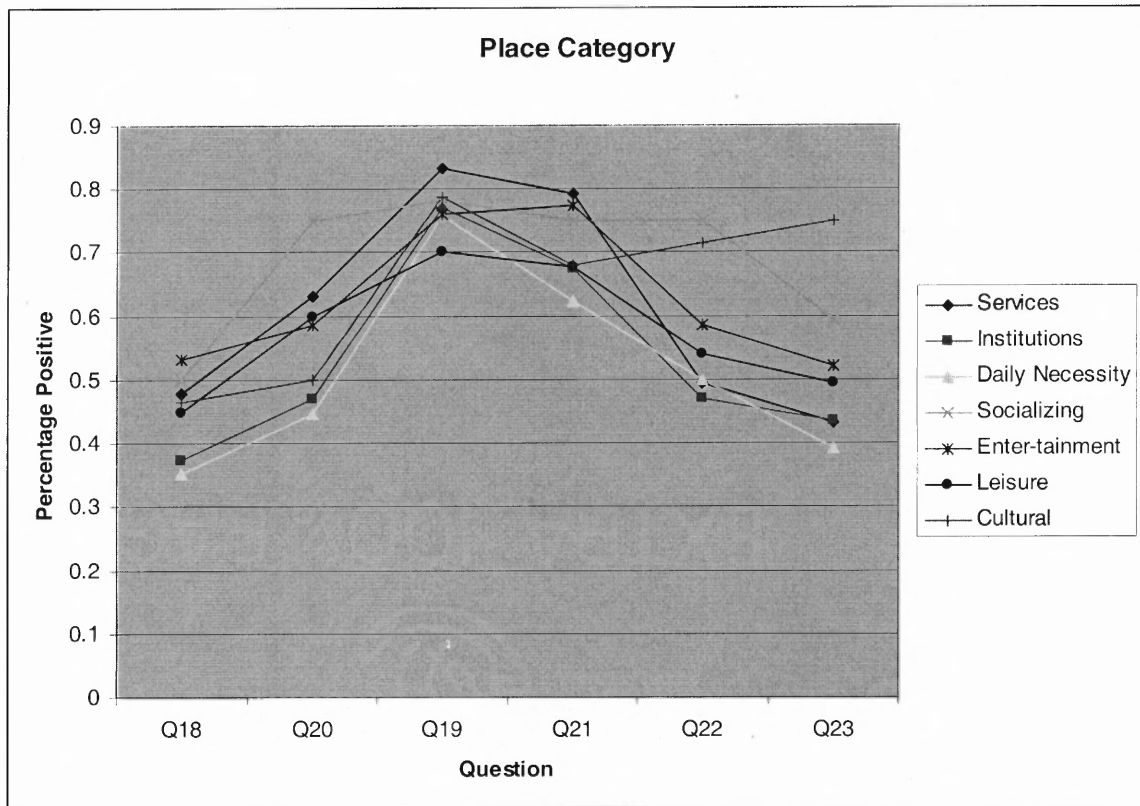


Figure 5.3 Line chart of observed place-category and responses to P3-System services questions.

5.5.4 Survey Site

The outcomes here follow from what was observed with place-categories, except that sites previously part of the same category appear to have considerably different behaviors (i.e. Supermarket and Cafe). This indicates that Kramer's categories may not have been the best categorization of place-type.

Table 5.14 Survey Site VS Questions 18-23

	Gas Sation	Grand Central	Post Office	Public Library	Supermarket	Restaurant	Cafe	Cinema	Central Park	Rockefeller	Museum
Q18: Would you like to know where a person from any of the following categories is/are right now?	46.7%	48.1%	36.6%	38.1%	26.9%	39.6%	50.0%	53.3%	42.6%	50.0%	46.4%
Q20: Would you like to know if a person/s from any of these categories is/are nearby now?	60.0%	64.2%	48.8%	45.2%	30.8%	52.1%	75.0%	58.7%	52.5%	76.9%	50.0%
Q19: Who would you allow to know that you are in this place now?	80.0%	85.2%	73.2%	81.0%	73.1%	77.1%	78.1%	76.0%	68.9%	73.1%	78.6%
Q21: Who of these people would you let know that you are nearby now?	76.7%	80.2%	70.7%	64.3%	61.5%	62.5%	75.0%	77.3%	62.3%	80.8%	67.9%
Q22: Would you like to be able to READ comments about this place or events that happen here from the following people?	60.0%	45.7%	46.3%	47.6%	46.2%	52.1%	75.0%	58.7%	55.7%	50.0%	71.4%
Q23: Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	46.7%	42.0%	51.2%	35.7%	38.5%	39.6%	59.4%	52.0%	50.8%	46.2%	75.0%

The above table depicts the percentage of positive answers to the questions listed, of the total respondents per survey site.

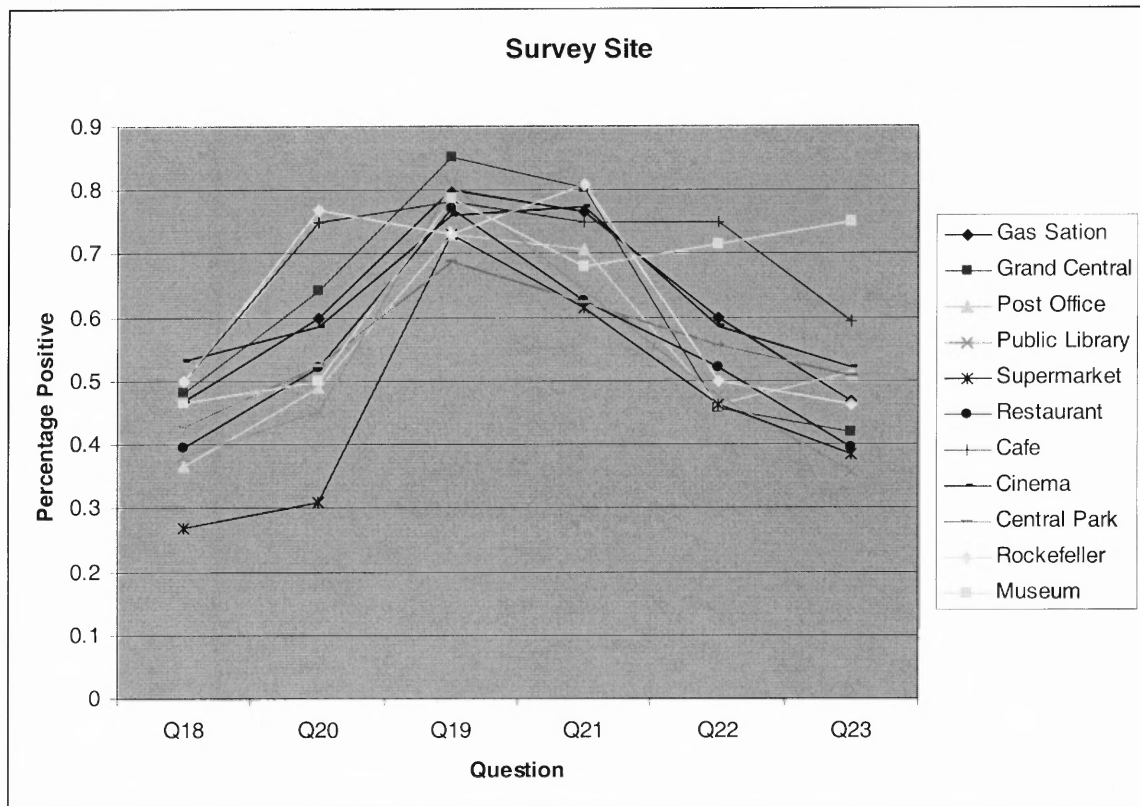


Figure 5.4 Line chart of observed survey site and responses to P3-System services questions.

5.5.5 Frequency of Visit

In Figure 5.5 the last two questions (Q22 and Q23) appear to depict erratic behavior as the frequency of visit decreases – first time visitors and those who visit every six months showing the largest interest in posting and reading place linked comments whereas those who visit every three months show the least interest (at as much as 30 percentage points lower). The fact that the data points of those who visited more than weekly followed the same curve as those who visited every three months puts to question the importance and relevance of the ‘frequency of visit’ variable.

Table 5.15 Frequency of Visit VS Questions 18-23

	First Time	Every 6 Months	Every 3 Months	Monthly	Weekly	More Than Weekly
Q18: Would you like to know where a person from any of the following categories is/are right now?	44.6%	49.3%	34.0%	47.1%	50.6%	38.3%
Q20: Would you like to know if a person/s from any of these categories is/are nearby now?	54.5%	62.0%	51.1%	57.5%	62.0%	51.1%
Q19: Who would you allow to know that you are in this place now?	75.0%	70.4%	85.1%	74.7%	84.8%	76.6%
Q21: Who of these people would you let know that you are nearby now?	67.0%	67.6%	76.6%	73.6%	73.4%	73.4%
Q22: Would you like to be able to READ comments about this place or events that happen here from the following people?	61.6%	60.6%	40.4%	47.1%	63.3%	46.8%
Q23: Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	56.3%	59.2%	29.8%	46.0%	50.6%	38.3%

The above table depicts the percentage of positive answers to the questions listed, of the total respondents per frequency of visit grouping.

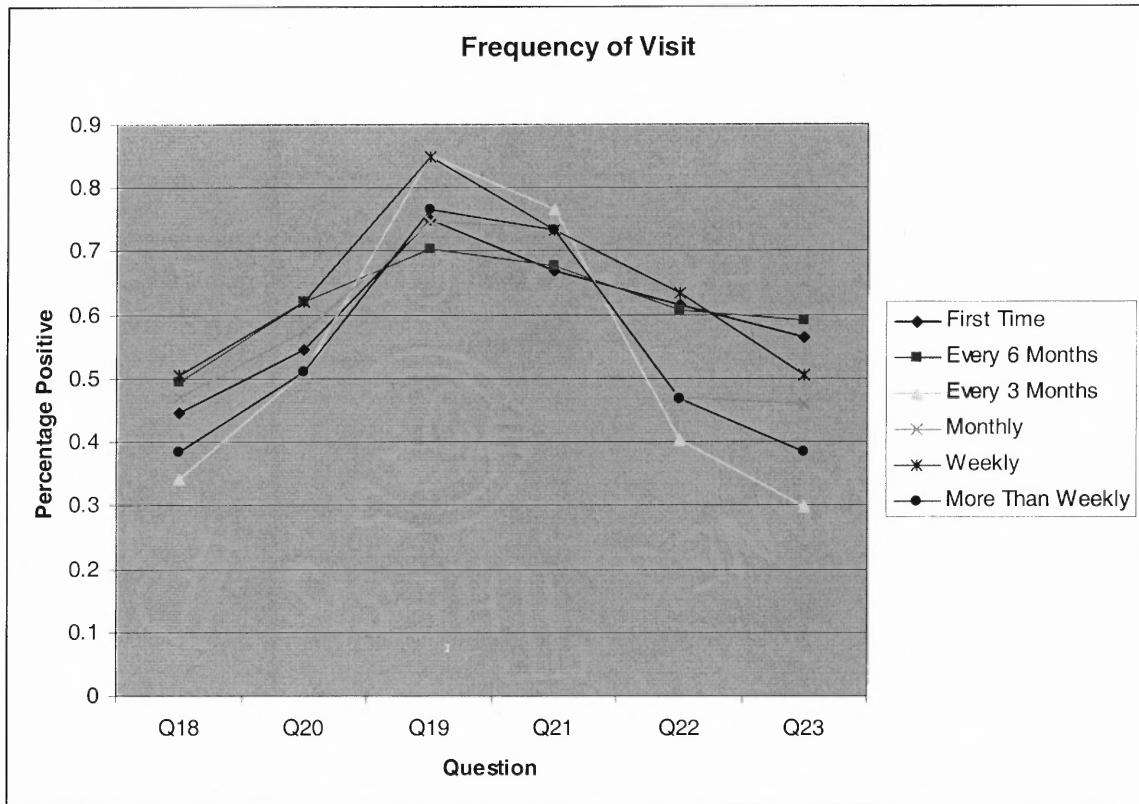


Figure 5.5 Line chart of observed frequency of visit and responses to P3-System services questions.

5.5.6 Scheduled Visit

As with the relationships noted in the section on gender, scheduled activities resulted in a greater interest in social information exchange. Note that the interest appears to diminish for Q22 and Q23, which can be attributed to the predefinition of the activity.

Table 5.16 Scheduled Visit VS Questions 18-23

	Scheduled	Unscheduled
Q18: Would you like to know where a person from any of the following categories is/are right now?	53.6%	40.9%
Q20: Would you like to know if a person/s from any of these categories is/are nearby now?	69.3%	51.1%
Q19: Who would you allow to know that you are in this place now?	84.3%	74.3%
Q21: Who of these people would you let know that you are nearby now?	82.9%	66.9%
Q22: Would you like to be able to READ comments about this place or events that happen here from the following people?	61.4%	51.4%
Q23: Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	50.7%	46.9%

The above table depicts the percentage of positive answers to the questions listed, of the total respondents per whether they came for a scheduled visit.

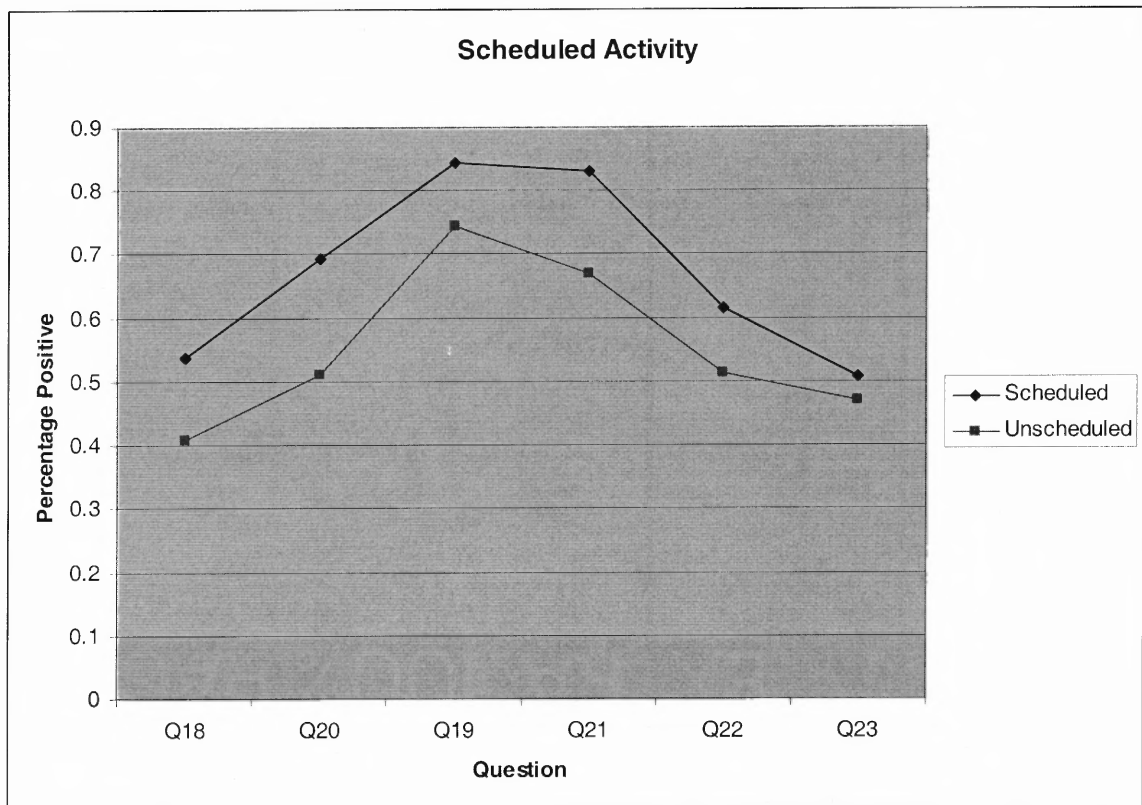


Figure 5.6 Line chart of observed scheduled visit and responses to P3-System services questions.

5.5.7 Proximity of Household to Survey Site

When plotting people's household proximity to the survey site, three distinct groups appeared, 1) the Tri-State dwellers (New York, New Jersey, and Connecticut), 2) the rest of the United States, and 3) persons from outside the USA. The interesting relationship observed here is the on average ten percentage point increase in positive answers (for questions 18-23) provided by persons in the US, but not the Tri-State area. These two curves maintain consistent ~10 percentage points separation throughout the questions. On a side note, participants from outside the US produced a kink in the curve at Q21, most likely the result of their relationship to the place, translating to the unlikeliness of anyone they know being in Manhattan and looking for them.

Table 5.17 Near/Far VS Questions 18-23

	Within Tri-State	US w/o Tri-State	Outside US
Q18: Would you like to know where a person from any of the following categories is/are right now?	44.5%	55.4%	27.8%
Q20: Would you like to know if a person/s from any of these categories is/are nearby now?	56.6%	66.2%	41.7%
Q19: Who would you allow to know that you are in this place now?	78.7%	86.2%	52.8%
Q21: Who of these people would you let know that you are nearby now?	73.0%	83.1%	38.9%
Q22: Would you like to be able to READ comments about this place or events that happen here from the following people?	53.0%	61.5%	47.2%
Q23: Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	47.3%	56.9%	38.9%

The above table depicts the percentage of positive answers to the questions listed, of the total respondents per the proximity of their households to the survey site.

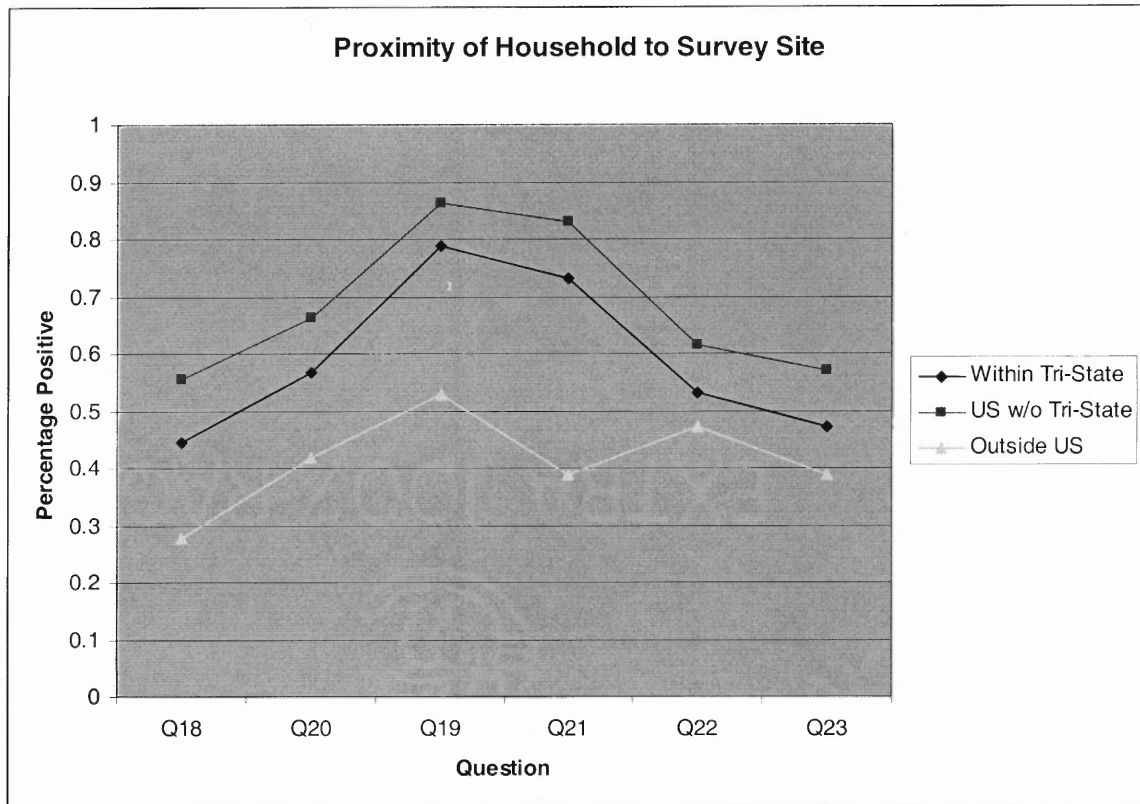


Figure 5.7 Line chart of observed near/far and responses to P3-System services questions.

5.6 Logistic Regression

Multivariate analysis was conducted by other members of the research team. The key findings are noted in this section. For further information please look to the similarly titled CHI 2005 published paper from which these findings are derived [16].

Logistic regression modeling was conducted on answers to the question of 'willingness to be counted as in a place', and each of those found in Tables 5.7 and 5.9, to determine the key predictors of willingness to share and desire for place-linked social information. The primary approach used for regression modeling was backward elimination. The independent variables examined carried over from Section 5.5 (Observed Relationships) as the outcomes noted were investigated for statistical

significance; these were, age, gender, place-category, survey site, frequency of visit, scheduled visit, and place of residence (the analysis reported here excludes respondents that did not provide a United States residential zip code). The regression analysis included the breakdown of the positive answers to their corresponding categories of 1) family and friends, 2) work / service related, and 3) strangers, as opposed to the ‘yes to any’ approach used in the tabulations. Using regression modeling facilitated the inclusion of this breakdown.

Key findings from the regressions are:

1. The Kramer-derived place-categories were weaker predictors than the full fine grained approach of considering each survey site uniquely.
2. Younger respondents, as observed in the tabulation, were more likely than older respondents to both desire place-linked social information and share their location data. This outcome, however, reversed itself after the age of 65.
3. The variable ‘survey site’ only became significant when the type of social relationship (i.e. family and friends vs. work / service related) was controlled for. This can be illustrated by an examination of the modeling of the first question in Table 5.7, where “going to the location for a scheduled activity” was the best predictor of the ‘Yes to Any’ (category) response ($\chi^2=6.14$, $df=1$, $p=0.013$), while the ‘survey site’ was the primary predictor when ‘family and friends’ was the dependent variable in the logistic regression ($\chi^2=24.91$, $df=10$, $p=.006$). Another important example results from the modeling of answers to the first question listed in Table 5.9 - where ‘Yes to Any’ (category) was best modeled by age and schedule ($\chi^2=18.26$, $df 6$, $p=.006$) and ‘friends and family’ was best modeled by combining “survey site” and “age” ($\chi^2=43.54$, $df 15$, $p=.000$).

CHAPTER 6

DISCUSSION

6.1 The Impact of Place

Whereas this started as an investigation of the impact of place on people's social information needs and willingness to share personal location data, as per the interest in validating and elaborating on the P3-Systems Framework, the results reveal that the issue at hand is much more complex, and must factor in other variables, particularly demographic variables and those defining personal activities.

Furthermore, when factoring in variables such as whether the visit was scheduled and the age of the respondents, the results indicate that the categories proposed by Kramer are not the most ideal categorizations for such analyses; by isolating each survey site independently, the results showed a greater role of the effect of place.

While it may pass without issue to attribute the results to an 'inadequate' choice of categories, their being based on a respected and often cited publication in environmental psychology required that the problem be investigated further. In realizing that the finer grain analysis provided for better predictions, Figure 5.4 (chart of survey site relationships) was meticulously studied and particular patterns were noted. Most prominently, the supermarket and the public library shared a very similar curve-path and yet belonged to different Kramer-Categories. Upon reviewing Kramer's "Classification of Generic Places" [24], a link between the level of privacy attributed to the place and the correlations observed in the fine grained analysis was established. The ethnographic data collected and the characteristics of these places indicated that privacy was a greater issue at these places than others, others even in the same categories as provided by Kramer.

Thus it appeared that the classification (categorization) of these generic places should be revised to give more prominence to the level of privacy attributed to the place.

On another note, places which afford only very specific activities (i.e. museum and post office) produced unique relationships that were not observed elsewhere. Again, Figure 5.4 provides a clear visualization of this behavior. It appears that the definition of place, as per an activity filling a space [19], is very much dependent on the kind of activities and their diversity. If they (activities) become increasingly diverse, and are occurring in concurrency, then the definition of place loses its strictness, which would explain the relative ‘generality’ of the relationships observed for most of the sites surveyed – few of these sites exhibited a strict set of activities. A notable example would be the last two data points of the museum in Figure 5.4, where the educational characteristics of the museum lead to a very high (and diverging from the rest) interest in leaving and reading place-linked comments.

On a similar note, the unique ethnographic nature of Manhattan (touristy) might have come to play a divisive role in the place-effects observed. This was highlighted in the relatively high number of ‘entertainment’ responses (37.8% of total responses, and over twice as great as any other unique response) provided for the question “what are you here for”. Since activities are integral to defining place, as argued in the previous paragraph, the limited number of study, work, and errand activities noted indicates the possibility for touristy polarization of the data. Thus, the significance of the place-categories may have been subdued by the selection of New York City as the urban center for the study.

6.2 Demographic Effects

Age, gender, and location of residence proved to be some of the most powerful predictors for interest in P3-Systems Services. This was witnessed in the significance of these variables in both the tabulations, and then the regressions that confirmed the observed relationships.

6.2.1 Age

Age presented many interesting relationships, especially as some proved to be statistically significant. Most notably, younger respondents expressed more interest in both sharing and seeking location information, as well as posting and reading place-linked comments. This could be attributed to their being more ‘technologically savvy’, but could also be related to different attitudes found in different age categories.

From the clear divisions apparent in the cross-tabulations and resulting charts [Table 5.11 and Figure 5.1], respondents can be grouped into three age-specific categories, for which I suggest the following characteristics, based on the patterns of responses to the survey questionnaire: 1) varyingly dependent, wandering, curious; 2) independent, committed, focused; and 3) more dependent, curious. Up until the age of 50 (but decreasingly so in the last age range of ‘36 to 50’), respondents followed a common curve in their responses. Age ranges ‘under 18’ and ‘18 to 25’ were aligned to the point that they can be combined into a single range, as can the age ranges of ‘26 to 35’ and ‘36 to 50’, although to a lesser degree due to the divergent behavior of ‘36 to 50’ on question 18. However, one could even combine all four age ranges into one range seeing as the differences between them is relatively negligible when compared to the last two (‘51 to 65’ and ‘over 65’). These fall into category 1 (varyingly dependent, wandering, and

curious) as can be seen in their high levels of interest in sharing, seeking, and exchanging location information. However, the behaviour of age range '36-50' is somewhat divergent, particularly on question 18 (Would you like to know where a person from any of the following categories is/are right now?). This divergence might be accounted for by its adjacency to the age ranges of '51 to 65', and 'over 65', which is substantially different from the rest.

Since most people in North America between the ages of 51 and 65 are likely to be established with family, work, and life-priorities, they could be posited to have a different set of needs and attitudes towards P3 systems, due to their being more focused, and independent, as in category 2. This might explain the significant divergence from the rest of the respondents in the very low percentages of positive responses (as low as 21.8%).

Interestingly, the age range of 65 and above exhibited the greatest variation of positive responses between different questions, with an astonishing 54.5 percentage point difference between questions 19 and 20 [see Figure 5.1]. To better understand this phenomenon it is necessary to understand what differentiates this group from the rest. Compared to younger age groups, one might posit that seniors are more dependent and less mobile. Consequently, they are less likely to seek the location information of others, especially proximate location (as many would be less mobile at that age). It is also interesting to note their almost unanimous willingness to reveal their location information to others, particularly absolute location information. In this respect, they appear sociable and wanting others to come to them. These relationships, however, need to be explored

with a larger number of elderly respondents, since the survey numbers are too small to be statistically significant (n of 'over 65' is only 11).

Given the kind of information generated by the survey, it is difficult to give a more precise analysis of the relationships, beyond describing their characteristics and giving the few speculative suggestions noted above. Further investigation is needed to understand the significance of age in potential P3 systems usage. It would be useful to conduct a survey similar to the one carried out here, grouping age ranges differently, to see if this would affect the results noted above. Thus, given the larger proportion of educated and technologically aware "senior citizens", and their improved health and mortality rates, the cut off point may well not be 65, but possibly 70 or 75. The possibility that P3 systems might have to be designed to accommodate the needs and attitudes of different age groups remains an interesting challenge.

6.2.2 Gender

Gender proved to be particularly interesting in its variation across the groupings of the questions. Females were about ten percentage points less likely to seek out other people's location information than males. This held through both absolute location and proximate location. However, that gap narrowed to less than four percentage points in questions that queried willingness to share personal location data. The expectation was for the opposite, where females were to be less willing to share personal location data due to privacy concerns. It appears that the delineation of the 'persons with whom you are willing to share' has kept privacy fears at bay, by requiring a specific selection of who is allowed access.

Overall, males maintained a greater positive response throughout the questions, indicating a possibility for greater acceptance of location aware community systems by the male gender.

6.2.3 Place of Residence

Local (Tri-State) residents provided less positive responses (10 percentage point difference) than the rest of the US respondents. It is believed that this is the result of the Tri-State grouping which does not clearly differentiate ‘locals’ from ‘out of towners’. This is reinforced by the very similar paths taken by the two curves, and the almost identical percentage difference exhibited. By matching survey site zip codes to place of residence zip codes, a more realistic perspective on relative relation to community would have arisen.

The kink in the non US respondents’ (not living in the US) curve, first noted in Section 5.5.7, clearly defines them as tourists ‘not belonging’ to the community of Manhattan. The sudden change in willingness to share personal location data between questions 19 and 21 is most likely due to the ‘detachment’ experienced by tourists when in a foreign country – there is little expectation that anyone they know will be within their proximity, thus many of them would have disregarded the question as valid to their case. Furthermore, they provided less positive responses overall, in line with the notion of ‘being detached’ as tourists.

6.3 Relationship to Place and the Role of Activities

The results indicate that the respondents' relationship to place, as introduced in Section 6.2.3, can determine their interest in location aware community services. Furthermore, the activities that take part in defining the place [19] play a similar role in affecting the interest in these services. The most notable behaviors observed, as pertaining to relationship to place and the role of activities, were from the variables, 1) Frequency of Visit and 2) Scheduled Visit.

6.3.1 Frequency of Visit

The expectation was that as frequency of visit increased, and the relationship to place was reinforced, there would be a greater number of positive responses to social networking questions. But it seems that the fallacy lies in the assumption that frequency of visit will affect a person's relationship to place in the manner necessary to enable community networking.

The relationships observed indicated that frequency of visit could not reliably predict people's interest in and willingness to share location information. As previously noted, there exists a 'crisis of community' [8], which may in effect have eliminated the effect frequency of visit had on establishing a sense of 'belonging' [6] over time that would have enabled a predictor for that variable. This leads to the importance of the role of activities in compensating for the weakening relationship to place that has emerged.

6.3.2 Scheduled Activity

The role and effect of activities on respondents first appeared in Section 6.1 where it was apparent that activities-centric places (i.e. museum and post office) exhibited a unique behavior in responses. Similarly, in the results, the ‘scheduled activity’ variable was found to predict (when positive) a greater interest in social networking. This disagrees with the initial hypothesis that assessed a lessening of this networking activity due to the ‘focus’ of the purpose of the visit.

The movement of the curve indicates the highest difference in interest resting on proximate location interaction (18.2 percentage point difference), then absolute location interaction (12.7 percentage point difference), and finally posting and leaving messages (3.8 percentage point difference) which is less than one-third of the lesser of the previous two. This falls neatly in line with the mindset of a person who plans on meeting someone (high interest in locating them), a person who is looking for someone they are supposed to meet (high interest in proximate location), and a person who is taking part in a scheduled activity that might restrict their capacity for posting/reading comments.

Thus activities appear to be very good predictors of people’s willingness to share, seek and interact with community networks.

6.4 Accounting for Disposition

Disposition can be attributed to the behavior of many of the data relationships observed. In previous studies [23], disposition was concluded as having an ‘unsettling’ effect on predictor variables due to its capacity to completely change the mood, mindset, and outlook of the user.

However, disposition remains highly elusive to quantify as a variable, but can be tackled indirectly through other variables, primarily demographic variables. As previously discussed in Section 6.2, understanding the psychology and socio-cultural impressions of a particular age group can help explain ‘common disposition’, as in disposition that is not spontaneous, by acknowledging certain behavioral characteristics. The real issue with tackling ‘spontaneous disposition’ remains in becoming aware of the onset of this state, but in theory, a study can be carried out to determine how different dispositions affect interest in social networking, prior to the existence of systems that can be aware of such variables.

6.5 Notable Issues

Privacy was a core issue arising from previous studies [23, 22]. However, both the ethnographic and questionnaire data collected indicated that although there were a few notable issues of privacy (i.e. 23 or 490 respondents refused to note down their zip code), the majority of the participants exhibited an acceptable level of ‘trust’ in the system by being willing to provide their personal location data (to an authorized set of people).

This indicates people’s general trust in technology, but could also be attributed to the segregation, layout, and wording of the survey that could have instilled a clear indication of who could do what.

However, with most survey sites being public places, and the majority of respondents seeking entertainment activities, there’s a possibility that privacy issues were subdued and did not reflect how people would have responded at home, in the office, at work, in a strip club, and in just about any place that can be regarded as more private than

public. This does not mean that the results are wrong, but rather that P3-Systems design would need to account for what is ‘not’ in the results to make sure that the mobile device does not become a liability in unaccounted for situations.

6.6 Real World Implications

Four major findings can be extracted from the results of this survey. First, P3-Systems services are of general interest to the public with over 40% of respondents expressing an interest in locating others at the various survey sites; thus the demand for these services exists. Secondly, the majority of respondents in the 11 survey place-types were willing to share aspects of their personal location data (e.g. 84.3% of respondents were willing to have their location data used to provide information about occupancy / crowding), indicating an almost unanimous interest in contributing to populating the systems with data. Collectively these first two points suggest that if trustworthy P3-Systems, that adequately address user privacy concerns are built, demand for P3-services will be high and the services provided would be richly populated with data, increasing their appeal and use.

Thirdly, demographics and geo-temporal routines matter. Younger respondents were much more likely to both desire, and share personal location data, and other age groups exhibited unique interest patterns (the seniors’ exceptional interest in absolute user location services). Further, gender, schedules, and frequency of visit to the survey sites were often found in the regression modeling to predict willingness to share or utilize place-related social data.

Finally, the logistic regression modeling shows that while place/location is clearly important, it is not as important as social relationships in predicting when or with whom individuals want to share/retrieve personal location data.

6.7 Applications on Systems Design

Building on the results and analysis, the following recommendations can be made towards the design of mobile location aware community systems (P3-Systems):

- Most importantly, provide manual overrides for all automated functions to build confidence in ‘who’s in control of’ the system, and alleviate privacy concerns.
- When accessing the system for the first time, provide the option for different levels of participation (absolute location only or posting/reading comments only), or no participation at all.
- Establish a no share / no seek policy to avoid stalkers and issues with tracking.
- Set discrete intervals for context polling to avoid full tracking capacities and reduce power consumption on mobile devices.
- Implement an adaptive mode that changes the behavior of the system according to the variables discussed.
- Include demographic information in the ‘profile’ of the user that will be used to adjust the behavior of the system if left in automatic adaptation mode. Younger users’ devices could have more aggressive context polling frequencies for a more accurate representation of ‘real-time’.
- Integrate personal calendar access on the device (most likely through synchronization with Microsoft Outlook) to allow for automatic adaptation to scheduled activity environments. Activities can be given simple tags that would be machine readable providing for further automated customization.
- Tie location awareness with place of residence for possible awareness of proximity to personal community and social networks.
- Cache location information within a set period of time for possible next-location prediction to facilitate scheduled activities coordination. Furthermore, this data can be used for geo-temporal routine matching in implementations of matchmaking systems.

6.8 Future Exploration

Different urban and suburban settings should be surveyed to determine the generalizability of these findings, with a selection of places that would provide better access to the minority age groups (under 18 and over 65) represented here. Greater numbers will be necessary in future studies in order to better assess the significance of any findings.

Using prototypes in the field to mimic the proposed devices is a logical next step that is currently being carried out. Tablet PCs and PDAs are being used to collect contextual information and query users accordingly. This data is to be much finer grained and provide better insight into the effects of disposition and geo-temporal routines.

APPENDIX A

INITIAL SURVEY

This is the final draft of the survey, prior to the last edit and finalization.

Location Aware Mobile Systems Survey



_____ Information Systems @ New Jersey Institute of Technology Time/Date: _____

This survey aims to collect information for the following purposes:

- *To better understand what kind of social information people want in specific places.*
- *To determine if it is possible to generalize these needs in order to develop intelligent mobile (e.g. cell phone) applications.*

1 Age: Under 18 ☐ 18 to 25 ☐ 26 to 35 ☐ 36 to 50 ☐ 51 to 65 ☐ Over 65 ☐

2 Gender: Female ☐ Male ☐

3 Home Zip Code: _____

4 Occupation: _____

5 Where are you now? (ex: "parking lot of supermarket" ; "platform of train station" ; "bar in restaurant")

6 Where have you just come from? _____

7 Where do you plan on going next? _____

8 How frequently do you visit this place?

First Time ☐ Every 6 Months ☐ Every 3 Months ☐ Monthly ☐ Weekly ☐ More than Weekly ☐

9 Are you here for a scheduled activity?

Yes ☐ No ☐

10 Do you consider this place:

Private ☐ Semi-Private ☐ Public ☐

11 Are you here for:

Work ☐ Study ☐ Errands ☐ Entertainment ☐ Other: _____

Please check the box
for Yes or leave it
unchecked for No.

NJIT

	Stranger	Acquaintance	Friend	Boy/Girlfriend	Sexual Partner	Your Child	Colleague	Customer	Superior/Your Boss	Subordinate/Employee	Other:
12 Who have you seen here previously?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
13 Did you come here to meet any of these people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
14 Would you like to have known before you came here if any of these people were here?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
15 Do you expect to meet with people from any of these categories at the next place you're going to?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
16 Would you like to know, before you go to the next place, if any of these people are there?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
17 Would you like to know where a person/s from any of the following categories is/are right now?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
18 Would you let any of these people know that you are in this place now?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
19 Would you like to know if a person/s from any of these categories is/are nearby now?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
20 Would you let any of these people know that you are nearby now?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Please check the box
for Yes or leave it
unchecked for No.

NJIT

	Stranger	Acquaintance	Friend	Boy/Girlfriend	Spouse/Partner	Your Child	College	Customer	Superior/Your Boss	Subordinate/Employee	Other:
21 Would you like to be able to READ comments about this place from the following people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
22 Would you like to be able to READ comments about events that occur in this place from the following people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
23 Would you like to be able to LEAVE comments about this place for the following people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
24 Would you like to be able to LEAVE comments about events that occur in this place for the following people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

25 Would you like to know how many people are in this place before you come here? (nobody, crowded, etc.)

Yes ☐ No ☐

26 Would you like to know how many people are in the next place you're going to before you go there?

Yes ☐ No ☐

27 Would you like to know how many people are nearby now?

Yes ☐ No ☐

28 Would you let yourself be counted as one of the people in this place now?

Yes ☐ No ☐

29 Would you like to know what kind of people come to this place? (e.g. common hobbies, average age, etc.)

Yes ☐ No ☐

If Yes, please list what you would like to know: (e.g. common hobbies, average age, music preferences, etc.)

30 Do you have any comments about the survey and/or questions for the researchers?

APPENDIX B

FINAL SURVEY

This is the final survey that was distributed to respondents in the field.

Location Aware Mobile Systems Survey



_____ Information Systems @ New Jersey Institute of Technology Time/Date: _____

This survey aims to collect information for the following purposes:

- To better understand what kind of social information people want in specific places.
- To determine if it is possible to generalize these needs in order to develop intelligent mobile (e.g. cell phone) applications.

1 **Age:** Under 18 ☐ 18 to 25 ☐ 26 to 35 ☐ 36 to 50 ☐ 51 to 65 ☐ Over 65 ☐

2 **Gender:** Female ☐ Male ☐

3 **Home Zip Code:** _____

4 **Occupation:** _____

5 **Where are you now?** (ex: "parking lot of supermarket" ; "platform of train station" ; "bar in restaurant")

6 **Where have you just come from?** _____

7 **Where do you plan on going next?** _____

8 **How frequently do you visit this place?**
First Time ☐ Every 6 Months ☐ Every 3 Months ☐ Monthly ☐ Weekly ☐ More than Weekly ☐

9 **Are you here for a scheduled activity?**
Yes ☐ No ☐

10 **Are you here for:**
Work ☐ Study ☐ Errands ☐ Entertainment ☐ Other: _____

11 **Would you like to know how many people are in this place before you come here? (nobody, crowded, etc.)**
Yes ☐ No ☐

12 **Would you like to know how many people are nearby now?**
Yes ☐ No ☐

13 **Would you let yourself be counted as one of the people in this place now?**
Yes ☐ No ☐

14 **What would you like to know about the people that come to this place?**
Age ☐ Sex/Gender ☐ Income ☐ Common Hobbies ☐ Musical Tastes ☐ Religion ☐
Ethnicity/Race ☐ Political Views ☐ Other _____

Please check the box for
Yes or leave it
unchecked for No.

NJIT

	People You Don't Know	Friend	Boy-Girlfriend/Spouse	Your Child	Colleague	Superior/Your Boss	Subordinate Employee	Customer	Other:
15 Who have you seen here previously?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
16 Who of these people did you come here to meet?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
17 Before you came here, would you have liked to know if any of these people were here or not?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
18 Would you like to know where a person/s from any of the following categories is/are right now?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
19 Who would you allow to know that you are in this place now?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
20 Would you like to know if a person/s from any of these categories is/are nearby now?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
21 Who of these people would you let know that you are nearby now?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
22 Would you like to be able to READ comments about this place or events that happen here from the following people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____
23 Would you like to be able to LEAVE comments about this place or events that happen here for the following people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> _____

24 Do you have any comments about the survey and/or questions for the researchers?

APPENDIX C

INFORMATION SHEET

This Information Sheet was provided to all participants who accepted to complete the survey, and others who requested further information but chose not to participate. Also, it was included in the package provided to request permission to conduct the survey.

Information Sheet

Location Aware Mobile Systems Survey

This survey aims to fulfill the following purposes:

- To better understand what kind of social information people want in specific places. *Social information is defined as information about people who are part of our social lives, be it where they are, their opinions about specific places and activities, their routines, and so on...*
- To determine if it is possible to generalize these needs in order to develop intelligent mobile (e.g., cell phone) applications.

The places at which we are conducting the survey are listed below:

Services	Institutions	Daily Necessity	Socializing	Entertainment	Leisure	Cultural	Physical	Residential
Parking Lot	Bank / Police Station	Supermarket	Café	Cinema	Central Park	Church	Gym	Units
Train Station	Post Office	Restaurant	Pub	Strip Club	Rockefeller Center	Art Gallery	Pool	N/A

These places have been chosen to reflect a variety of place types in order to better understand the relationship between place type and social information needs of people in these places.

We will be collecting data at different times in each place in order to account for peak and off peak differences. These differences, we believe, have a profound effect on people's dispositions and thus their social information needs.

All the information we collect is anonymous, and cannot be traced back to the person who conducted the survey.

By participating in the survey, you will be contributing to the development of intelligent mobile (e.g. cell phone) applications and systems that will provide a new and revolutionary way of social communication, which is expected to provide the following benefits:

- Develop community ties by building relationships with strangers who share similar routines and characteristics.
- Keep an eye on loved ones who are susceptible to danger and or accidents.
- Maintain a healthy personal social image by minimizing unexpected encounters with specific people.

For more information, please contact:

Dr. Quentin Jones
Department of information Systems
College of Computing Sciences
New Jersey Institute of Technology
GITC Building 4400
University Heights
Newark, NJ 07102, USA
College Phone: (973)596-3366
College Fax:(973)596-5777
Mobile Phone 732-221-6502
Email: qgjones@acm.org

APPENDIX D

PHOTO JOURNAL OF SURVEY SITES

This photo journal displays photos taken at each survey site. All photos are original art, unless otherwise noted.

- Loews Cineplex – Entertainment Category



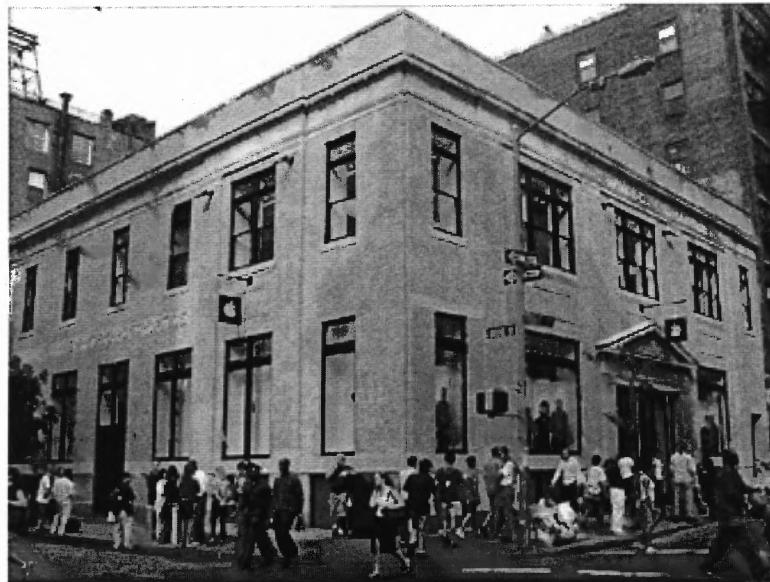
- Grand Central Station – Services Category



- **Mid-Manhattan Public Library (NYPL) – Institutions Category**



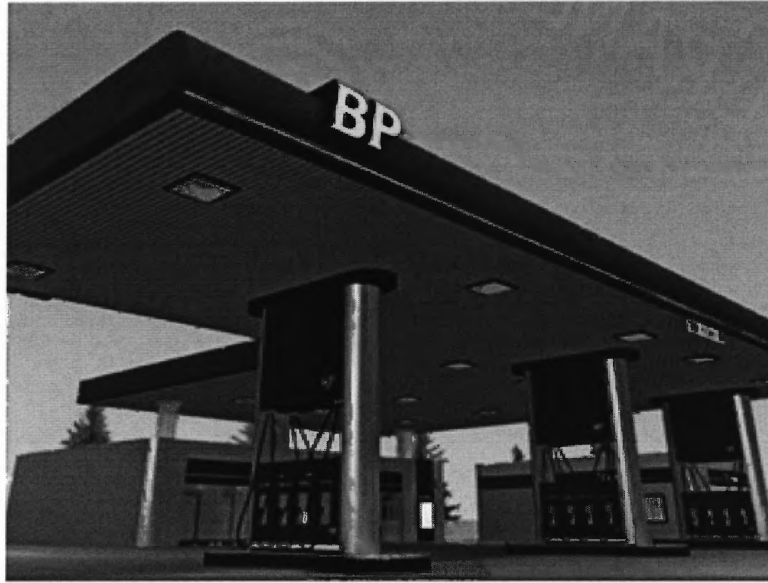
- **United States Post Office (USPS) – Institutions Category**



Note: Above Image was Retrieved from Mac Fan Net at:

<http://macfannet.mycom.co.jp/special/MWCEXpoNY2002/020719applestoreSOHO.html>

- **BP Gas Station – Services Category**



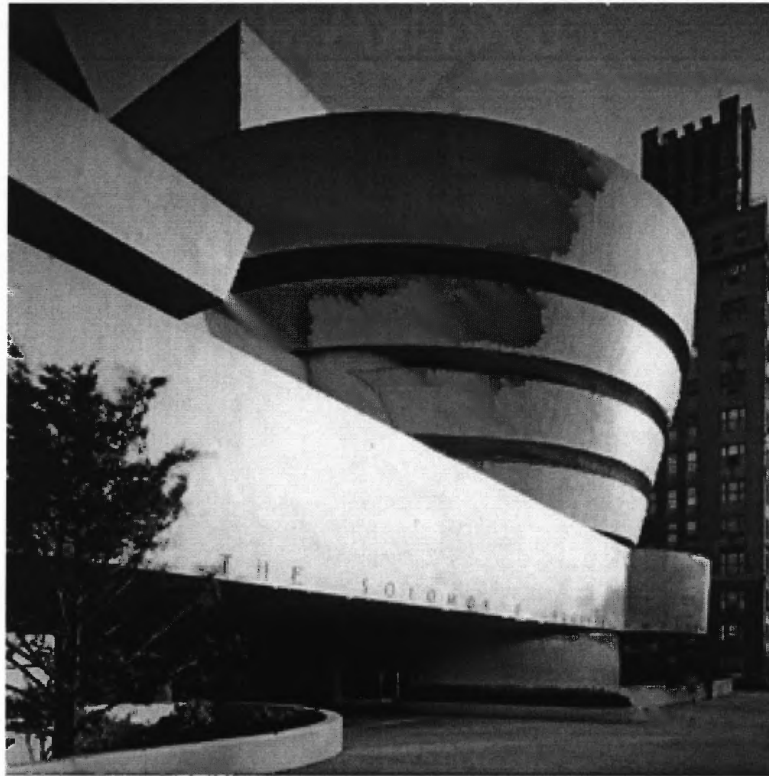
Note: Above Image was Retrieved from Turbo Squid at:

<http://www.turbosquid.com/FullPreview/Index.cfm/ID/237517/Action/FullPreview>

- **Central Park – Leisure Category**



- **Guggenheim Museum – Cultural Category**



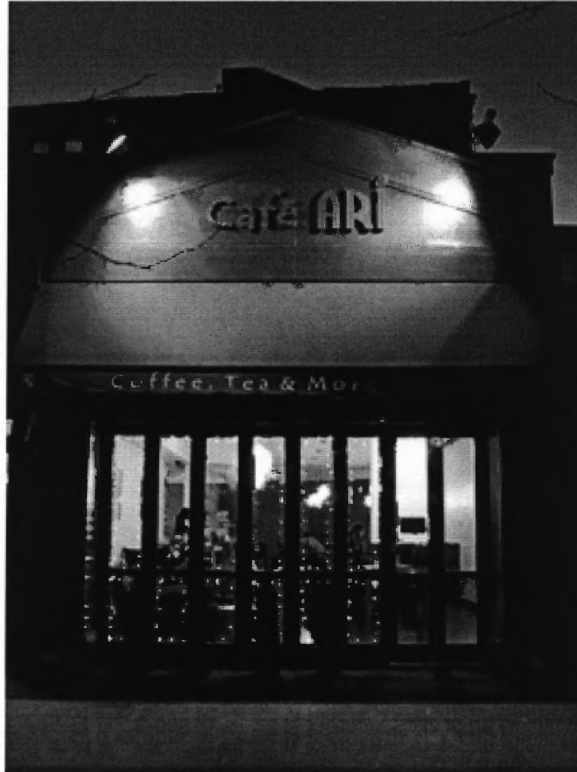
Note: Above Image was Retrieved from Lexis Education at:

http://www.lexised.com/architecture/wright/media/wks/guggallery/pages/gug8_jpg.htm

- **New York Sports Club (NYSC) – Physical Category**



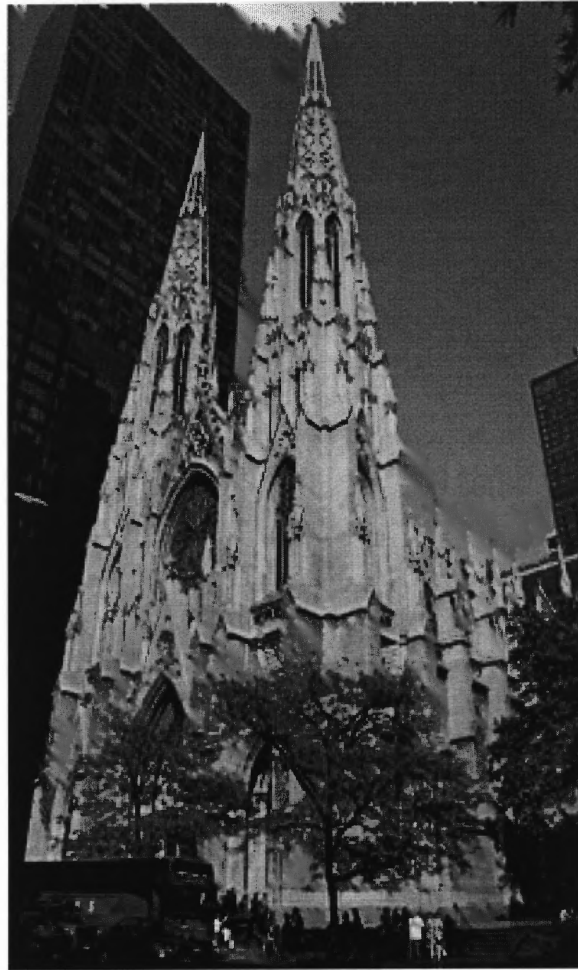
- **Cafe Ari (Greenwich Cafe) – Socializing Category**



- **Gourmet Garage Supermarket – Daily Necessities Category**



- **St. Patrick's Cathedral – Cultural Category**



- **Gray's Papaya Restaurant – Daily Necessities Category**



- **Rockefeller Center Plaza – Leisure Category**



- **Trattoria Spaghetti Restaurant – Daily Necessities**



APPENDIX E

PROMPT SHEET

The Prompt Sheet was used to guide the surveyors through the collection of ethnographic data at the survey sites. It also provided them with a box in which rejections (to complete or simply take part) were recorded.

Prompt Sheet for Surveyor

Name: _____

Beginning Survey #: _____

Ending Survey #: _____

Start Time at 1 hour interval: _____

End Time at 1 hour interval: _____

Date: _____

Number of No:

Services	Institutions	Daily Necessity	Socializing	Entertainment	Leisure	Cultural	Physical	Residential
Gas Station	Bank / Police Station	Supermarket	Café	Cinema	Central Park	Church	Gym	Units
Train Station	Post Office	Restaurant	Pub	Strip Club	Rockefeller Center	Art Gallery	Pool	N/A

Circle the place-type from the list below, or note here: _____

Perceived state of place:

Is this place crowded now? YES NO

Is this place noisy now? YES NO

Are most of the people here doing the same thing? YES NO

Are the people mostly teens, adults, or seniors? (note if mixed)

Do the activities here 'fit' the type of place? (if no, please explain) YES NO

If no, explain: _____

Is it raining? YES NO

Is it cold outside? YES NO

Is the temperature comfortable inside? YES NO

APPENDIX F

SURVEY SCRIPT

The Survey Script set a standard base for survey steps and protocol.

Introduction and Speech Protocol

**This protocol stipulates HOW the surveyor will approach the surveyed
The focus is on order and important components,
rather the actual wording, grammar and vocabulary.*

Approach your potential subject and say the following

- Hello, my name is _____.
- I am a student at the New Jersey Institute of Technology.
- As a part of research sponsored by the National Science foundation, I am here to conduct a survey on people's social information needs in various places such as post office, train station and movie theater
- By social information I mean information about people within your social circle such as family, friends, colleagues...
- Would you please volunteer to participate in this survey?
- It will take you at most 6 minutes to complete.
- Any information provided by you will be completely anonymous, and cannot be traced back to you in any way.

Pause here.

- If they say Yes administer the survey
 - Else say "Thank you for listening. Here is an information sheet for you to take back"
- After the Survey say "Thank you very much for your time, I appreciate you volunteering for this research and here is a information sheet for you to take back"

APPENDIX G

FIELD RESEARCH PROTOCOLS

The Field Research Protocols set strict fieldwork protocols for researcher conduct and interactions with potential participants. This protocol was part of the package submitted when requesting authorization to conduct the survey indoors or on private property.

Field Research Protocols:

Overview

- In the field, all data collectors (hereafter named survey personnel) must, at all times, wear an NJIT ID badge to be issued by us.
 - Furthermore, if NJIT branded clothing is available, it is advisable that the owner makes use of these articles for increased visibility.
- Survey personnel will be clustered into groups of 3, with each cluster targeting a separate entity within the place-type table.
- Each cluster will be headed by a supervisor (Samer, Sue, or Suling), or if this is not possible the cluster will report to a supervisor on duty on an hourly basis, and when necessary otherwise.

Subjects' Selection

- Subjects will be chosen according to three variables:
 - *The type of place:* This affects the selection process due to the existence of a number of special place types that require considerable care (i.e. Police Station, Church, Strip Club)
 - *The perceived role of the subjects in this place:* We expect people's activities and roles in a place to affect their answers, thus the need to poll different roles within a specific place.
 - *The level of congestion:* If there is a rarity of subjects in a particular place (i.e. Strip Club?) we might need to poll everyone at hand.

Survey-Independent Information Collection

Some information will not be captured in the surveys and must be noted by the survey personnel. These information bites are listed below:

- *Period of collection.*
- *Time of day collected at ½ hour intervals.*
- *The SurveyID of the first and last survey completed within the ½ hour interval.*
- *The perceived state of the place within the ½ interval:* This is primarily a Peak / Off-Peak perception that is noted to ensure the compliance of our assumptions regarding peak and off-peak hours.
- *The number of non-respondents per ½ hour interval.*

The above mentioned information will be collected on preconfigured data sheets that provide 'slots' for easy and consistent data capture.

Permission

If permission is required it will be acquired prior to the arrival of the survey personnel; all places will be queried for the need for permission (except for Rockefeller Square and Central Park).

When requesting permission, the following articles should be presented (and given if need be) to the 'authorities':

- *The finalized questionnaire.*
- *The information form to be given to the subjects.*
- *IRB online study certificates for all the personnel involved.*
- *IRB paper of approval from NJIT.*
- *The names of all the personnel who could be working in the field.*

Professionalism

All personnel will complete the online IRB certification process. Further steps taken to guarantee professionalism are:

- Periodical debriefing of the personnel to ensure that issues are handled before achieving critical status.
- Personnel are to have a non-confrontational approach: if a problem arises, they are not expected to fix it, but will provide the contact information sheet to the parties concerned.

APPENDIX H

SURVEY DESCRIPTION: UBICOMP 2004

This extended abstract, published at UbiComp 2004, was included in the package submitted when requesting authorization to conduct the survey indoors or on private property.

'Place' and Social Information Needs: A Survey Study of Design Requirements for Location-Aware Community Systems

Samer Karam, Sukeshini A. Grandhi, Suling Zhang and Quentin Jones

ABSTRACT

In recent years it has become possible to use technologies such as mobile phones, GPS, RFID, and Wi-Fi to locate individuals. This has resulted in the emergence of a new class of computer systems which links People-to-People-to-Geographical-Places, labeled P3-Systems. Various P3-System services have been proposed based on the sharing of personal location data. However, the potential value of such services is unclear.

This paper outlines on-going research into 'where', 'when', and 'with whom', people wish to receive or provide personal location data for the P3-System services. We make use of the P3-Systems framework to guide a survey study of the impact of place on people's social information needs. The survey is being conducted in Manhattan, NYC at a diverse set of places. Through this survey we hope to gain a deeper understanding of the design requirements of location-aware community systems.

Keywords

Ubiquitous Computing, Virtual Communities, P3-Systems, Place, Computer Supported Cooperative Work.

INTRODUCTION

The emergence of technologies such as locatable mobile phones, the Global Positioning System (GPS), 802.11, Bluetooth, and RFID enable the development of systems that link information and communication to physical places. People, acting individually and collectively, actively structure their environments by creating specialized types of *places* – the office, home, coffee shop, museum, school, etc. – to support a variety of activities and constrain possibilities for action and communication. Mobile systems can potentially utilize the existence of physical places to support the management of social information to users.

To effectively utilize place-type data to support mobile community system design we will need to understand how: 1) place-types relate to people's desire for place-related awareness of and communication with others, and 2) what information are people willing to provide about themselves to enable place-related communication and awareness. We examine this through a survey conducted in 17 distinct places in New York City, guided by the P3-Systems Framework.

THE P3-SYSTEMS CONCEPTUAL FRAMEWORK

The P3-Systems conceptual framework organizes the design space of location-aware 'community' systems into a 2 x 2 matrix. The rows characterize the user interface, which we divide into **People-Centered** and **Place-Centered** techniques¹. People-Centered techniques use location information to support interpersonal awareness, enable informal communication, and identify previously unknown affinities between users. Place-Centered

techniques link virtual spaces to physical locations, using social information to aid place-based navigation and decision making.

The columns characterize the synchronicity of the design space by use of the traditional CSCW distinction between **synchronous** and **asynchronous** systems. We extend this distinction, however, beyond communication to include user-location information. Thus, we also refer to synchronous and asynchronous "location awareness". This distinguishes techniques that provide information about *current* user location or activity within a place from those that provide *historical* information.

People-Centered systems are further subcategorized into those that represent absolute user location and those that operate in terms of user proximity or co-location. The distinction here is between systems that can tell you where all your buddies are vs. those that can only tell you which buddies are close to you now. Place-Centered systems are further subcategorized by the representation type. Some Place-Centered systems represent current or past user activity relative to a location, e.g., showing something about who is on a university campus now. Others associate virtual spaces with a physical location.

Table 1: P3-System Techniques and Services

P3-System Services		Synchronous Communication or Synchronous Location Awareness	Asynchronous Communication or Asynchronous Location Awareness
People Centric	Absolute User Location	(1) Provide remote awareness of current user location.	(5) Utilizes people's location histories.
	Co-location / Proximity	(2) Real-time inter-user co-location for the exchange of social information.	(6) Utilizes co-location history to enable future interactions.
Place Centric	Use of Physical Spaces by People	(3) Online representation of user's current use of physical spaces.	(7) History of People's use of a particular space.
	Interactions in Matching Virtual Places	(4) Synchronous online interactions spaces related to physical location.	(8) Asynchronous online interactions related to physical location.

RELATIONSHIP BETWEEN PLACE-TYPES AND PLACE-INFORMATION

Initial research suggests that the relationship between places and information retrieval needs relates to how frequently individuals visit the place in question, and the stability of the information in question. Stable information includes things like train schedules and restaurant menus; dynamic information includes things such as whether a particular train is running late and the waiting time to be seated at a restaurant.

Table 2 highlights this relationship which will need to be taken into account when assessing the relationship between place and community data needs.

¹ A single system may implement different types of techniques; however, for ease of exposition we refer to systems, rather than techniques when the context makes the meaning clear.

Table 2: Relationships between Places, Activities, and Information Needs

Activity Frequency	Stable Information	Dynamic Information
Frequently	Need: Low	Need: Moderate/High
Infrequently	Need: High	Need: High

METHOD

To collect quantitative data relevant to our previous studies, we have constructed a survey questionnaire to be conducted in NYC.

Places / Locations

The survey is being conducted in Manhattan, NYC of the state of New York (USA).

Places were chosen to fit into the place-types set forth by Kramer in the "Classification of Generic Places" [5]. These types were reduced to the following collection to accommodate our interests: (1) places that provide services, (2) institutions, (3) places that are considered daily necessities, (4) places for socializing, (5) places for leisure, (6) places for entertainment, (7) places for physical activities, (8) cultural places, and (9) residential places.

Survey Design

The primary instrument in this study is a questionnaire. This is developed from three sources, (1) the framework [7] (2) studies 1 and 2 [6] (3) literature on environmental psychology [3].

The questionnaire addresses three information types:

- People's relation to the place.
- People's relation to others in the place.
- The place type.

Each question can be placed within a section of the P3 Systems framework, with the questions primarily focusing on the following areas:

- (1) Provide remote awareness of current user location
- (2) Real-time inter-user co-location for the exchange of social information
- (3) Online representation of user's current use of physical spaces.
- (8) Asynchronous online interactions related to physical location.

These make the core of the questions, with additional questions addressing demographics.

Ethnographic Data Collection

- Some information will be noted by the survey personnel.
- *The perceived state of the place within the ½ interval:* This is primarily a Peak / Off-Peak perception that is noted to ensure the compliance of our assumptions regarding peak and off-peak hours.
- *The number of non-respondents per ½ hour interval.*
- *Take Photographs of the place*

The above mentioned information will be collected on preconfigured data sheets that provide 'slots' for easy and consistent data capture.

Subjects

Survey informants are recruited through a random stratified sampling technique. The stratification is achieved through three

variables: 1) The location / place of sampling; 2) The perceived role of potential informants in place: We expect people's activities and roles in a place to affect their answers, thus we will target our survey's initially towards individuals that work in a particular location and then others that come to the place for services; and 3) Seasonality

EXPECTED CONTRIBUTIONS AND ISSUES

As time is the primary constraint, we have limited our study to the urban setting of NYC, which should limit the scope of our results due to the specific nature of the setting. However, we do believe that NYC provides a rich enough environment for a diverse pool of answers that should provide for interesting results.

Further issues arise from our lack of incentive when asking for participants to complete our survey. We believe this will hamper the speed of collection, but should not be an issue if more time and effort is devoted to the process.

Our contributions will be primarily to the quantitative definition of our previous qualitative findings. Thus:

- We hope to determine the generalizability of our previous findings.
- We have designed our survey to collect information for further investigations in the field.

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- [4] Jones Q., Grandhi S., Terveen L., and Whittaker S., (2004). People-To-People-to-Geographical-Places: The P3 Framework for Location-Based Community Systems. *Journal of Computer Supported Cooperative Work*. Kluwer Academic Publishers.
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APPENDIX I
EXTENDED DESCRIPTIVE REPORTS

The Descriptive reports used for the analysis are included here.

Age Cross-Tabulations

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eighte_s * 1	490	100.0%	0	.0%	490	100.0%
twenty3s * 1	490	100.0%	0	.0%	490	100.0%
twenty2s * 1	490	100.0%	0	.0%	490	100.0%
twenty_s * 1	490	100.0%	0	.0%	490	100.0%
twenty1s * 1	490	100.0%	0	.0%	490	100.0%
ninete_s * 1	490	100.0%	0	.0%	490	100.0%

eighte_s * 1 Crosstabulation

		1						Total	
		Under 18	18 to 25	26 to 35	36 to 50	51 to 65	over 65		
eighte_s	.00	Count	9	71	86	58	42	6	272
		% within 1	37.5%	47.3%	52.4%	67.4%	76.4%	54.5%	55.5%
	1.00	Count	15	79	78	28	13	5	218
		% within 1	62.5%	52.7%	47.6%	32.6%	23.6%	45.5%	44.5%
Total		Count	24	150	164	86	55	11	490
		% within 1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

ninete_s * 1 Crosstabulation

		1						Total	
		Under 18	18 to 25	26 to 35	36 to 50	51 to 65	over 65		
ninete_s	.00	Count	5	23	40	19	24	1	112
		% within 1	20.8%	15.3%	24.4%	22.1%	43.6%	9.1%	22.9%
	1.00	Count	19	127	124	67	31	10	378
		% within 1	79.2%	84.7%	75.6%	77.9%	56.4%	90.9%	77.1%
Total		Count	24	150	164	86	55	11	490
		% within 1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

twenty_s * 1 Crosstabulation

		1						Total	
		Under 18	18 to 25	26 to 35	36 to 50	51 to 65	over 65		
twenty_s	.00	Count	9	53	65	43	37	7	214
		% within 1	37.5%	35.3%	39.6%	50.0%	67.3%	63.6%	43.7%
	1.00	Count	15	97	99	43	18	4	276
		% within 1	62.5%	64.7%	60.4%	50.0%	32.7%	36.4%	56.3%
Total		Count	24	150	164	86	55	11	490
		% within 1	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

twenty1s * 1 Crosstabulation

Frequency of Visit Cross-Tabulations

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eighte_s * 8	490	100.0%	0	.0%	490	100.0%
ninete_s * 8	490	100.0%	0	.0%	490	100.0%
twenty_s * 8	490	100.0%	0	.0%	490	100.0%
twenty1s * 8	490	100.0%	0	.0%	490	100.0%
twenty2s * 8	490	100.0%	0	.0%	490	100.0%
twenty3s * 8	490	100.0%	0	.0%	490	100.0%

eighte_s * 8 Crosstabulation

		8						Total
		First Time	Every 6 Months	Every 3 Months	Monthly	Weekly	More Than Weekly	
eighte_s	.00	Count	62	36	31	46	39	272
		% within 8	55.4%	50.7%	66.0%	52.9%	49.4%	55.5%
	1.00	Count	50	35	16	41	40	218
		% within 8	44.6%	49.3%	34.0%	47.1%	50.6%	44.5%
Total		Count	112	71	47	87	79	490
		% within 8	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

ninete_s * 8 Crosstabulation

		8						Total
		First Time	Every 6 Months	Every 3 Months	Monthly	Weekly	More Than Weekly	
ninete_s	.00	Count	28	21	7	22	12	112
		% within 8	25.0%	29.6%	14.9%	25.3%	15.2%	22.9%
	1.00	Count	84	50	40	65	67	378
		% within 8	75.0%	70.4%	85.1%	74.7%	84.8%	77.1%
Total		Count	112	71	47	87	79	490
		% within 8	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

twenty_s * 8 Crosstabulation

[illegible]

twenty1s * 8 Crosstabulation

[illegible]

twenty2s * 8 Crosstabulation

[illegible]

twenty3s * 8 Crosstabulation

[illegible]

Gender Cross-Tabulations

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eighte_s * 2	490	100.0%	0	.0%	490	100.0%
ninete_s * 2	490	100.0%	0	.0%	490	100.0%
twenty_s * 2	490	100.0%	0	.0%	490	100.0%
twenty1s * 2	490	100.0%	0	.0%	490	100.0%
twenty2s * 2	490	100.0%	0	.0%	490	100.0%
twenty3s * 2	490	100.0%	0	.0%	490	100.0%

eighte_s * 2 Crosstabulation

			2		Total
			Female	Male	
eighte_s	.00	Count	140	132	272
		% within 2	60.6%	51.0%	55.5%
	1.00	Count	91	127	218
		% within 2	39.4%	49.0%	44.5%
Total		Count	231	259	490
		% within 2	100.0%	100.0%	100.0%

ninete_s * 2 Crosstabulation

			2		Total
			Female	Male	
ninete_s	.00	Count	57	55	112
		% within 2	24.7%	21.2%	22.9%
	1.00	Count	174	204	378
		% within 2	75.3%	78.8%	77.1%
Total		Count	231	259	490
		% within 2	100.0%	100.0%	100.0%

twenty_s * 2 Crosstabulation

			2		Total
			Female	Male	
twenty_s	.00	Count	113	101	214
		% within 2	48.9%	39.0%	43.7%
	1.00	Count	118	158	276
		% within 2	51.1%	61.0%	56.3%
Total		Count	231	259	490
		% within 2	100.0%	100.0%	100.0%

twenty1s * 2 Crosstabulation

			2		Total
			Female	Male	
twenty1s	.00	Count	70	70	140
		% within 2	30.3%	27.0%	28.6%
	1.00	Count	161	189	350
		% within 2	69.7%	73.0%	71.4%
Total		Count	231	259	490
		% within 2	100.0%	100.0%	100.0%

twenty2s * 2 Crosstabulation

			2		Total
			Female	Male	
twenty2s	.00	Count	120	104	224
		% within 2	51.9%	40.2%	45.7%
	1.00	Count	111	155	266
		% within 2	48.1%	59.8%	54.3%
Total		Count	231	259	490
		% within 2	100.0%	100.0%	100.0%

twenty3s * 2 Crosstabulation

			2		Total
			Female	Male	
twenty3s	.00	Count	131	124	255
		% within 2	56.7%	47.9%	52.0%
	1.00	Count	100	135	235
		% within 2	43.3%	52.1%	48.0%
Total		Count	231	259	490
		% within 2	100.0%	100.0%	100.0%

Near/Far Cross-Tabulations

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eighte_s * nearfar	467	95.3%	23	4.7%	490	100.0%
ninete_s * nearfar	467	95.3%	23	4.7%	490	100.0%
twenty_s * nearfar	467	95.3%	23	4.7%	490	100.0%
twenty1s * nearfar	467	95.3%	23	4.7%	490	100.0%
twenty2s * nearfar	467	95.3%	23	4.7%	490	100.0%
twenty3s * nearfar	467	95.3%	23	4.7%	490	100.0%

eighte_s * nearfar Crosstabulation

			nearfar			Total
			1.00	2.00	3.00	
eighte_s	.00	Count	203	29	26	258
		% within nearfar	55.5%	44.6%	72.2%	55.2%
	1.00	Count	163	36	10	209
		% within nearfar	44.5%	55.4%	27.8%	44.8%
Total		Count	366	65	36	467
		% within nearfar	100.0%	100.0%	100.0%	100.0%

ninete_s * nearfar Crosstabulation

			nearfar			Total
			1.00	2.00	3.00	
ninete_s	.00	Count	78	9	17	104
		% within nearfar	21.3%	13.8%	47.2%	22.3%
	1.00	Count	288	56	19	363
		% within nearfar	78.7%	86.2%	52.8%	77.7%
Total		Count	366	65	36	467
		% within nearfar	100.0%	100.0%	100.0%	100.0%

twenty_s * nearfar Crosstabulation

			nearfar			Total
			1.00	2.00	3.00	
twenty_s	.00	Count	159	22	21	202
		% within nearfar	43.4%	33.8%	58.3%	43.3%
	1.00	Count	207	43	15	265
		% within nearfar	56.6%	66.2%	41.7%	56.7%
Total		Count	366	65	36	467
		% within nearfar	100.0%	100.0%	100.0%	100.0%

twenty1s * nearfar Crosstabulation

			nearfar			Total
			1.00	2.00	3.00	
twenty1s	.00	Count	99	11	22	132
		% within nearfar	27.0%	16.9%	61.1%	28.3%
	1.00	Count	267	54	14	335
		% within nearfar	73.0%	83.1%	38.9%	71.7%
Total		Count	366	65	36	467
		% within nearfar	100.0%	100.0%	100.0%	100.0%

twenty2s * nearfar Crosstabulation

			nearfar			Total
			1.00	2.00	3.00	
twenty2s	.00	Count	172	25	19	216
		% within nearfar	47.0%	38.5%	52.8%	46.3%
	1.00	Count	194	40	17	251
		% within nearfar	53.0%	61.5%	47.2%	53.7%
Total		Count	366	65	36	467
		% within nearfar	100.0%	100.0%	100.0%	100.0%

twenty3s * nearfar Crosstabulation

			nearfar			Total
			1.00	2.00	3.00	
twenty3s	.00	Count	193	28	22	243
		% within nearfar	52.7%	43.1%	61.1%	52.0%
	1.00	Count	173	37	14	224
		% within nearfar	47.3%	56.9%	38.9%	48.0%
Total		Count	366	65	36	467
		% within nearfar	100.0%	100.0%	100.0%	100.0%

Place-Categorization Cross-Tabulations

eighte_s * 5 Crosstabulation

[illegible]

ninete_s * 5 Crosstabulation

[illegible]

twenty_s * 5 Crosstabulation

[illegible]

twenty2s * 5 Crosstabulation

twenty3s * 5 Crosstabulation

[illegible]

Scheduled Activity Cross-Tabulation

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eighte_s * 9	490	100.0%	0	.0%	490	100.0%
ninete_s * 9	490	100.0%	0	.0%	490	100.0%
twenty_s * 9	490	100.0%	0	.0%	490	100.0%
twenty1s * 9	490	100.0%	0	.0%	490	100.0%
twenty2s * 9	490	100.0%	0	.0%	490	100.0%
twenty3s * 9	490	100.0%	0	.0%	490	100.0%

eighte_s * 9 Crosstabulation

		9		Total
		Yes	No	
eighte_s	.00	Count	65	207
		% within 9	46.4%	59.1%
	1.00	Count	75	143
		% within 9	53.6%	40.9%
Total		Count	140	350
		% within 9	100.0%	100.0%

ninete_s * 9 Crosstabulation

		9		Total
		Yes	No	
ninete_s	.00	Count	22	90
		% within 9	15.7%	25.7%
	1.00	Count	118	260
		% within 9	84.3%	74.3%
Total		Count	140	350
		% within 9	100.0%	100.0%

twenty_s * 9 Crosstabulation

		9		Total
		Yes	No	
twenty_s	.00	Count	43	171
		% within 9	30.7%	48.9%
	1.00	Count	97	179
		% within 9	69.3%	51.1%
Total		Count	140	350
		% within 9	100.0%	100.0%

twenty1s * 9 Crosstabulation

			9		Total
			Yes	No	
twenty1s	.00	Count	24	116	140
		% within 9	17.1%	33.1%	28.6%
	1.00	Count	116	234	350
		% within 9	82.9%	66.9%	71.4%
Total		Count	140	350	490
		% within 9	100.0%	100.0%	100.0%

twenty2s * 9 Crosstabulation

			9		Total
			Yes	No	
twenty2s	.00	Count	54	170	224
		% within 9	38.6%	48.6%	45.7%
	1.00	Count	86	180	266
		% within 9	61.4%	51.4%	54.3%
Total		Count	140	350	490
		% within 9	100.0%	100.0%	100.0%

twenty3s * 9 Crosstabulation

			9		Total
			Yes	No	
twenty3s	.00	Count	69	186	255
		% within 9	49.3%	53.1%	52.0%
	1.00	Count	71	164	235
		% within 9	50.7%	46.9%	48.0%
Total		Count	140	350	490
		% within 9	100.0%	100.0%	100.0%

Survey Site Cross-Tabulations

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
eighte_s * Samer's version of place	490	100.0%	0	.0%	490	100.0%
ninete_s * Samer's version of place	490	100.0%	0	.0%	490	100.0%
twenty_s * Samer's version of place	490	100.0%	0	.0%	490	100.0%
twenty1s * Samer's version of place	490	100.0%	0	.0%	490	100.0%
twenty2s * Samer's version of place	490	100.0%	0	.0%	490	100.0%
twenty3s * Samer's version of place	490	100.0%	0	.0%	490	100.0%

eighte_s * Samer's version of place Crosstabulation

		Samer's version of place											Total	
		Gas Station	Grand Central	Post Office	Public Library	Supermarket	Restaurant	Cafe	Cinema	Central Park	Rockefeller	Museum		
eighte_s	.00	Count	16	42	26	26	19	29	16	35	35	13	15	272
		% within Samer's version of place	53.3%	51.9%	63.4%	61.9%	73.1%	60.4%	50.0%	46.7%	57.4%	50.0%	53.6%	55.5%
	1.00	Count	14	39	15	16	7	19	16	40	26	13	13	218
		% within Samer's version of place	46.7%	48.1%	36.6%	38.1%	26.9%	39.6%	50.0%	53.3%	42.6%	50.0%	46.4%	44.5%
Total		Count	30	81	41	42	26	48	32	75	61	26	28	490
		% within Samer's version of place	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

ninete_s * Samer's version of place Crosstabulation

		Samer's version of place											Total	
		Gas Station	Grand Central	Post Office	Public Library	Supermarket	Restaurant	Cafe	Cinema	Central Park	Rockefeller	Museum		
ninete_s	.00	Count	6	12	11	8	7	11	7	18	19	7	6	112
		% within Samer's version of place	20.0%	14.8%	26.8%	19.0%	26.9%	22.9%	21.9%	24.0%	31.1%	26.9%	21.4%	22.9%
	1.00	Count	24	69	30	34	19	37	25	57	42	19	22	378
		% within Samer's version of place	80.0%	85.2%	73.2%	81.0%	73.1%	77.1%	78.1%	76.0%	68.9%	73.1%	78.6%	77.1%
Total		Count	30	81	41	42	26	48	32	75	61	26	28	490
		% within Samer's version of place	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

twenty_s * Samer's version of place Crosstabulation

		Samer's version of place											Total	
		Gas Station	Grand Central	Post Office	Public Library	Supermarket	Restaurant	Cafe	Cinema	Central Park	Rockefeller	Museum		
twenty_s	.00	Count	12	29	21	23	18	23	8	31	29	6	14	214
		% within Samer's version of place	40.0%	35.8%	51.2%	54.8%	69.2%	47.9%	25.0%	41.3%	47.5%	23.1%	50.0%	43.7%
	1.00	Count	18	52	20	19	8	25	24	44	32	20	14	276
		% within Samer's version of place	60.0%	64.2%	48.8%	45.2%	30.8%	52.1%	75.0%	58.7%	52.5%	76.9%	50.0%	56.3%
Total		Count	30	81	41	42	26	48	32	75	61	26	28	490
		% within Samer's version of place	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

twenty1s * Samer's version of place Crosstabulation

			Samer's version of place											Total
			Gas Station	Grand Central	Post Office	Public Library	Supermarket	Restaurant	Cafe	Cinema	Central Park	Rockefeller	Museum	
twenty1s	.00	Count	7	16	12	15	10	18	8	17	23	5	9	140
		% within Samer's version of place	23.3%	19.8%	29.3%	35.7%	38.5%	37.5%	25.0%	22.7%	37.7%	19.2%	32.1%	28.6%
	1.00	Count	23	65	29	27	16	30	24	58	38	21	19	350
		% within Samer's version of place	76.7%	80.2%	70.7%	64.3%	61.5%	62.5%	75.0%	77.3%	62.3%	80.8%	67.9%	71.4%
Total		Count	30	81	41	42	26	48	32	75	61	26	28	490
		% within Samer's version of place	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

twenty2s * Samer's version of place Crosstabulation

			Samer's version of place											Total
			Gas Station	Grand Central	Post Office	Public Library	Supermarket	Restaurant	Cafe	Cinema	Central Park	Rockefeller	Museum	
twenty2s	.00	Count	12	44	22	22	14	23	8	31	27	13	8	224
		% within Samer's version of place	40.0%	54.3%	53.7%	52.4%	53.8%	47.9%	25.0%	41.3%	44.3%	50.0%	28.6%	45.7%
	1.00	Count	18	37	19	20	12	25	24	44	34	13	20	266
		% within Samer's version of place	60.0%	45.7%	46.3%	47.6%	46.2%	52.1%	75.0%	58.7%	55.7%	50.0%	71.4%	54.3%
Total		Count	30	81	41	42	26	48	32	75	61	26	28	490
		% within Samer's version of place	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

twenty3s * Samer's version of place Crosstabulation

		Samer's version of place	Total
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			Gas Station	Grand Central	Post Office	Public Library	Supermarket	Restaurant	Cafe	Cinema	Central Park	Rockefeller	Museum	
twenty3s	.00	Count	16	47	20	27	16	29	13	36	30	14	7	255
		% within Samer's version of place	53.3%	58.0%	48.8%	64.3%	61.5%	60.4%	40.6%	48.0%	49.2%	53.8%	25.0%	52.0%
	1.00	Count	14	34	21	15	10	19	19	39	31	12	21	235
		% within Samer's version of place	46.7%	42.0%	51.2%	35.7%	38.5%	39.6%	59.4%	52.0%	50.8%	46.2%	75.0%	48.0%
Total		Count	30	81	41	42	26	48	32	75	61	26	28	490
		% within Samer's version of place	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

APPENDIX J

EXTENDED LOGISTIC REGRESSION REPORTS

The Logistic Regression reports generated by SPSS® for the data analysis can be requested via E-mail, due to concerns for including excessive raw data (exceeding 200 pages) in a printed publication.

[mailto: snk4@njit.edu](mailto:snk4@njit.edu)

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