
Travel Information Search on the Internet: An Exploratory Study

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Introduction

Overall Structure

- Background/Purpose of Study
- Assumptions
- Conceptual Framework
- **Methodology**
- **Results**
- **Conclusions/Implications**

Background

- 95 percent of web users used the Internet to gather travel related information; 93 percent use the Web for planning vacations (Lake, 2001)
- Frustrating travel planning on the Internet (Stoltz, 1999)
- Complex, contingent, and dynamic travel planning (Jeng, 1999)
- The vocabulary problem (Furnas, Landauer, Gomez & Dumais, 1987)
- We don't know how users used the Internet for travel planning
- Research on travel information search on the Internet is scarce; most are survey research

Purpose of Research

- Explore the structure of travel information search on the Internet in the context of travel planning
- Examine the satisfaction of travel information search on the Internet and its determinants

Core Assumptions 1

Travel Planning and Information Search

- Travel planning is (Jeng, 1999):
 - A hierarchy of decisions which involves a set of sub-decisions, for example, destination, travel partners, accommodation, dining and others;
 - Multi-facet, dynamic and contingent process.

Core Assumptions 2

Usability of Information System

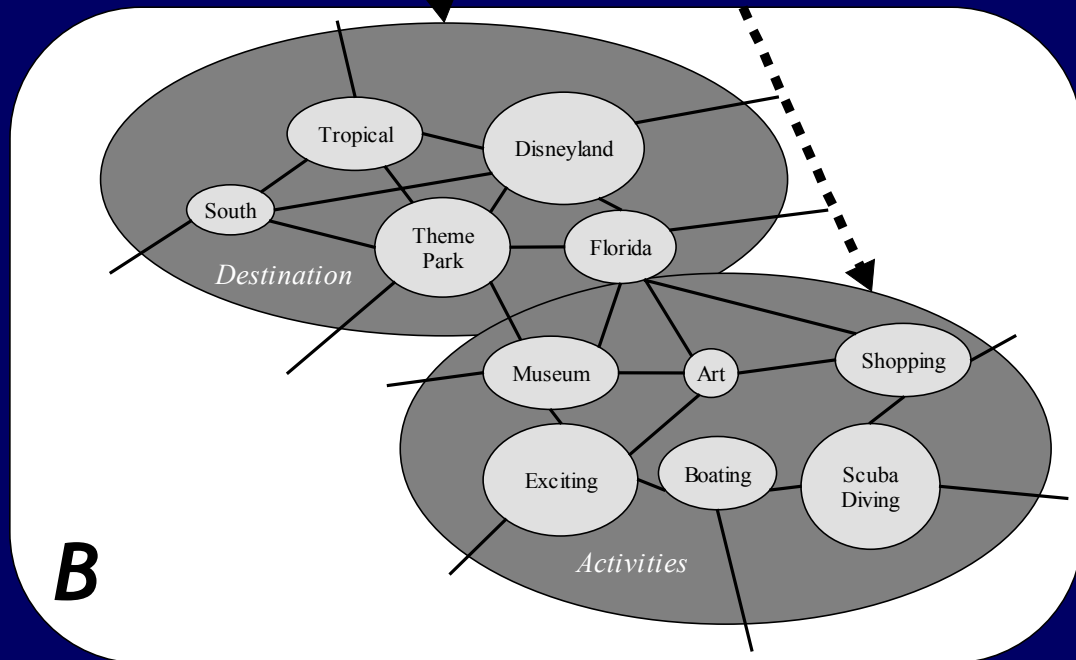
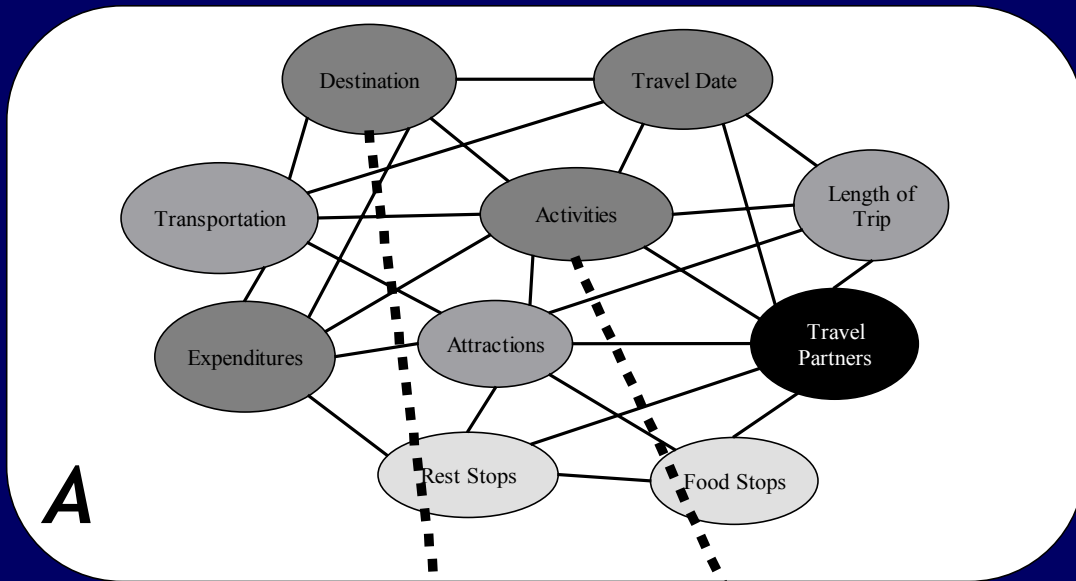
- The mismatch between user's mental model and system's conceptual model contributes to usability problem (Norman, 1986);
- The polyrepresentation of concepts in the languages of the users' cognitive space and the information system is a major issue when designing an effective information system interface (Ingwersen, 1996).
- Mismatch between travel information searcher's mental model and the semantic model of travel information space.

Core Assumptions 3

Mental Models and Information Search

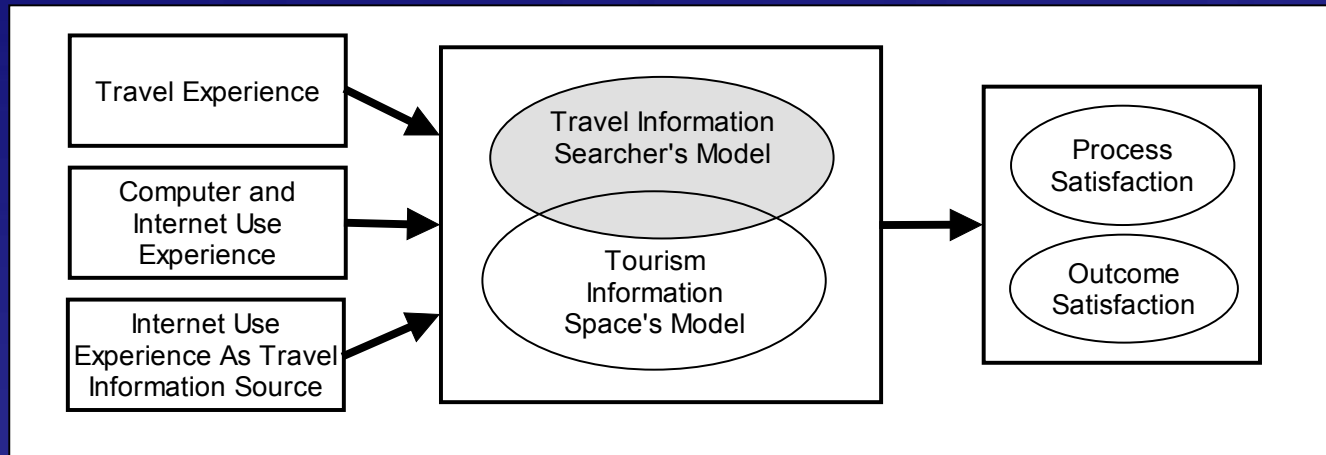
- Mental model as intermediate construct
- Semantic mental model vs. mental model in HCI
- Declarative Knowledge vs. Procedural Knowledge (Anderson, 2000)
- Using semantic networks to represent semantic mental models (Collins and Quillian, 1972; Doerfel, 1998)

Traveler's Semantic Mental Model

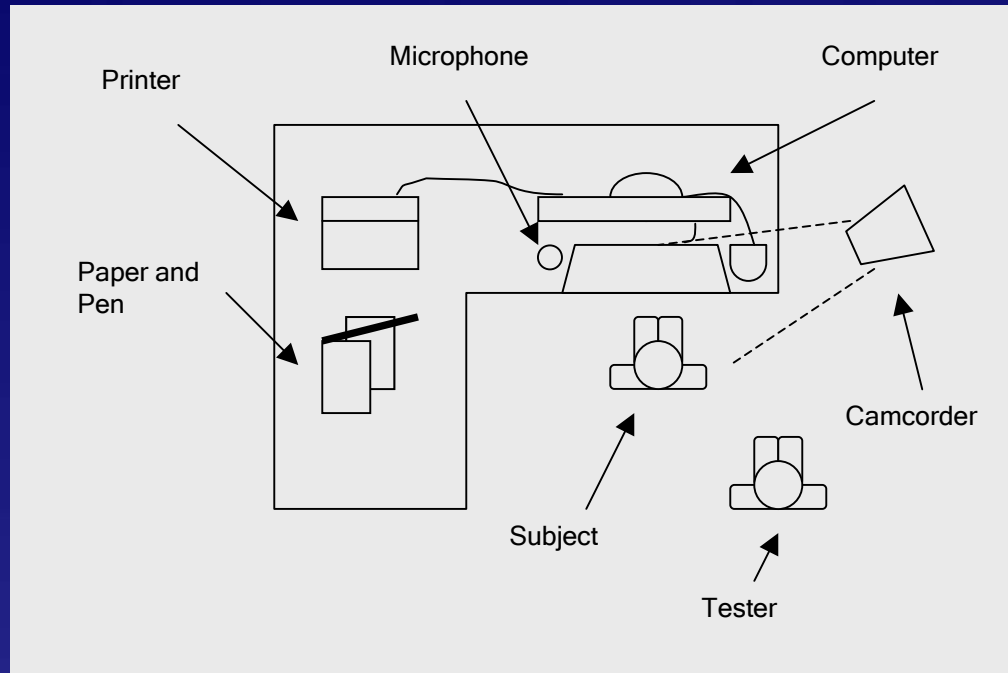


A Conceptual Model

- Choices of links are based on the relative value of information scent: the link anchors (text or pictures)
- Navigation process and reading process
- Search process can be broken up into different episodes; each episode targets at a sub-problem



Research Methodology



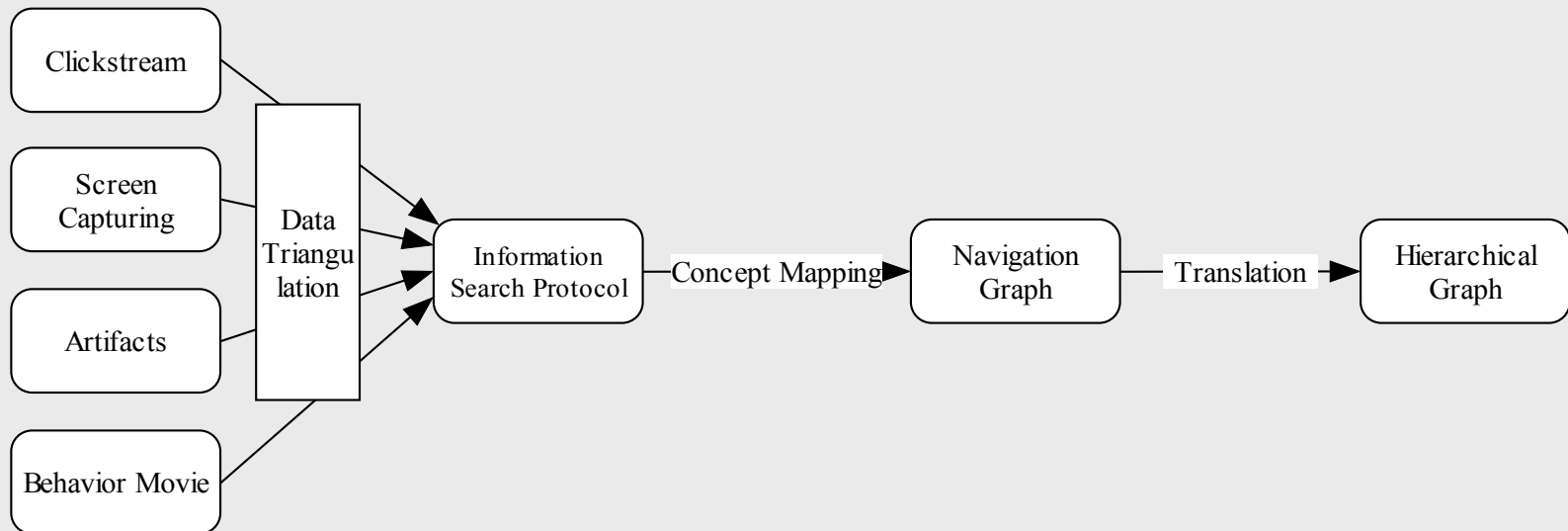
Travel Planning Exercise on the Internet

Research Methods

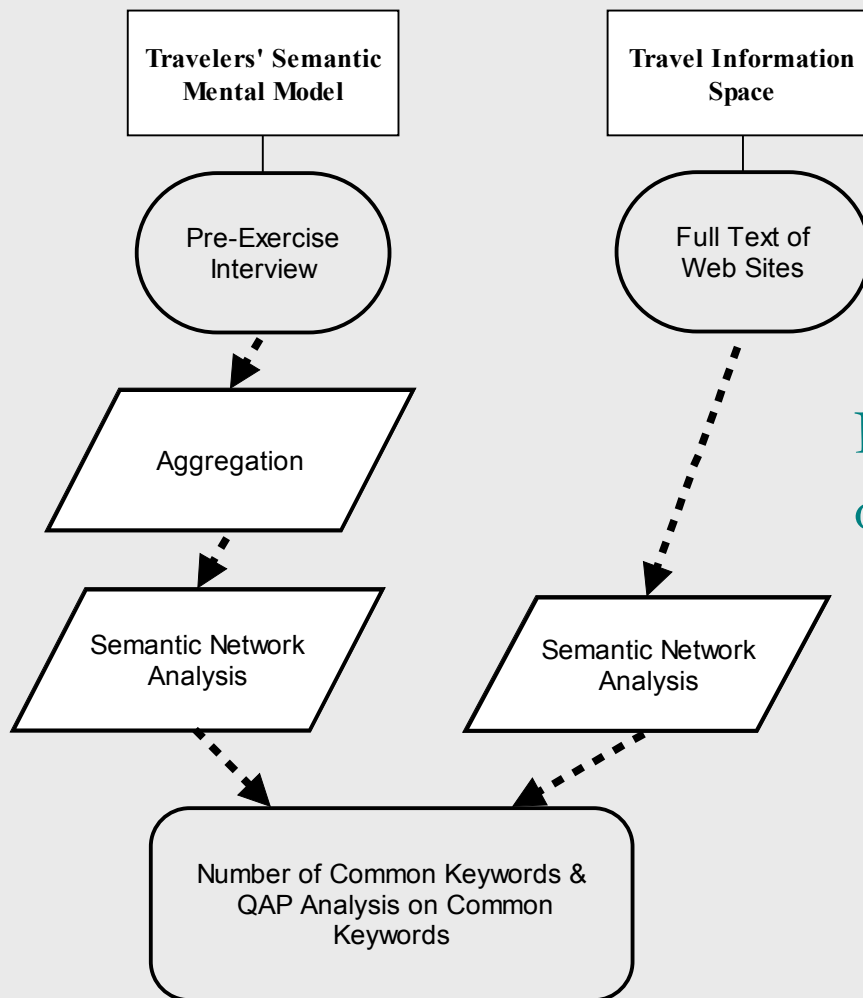
1. **Thinking-aloud Protocol:** Capturing information processing during the process
2. **Semantic network analysis and QAP analysis:** Using transcripts from interviews and text from full texts of web pages
 1. Transcripts from interviews
 2. Full texts of web pages from visited web sites
3. **Correlation analysis:** Using survey data and results from semantic analysis

Research Methodology

Phase I: Explore Structure

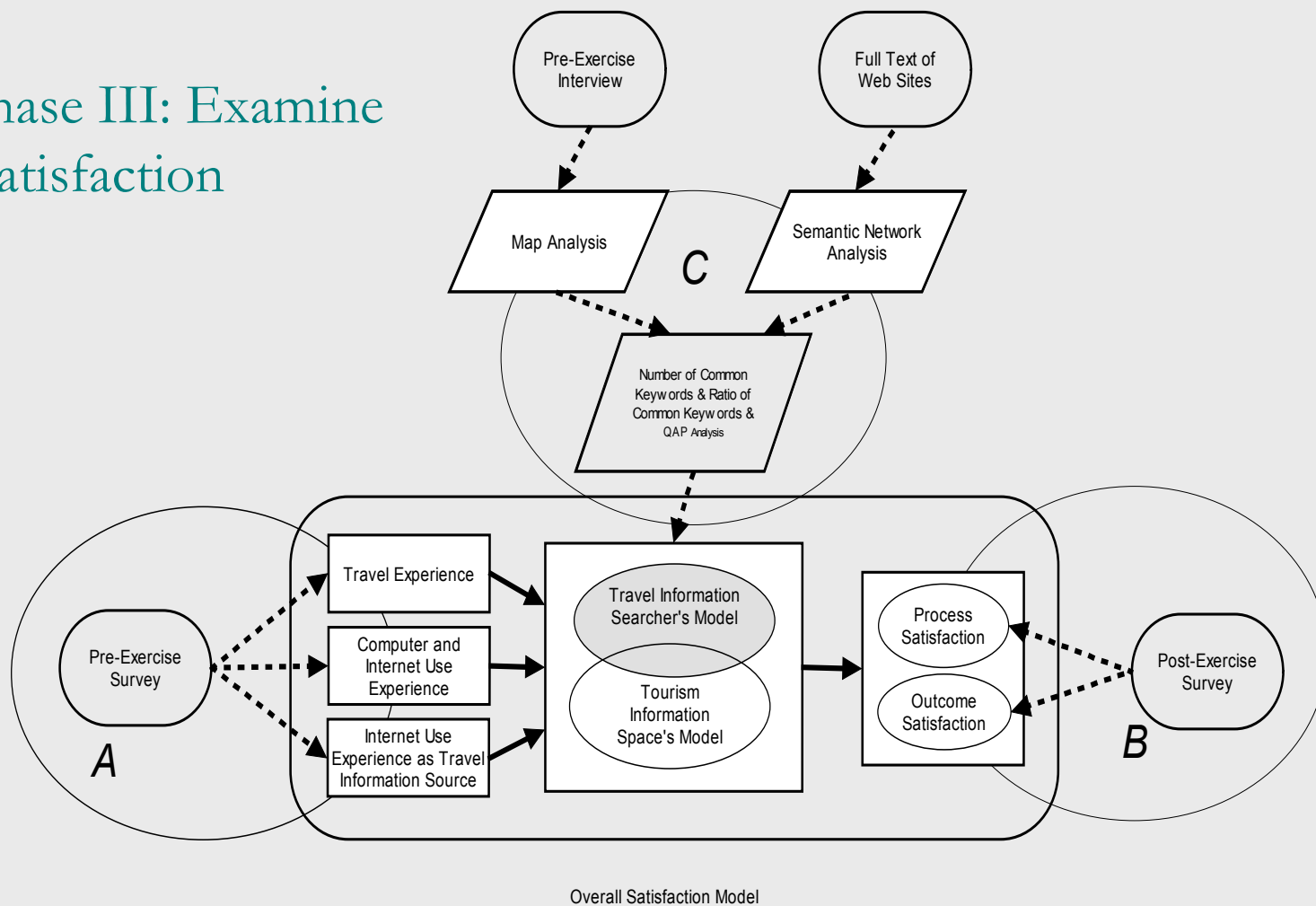


Research Methodology



Phase II. Global Level of Comparisons

Phase III: Examine Satisfaction



Analysis and Results

Phase I: Information Search Protocol: Data

Clickstream

(Internet Monitoring Software)

Online Activity

(Screen Capturing Software)

Artifacts from
Information Search

Large Scale Behavior

(Digital Camcorder)

Phase I: Original Clickstream

08/06/2002	20:15:40	00:01	TITLE	Program Manager	c:\winnt\explorer.exe	-
08/06/2002	20:15:41	00:04	TITLE	http://www.microsoft.com/isapi/redir.dll?prd=ie&pver=5.5&ar=msnhome - Microsoft Internet Explorer	c:\program files\internet explorer\iexplore.exe	-
08/06/2002	20:15:42	-	Link	http://www.microsoft.com/isapi/redir.dll?prd=ie&pver=5.5&ar=msnhome - Microsoft Internet Explorer	c:\program files\internet explorer\iexplore.exe	http://www.msn.com/
08/06/2002	20:15:45	-	Keystrokes	http://www.microsoft.com/isapi/redir.dll?prd=ie&pver=5.5&ar=msnhome - Microsoft Internet Explorer	c:\program files\internet explorer\iexplore.exe	w
08/06/2002	20:15:45	02:04	SUBTITLE	Welcome to MSN.com - Microsoft Internet Explorer	c:\program files\internet explorer\iexplore.exe	-
08/06/2002	20:15:45	-	Keystrokes	Welcome to MSN.com - Microsoft Internet Explorer	c:\program files\internet explorer\iexplore.exe	ww.sandiego.com

Phase I: Information Search Protocol: Data

Clickstream

(Internet Monitoring Software)

Online Activity

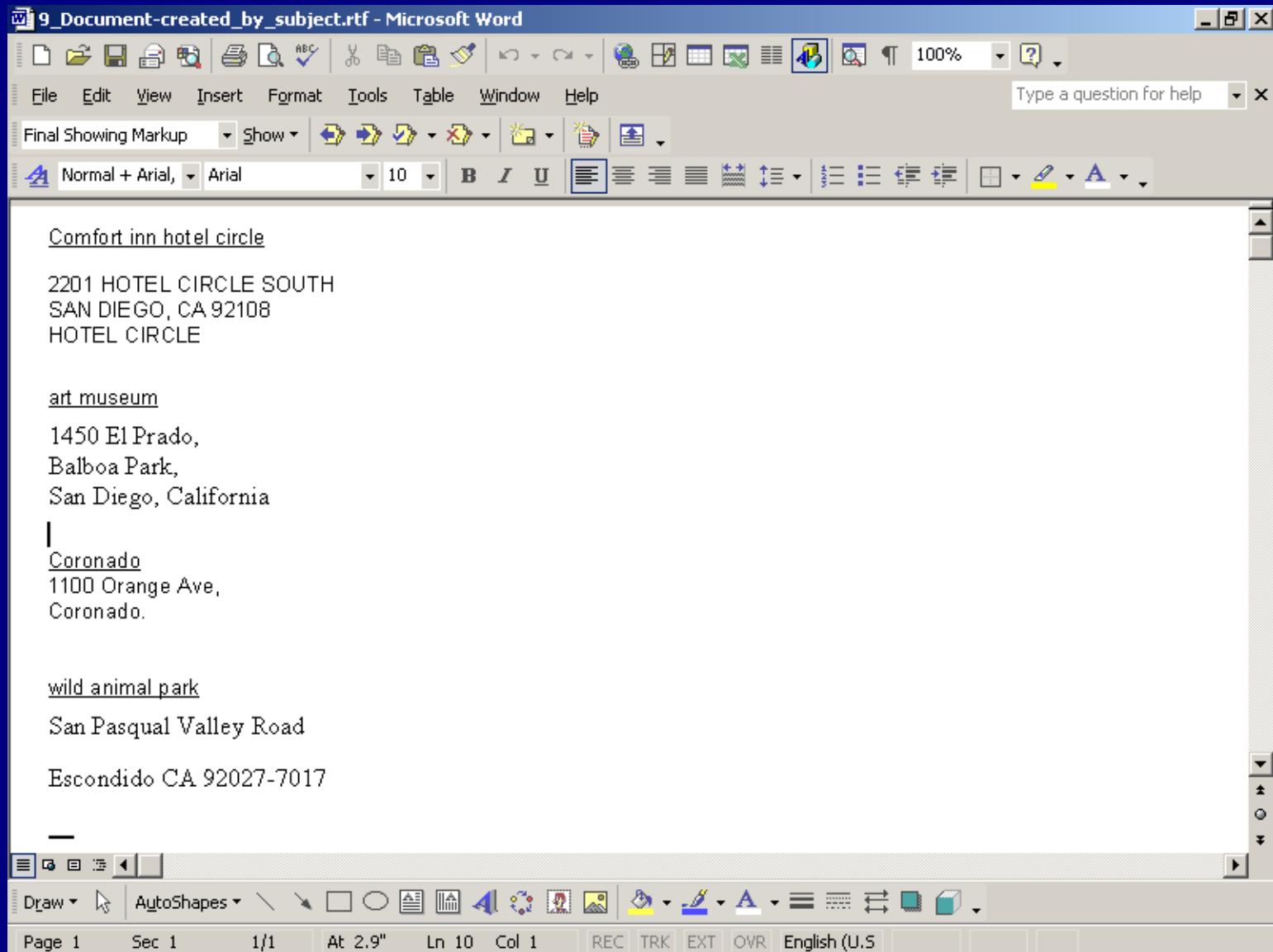
(Screen Capturing Software)

Artifacts from
Information Search

Large Scale Behavior

(Digital Camcorder)

Phase I: Information Search Artifacts



Phase I: Information Search Protocol: Data

Clickstream

(Internet Monitoring Software)

Online Activity

(Screen Capturing Software)

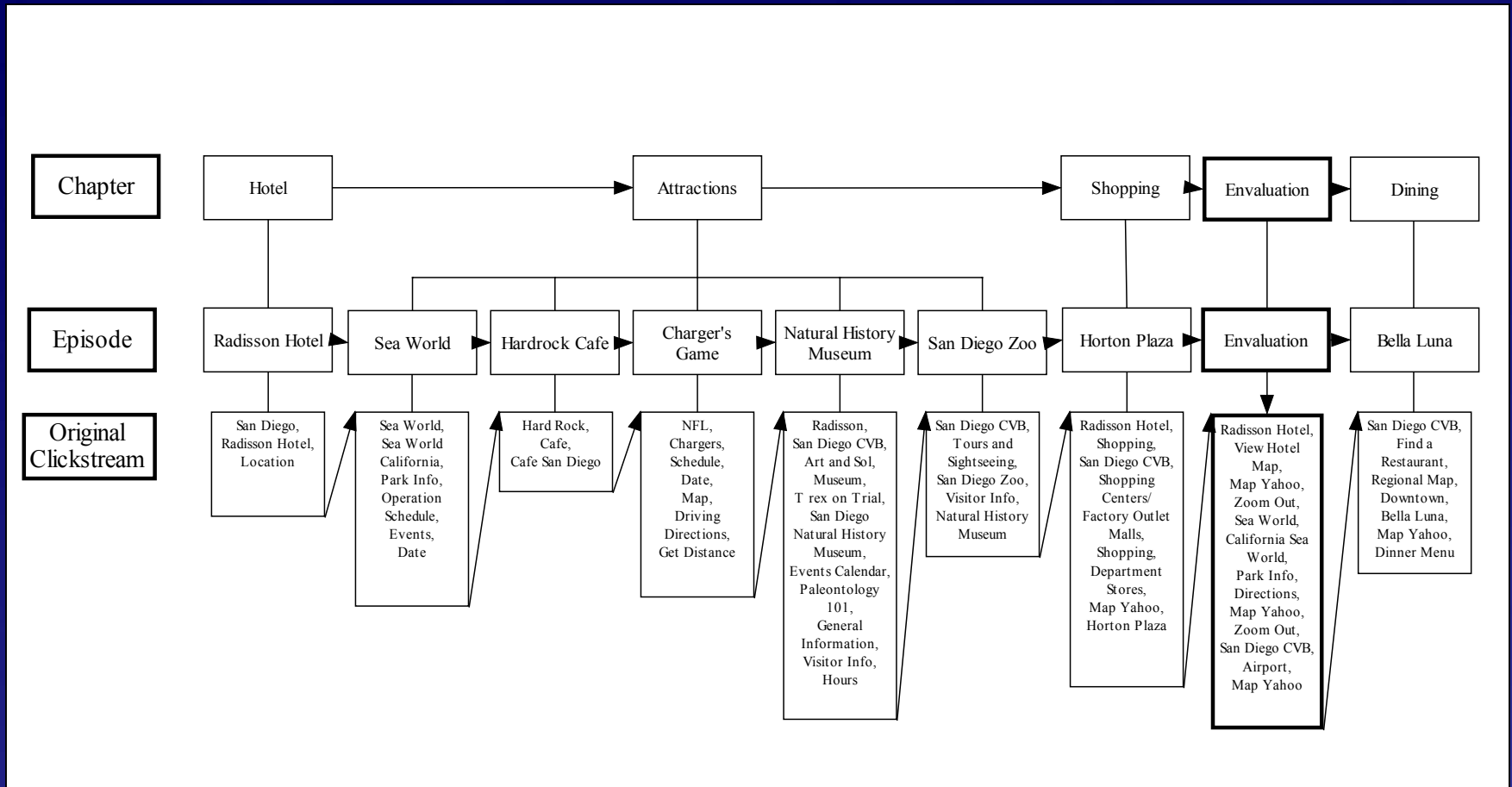
Artifacts from
Information Search

Large Scale Behavior

(Digital Camcorder)

Phase I: Final Protocol

Time Spent	Time	Behavior	Verbalization	Interpretation
0:00:03	20:15:42	Click Link	Go back to use Internet Explorer,	Start IE.
0:00:09	20:15:45	Type In	I'll go to google... SanDiego.com to see what I find here. See if there's anything interesting from the web site I can find out. Since I haven't been to the city.	Type in guessed address: sandiego.com
0:00:20	20:15:54	Click Link	All right, so we're here. Just looking around to see what's on here. Hotels, all right. Radisson Hotel San Diego. That catches my eye.	Click on Radisson Hotel San Diego.
0:00:11	20:16:14	Click Link	Stayed at Radisson before. I like them. Looks pretty nice. 89 to 90. I can deal with that for a day.	Scan information and click on Location.
0:00:31	20:16:25	Click Link	All right, location. Says, the heart of San Diego. Minutes from the major attractions. That's a good thing. Oh, Sea World. Oh, I probably make time to do that. I want to go to Sea World. I like fish. Working at marine labs, so. That'll be something I'm very interested in doing. All right. It's minutes, it says, to the attractions.	Click on Sea World link.
0:00:06	20:16:56	Click Link	I probably just take a taxi and not worry about renting a car for a day. It's a little bit too much.	Click on California on Sea World page.
0:00:10	20:17:02	Click Link	Too much work. All right. I'm at Sea World. So let's see. Park info.	Click on Park Info.
0:00:12	20:17:12	Click Link	Let's see. Wow, they have varieties, too. Hours of operation. Wow. It's expensive.	Check out detailed information and click on Operation Schedule.



Phase I: A Hierarchy of Travel Planning Process

Phase I: Findings

- Hierarchical structure
- Information behavior: searching, navigation and information organization
- Information hubs
- Accommodation: the most central sub-decision

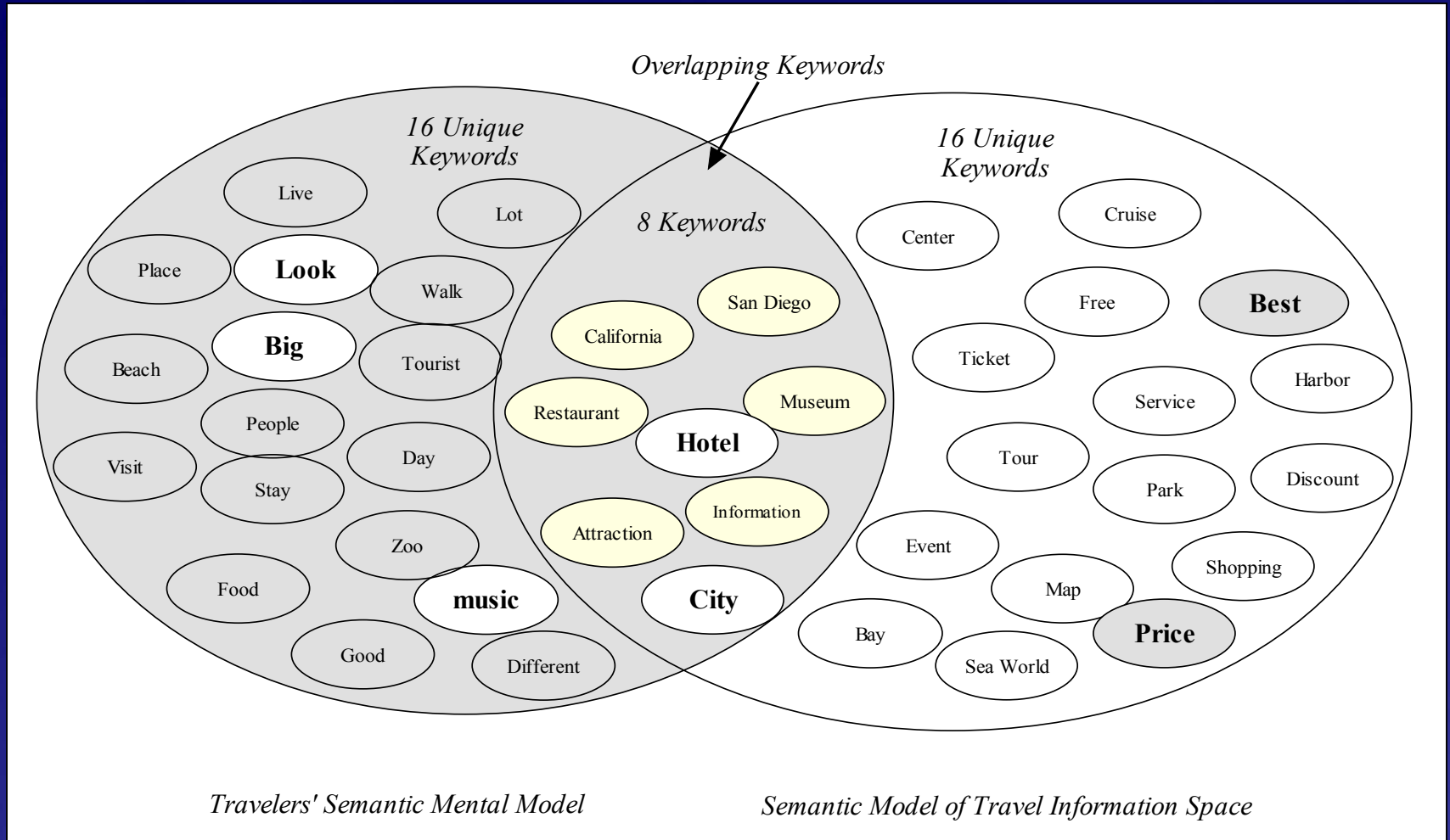
Phase I: Other Findings

- Combination of information sources and decision aids
- Geographical information and time frame
- Non-searchable attributes

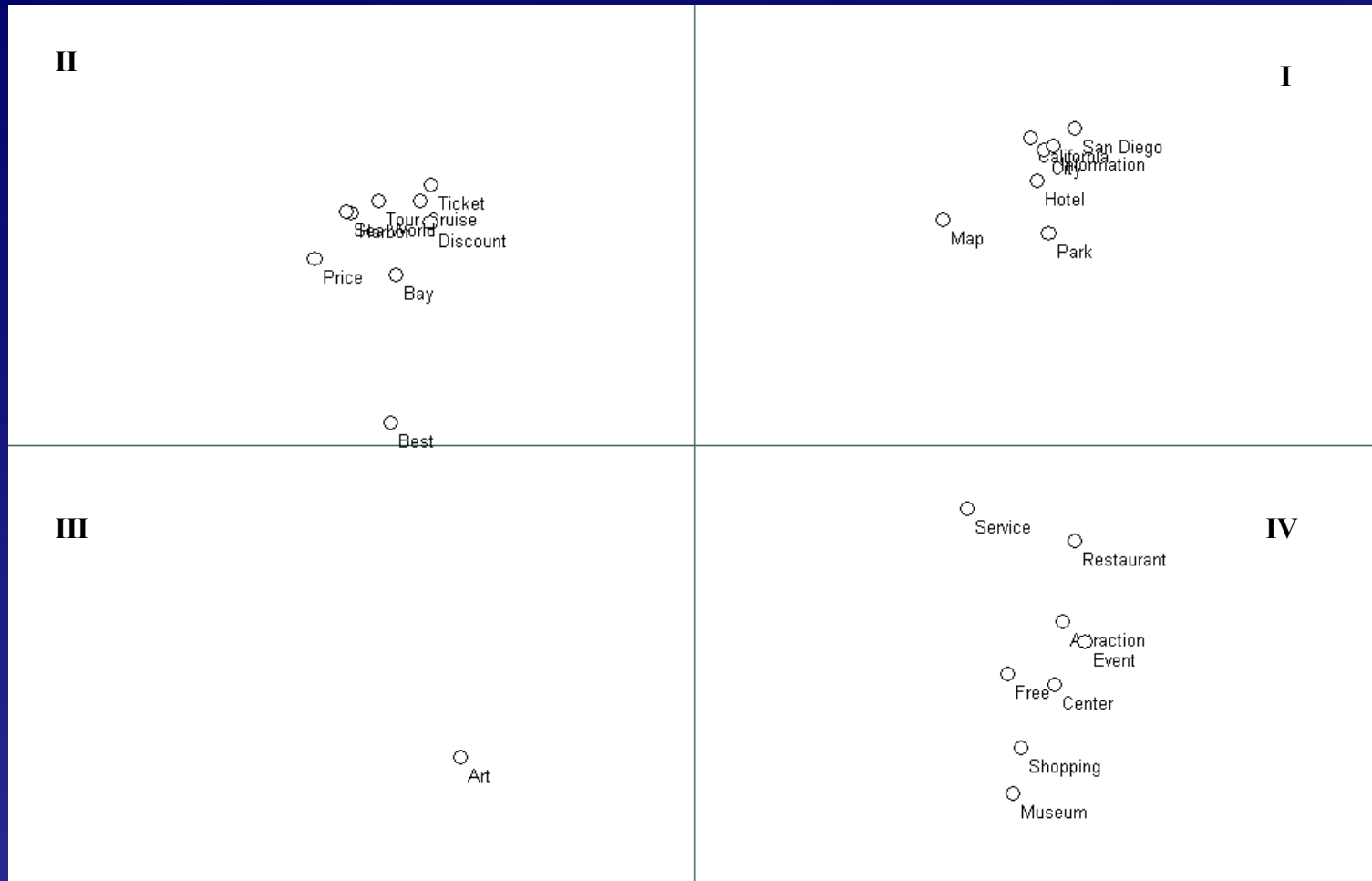
Phase II. Travel Information Space

Web Site	Number of Subjects Visited	Web Site	Number of Subjects Visited
www.google.com	13	www.sannet.gov	2
www.sandiegozoo.org	8	www.sandiego-online.com	2
www.sandiego.org	7	www.sandiego.cc	2
www.sdcommute.com	5	www.revup.biz	2
www.mapquest.com	5	www.reservetravel.com	2
www.trafficmp.com	4	www.portofsandiego.org	2
www.seaworld.com	3	www.orbitz.com	2
www.sandiego.com	3	www.netster.com	2
www.expedia.com	3	www.infosandiego.com	2
www.blueescape.com	3	www.hotwire.com	2
www.a-zsandiegoattractions.com	3	www.fodors.com	2
www.yahoo.com	2	www.citysearch.com	2
www.thebigbay.com	2	www.cafesevilla.com	2
www.sdsu.edu	2	www.balboapark.org	2
www.sdoro.com	2	www.arestravel.com	2
www.sdnhm.org	2	www.4adventure.com	2
www.sdinsider.com	2		

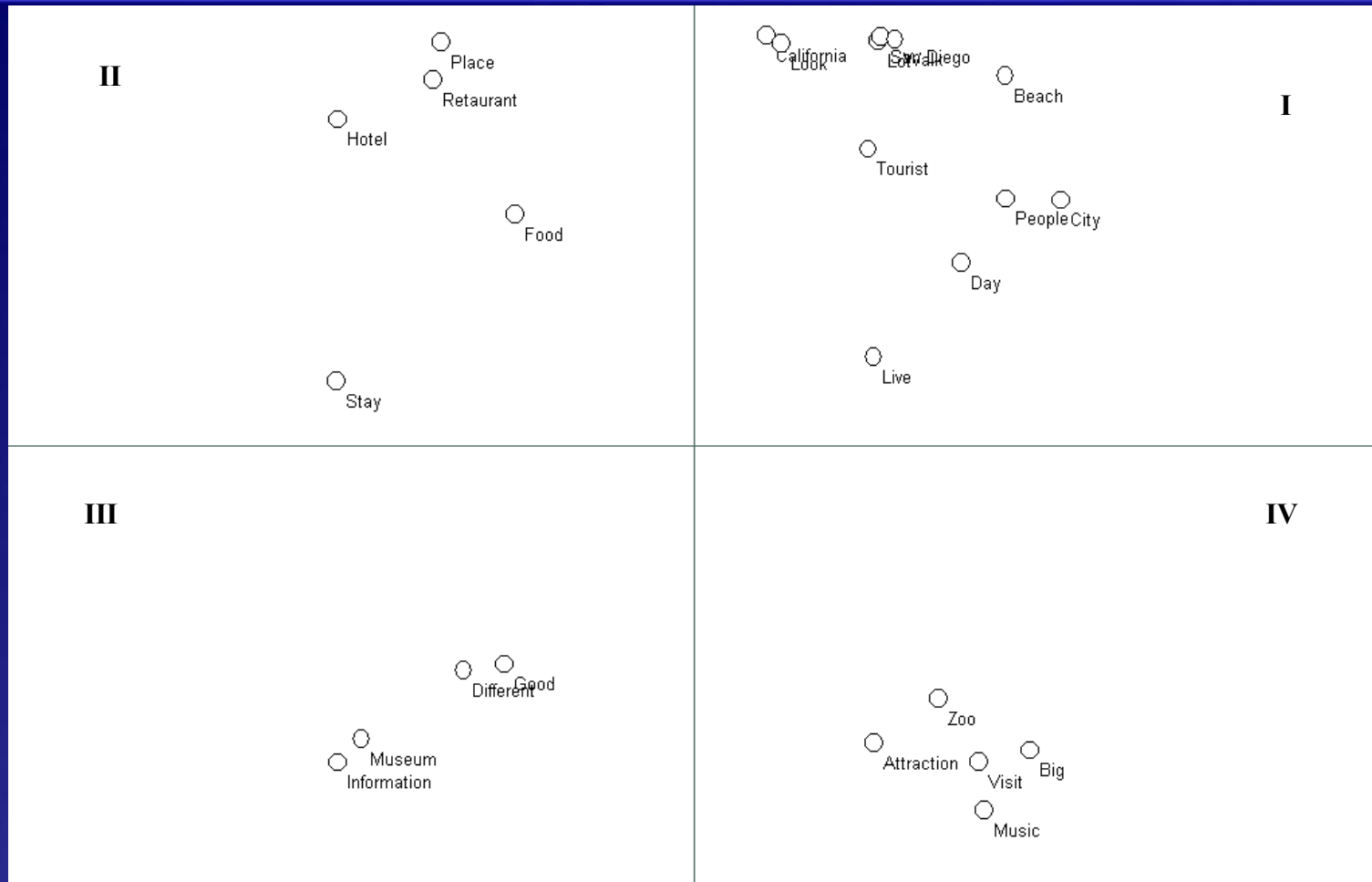
Phase II. Comparison of Two Semantic Models



Phase II. Semantic Model of Travel Information Space



Phase II. Traveler's Semantic Mental Model



Phase II: Findings

- Huge and diverse travel information space
- Different languages
 - Marketing language, price and quality
 - Traveler's language, subjective and experiential
- Common concepts are general concepts about information, hotel, restaurant, etc.

Phase II. Comparison of Two Semantic Models

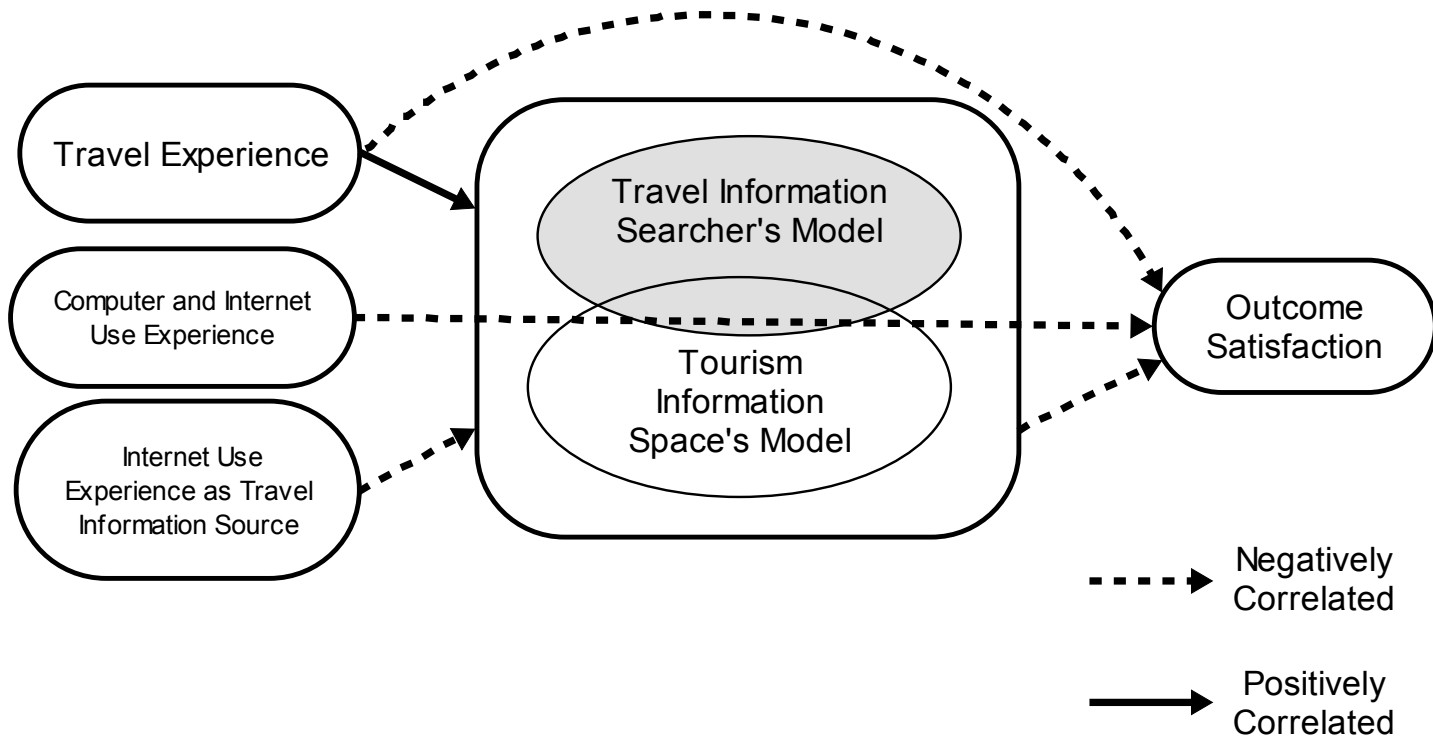
San Diego City is Located in **California**. Here we provide **information** on **hotels** and **parks**. You can also find **maps** of **San Diego**. Here you can find **best discount tickets** with the **best price** on **cruises, tours of harbor,** and the **Sea World** in bay area. You can go to various **attractions** and **services**, including **shopping centers, museums, restaurants** or **free events**. We also have **best art museums**.

We know **San Diego** is a **tourist city** located in **California**. If I go there, I'd like to **walk** around on a lot of **beaches** and **look** around the **city** in the **day**. I'd like to **watch people**, and see **live shows**. I'd like to **stay** at **good hotels** and **places, dining** at **restaurants** with **good food**. I'd like to **look** for **information** on **good** and **different museums**. I also like to visit the **big attractions**, like the **zoo** and **music clubs**.

Phase III: Congruence of Individual Model with Information Space

Subject #	Number of Common Concepts	Ratio of Common Concepts	QAP Correlation	Significance
1	4	0.20	0.39	0.34
2	3	0.20	0.80	0.33
3	5	0.17	0.28	0.12
4	7	0.41	0.28	0.01
5	6	0.10	0.30	0.26
6	6	0.33	0.48	0.00
7	8	0.16	0.31	0.03
8	6	0.17	0.10	0.50
9	6	0.24	0.36	0.11
10	10	0.14	0.33	0.03
11	9	0.26	0.18	0.26
12	7	0.11	0.24	0.16
13	8	0.24	0.35	0.01
14	4	0.18	0.44	0.05
15	6	0.09	0.13	0.41
Average	6.3	0.20	0.33	--

Phase III. Examination of Satisfaction Model



Phase III. Examination of Satisfaction Model

[travel planning] *“...is easy. Everything is settled, set. I have an itinerary set up already for me. I know when I am leaving, where my car will be at, which hotel I will be staying at, everything is reserved. I probably call a couple days before. I probably call the hotel and probably call the car rental company just to double-check, but basically everything is set up. Everything is paid for. Why I am satisfied? Not worried.”*

“Well, I was satisfied, but not completely satisfied, because my ideal planning time for a vacation will probably be like a couple of hours. Maybe between two to five hours’ research. Maybe looking at as much details as I can before making a decision. I feel probably this was as good as I could have done in the time set. I would like to have more time.”

“...Well, surprises all are found out. I don’t know much about San Diego, so it’s really exciting to see the Sea World there. Like, wow... I had no idea it was there. I really want to go. That would just be fascinating. You know. I heard about a lot about the zoo. I just really didn’t think about it till I saw the site. I’m like, oh, yeah, that’s good. You know they have a Hardrock café, so that’s really made my day...”

Phase III: Findings

Proposed model is not supported

- Lower congruence leads to higher satisfaction
- Internet experience leads to lower satisfaction
- Functional needs and hedonic needs
- Novel and exciting information needed

Overall Conclusions

1. Structure

- Episode and chapter structure
- Information overloading and decision aid tools
- Geographical information and time frame

2. Global level of analysis

- Different languages
- Marketing language vs. subjective and experiential language

3. Satisfaction

- High levels of satisfaction
- Two determinants of satisfaction: functional vs. hedonic, hygiene and motivator
- Looking for novel and exciting information

Theoretical Implications

- General information search protocol
- Confirmation of dynamic and contingent travel planning process; information overloading; information foraging behavior
- Different levels of behavior and their implications
- Higher level of usability and direction switch in research in use of technology

Design and Managerial Implications

- Based on commonalities of information search behavior
- Apparent limitations: geographical information and time frame
- Beyond customization and personalization
- Collaborations between different parties in tourism
- Generating tourism ontology from consumer's side

Limitations

- Sampling
- Semantic network analysis
- Choice of destination
- Coding

Future Research

- Large sample for validation
- Different levels of semantic analysis
- More controlled experiment for measuring efficiency
- Analysis on different sectors of tourism
- Analysis of sequence of navigation

Thank You!

Information Seeking and the Internet

- Information search on the Internet as navigation through hypertext
- Navigational task vs. information task (Kim and Hirtle, 1995)
- Information search experience and domain knowledge contribute to successful and satisfactory information search (Hsieh-Yee, 2001)

Why top 25 keywords?

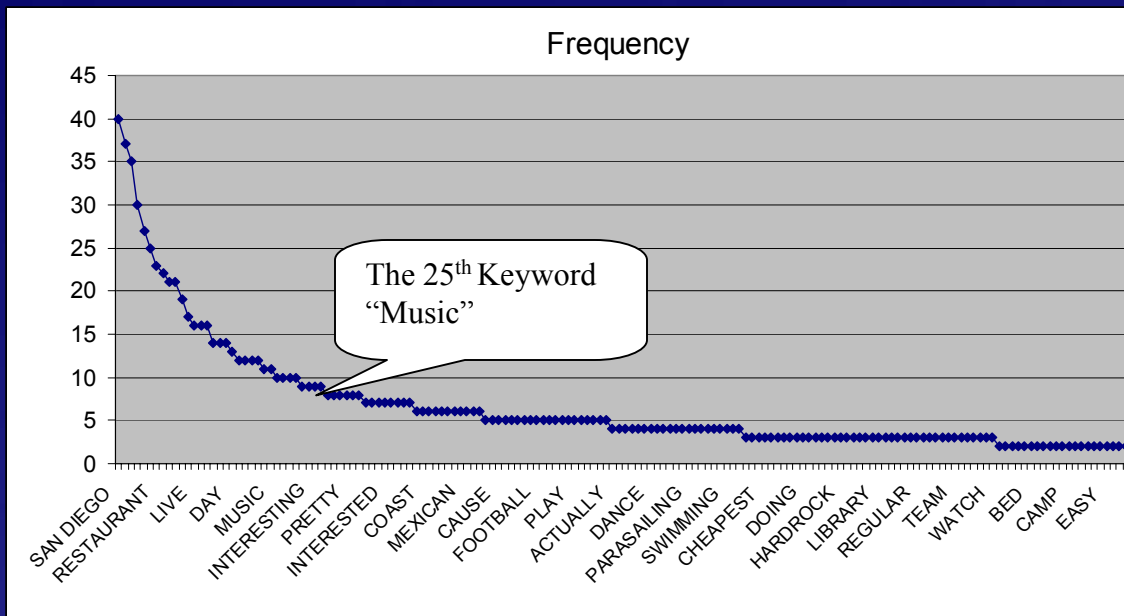


Figure 4-8. Top 160 Keywords and Their Frequencies in Travelers' Mental Model

Why top 25 keywords?

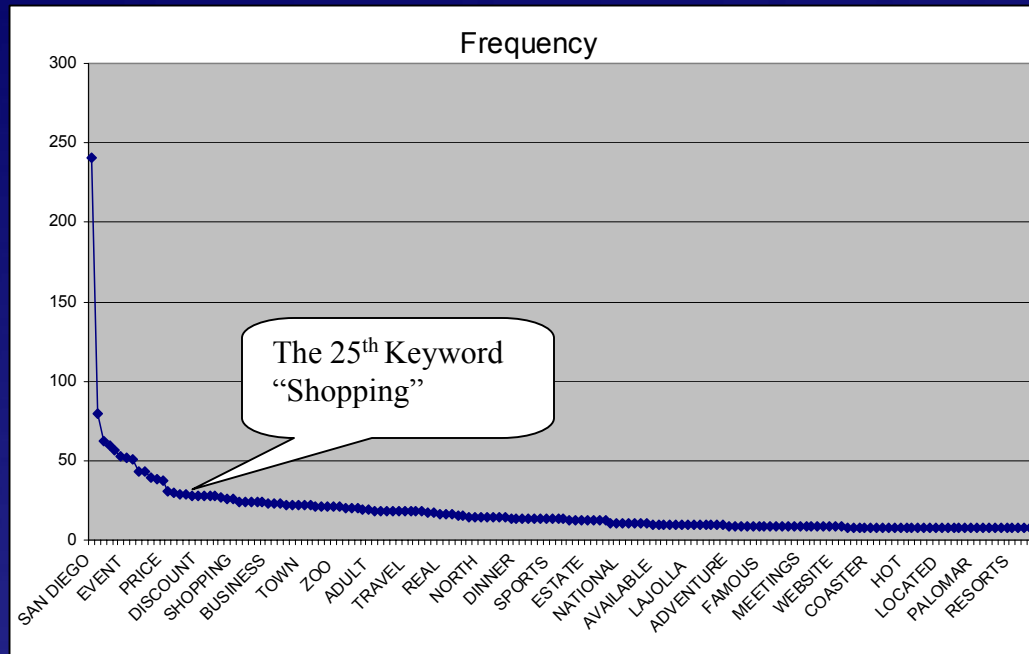


Figure 4-6. Top 160 Keywords and Their Frequencies in Tourism Information Space

Information Seeking and the Internet

- **Information Foraging** (Pirolli & Card, 1999)

- Information searchers use proximal cues to identify important information for further exploration or consumption

- **Information Scent** (Chi, Pirolli, Chen and Pitkow, 2001)

- Information searchers identify valuable information from the “snippets” of proximal cues



Comparison of Two Semantic Models, one set with high levels of satisfaction. The other one with low level of satisfaction.

Each individual is unique in terms of their mental models.

Measure of efficiency, maybe the ratio of clicks to episodes of decisions.

Linkage between navigation and comparison of semantics.

Michael: Why they go back to Radisson Hotel web page?

Definition of information hubs... go back and visit.

Qualitative, why they are not satisfied? Why they are satisfied.

Frequencies of keywords, including the distribution of all the keywords.

Research Procedure

1. **Pilot study** (May - June, 2002)
 - 5 subjects
2. **Formal experiment** (September, 2002)
 - 15 diverse subjects (Eveland, & Dunwoody, 2000)

Main Goals of Research

- Understand the structure of travel information search on the Internet
 - Episode?
- Examine satisfaction of travel information search process
 - Discover the congruence two semantic models
 - Explore the relationship between congruence of two models, satisfaction and information searchers' individual characteristics

Research Procedure

