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**Investigating the Impact of Sense of Place on Travel Behavior Using an  
Intercept Survey Methodology**

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**Investigating the Impact of Sense of Place on Travel Behavior Using an Intercept Survey  
Methodology**

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## **ABSTRACT**

Current trends in transportation and urban planning are moving in the direction of integrated land use and transportation models. These models require an understanding and accurate representation of the propensity of a location to host an activity, and thus generate a need for travel. Within this necessity to represent activity propensity comes an often-neglected area of human-spatial interaction—the attractiveness of a location. The propensity of an individual to travel to a specific location is highly subjective, and can vary from person to person and develop with exposure to the location, an attribute, which is said to be experiential in nature. This experiential aspect of place has been termed by those in geography and environmental psychology as “sense of place”. An intercept survey was thus designed to attempt to measure this sense of place and gain an understanding of how this experiential aspect of place differs among people and between locations. A series of statistical analyses of the data explore differences that exist in sense of place attitudes, as well as impacts of sense of place on travel behavior. Lastly, extensions of this pilot research project are described and future applications are discussed.

## INTRODUCTION

Current attempts to understand travel behavior of persons rest on innovations in methodology such as the activity-based approach in which as Timmermans (1) describes, one must also consider land use patterns, in the modeling process, to inform ones activities by imposing constraints and offering opportunities. For this to manifest itself into a reality, researchers and practitioners alike must expand the data collection efforts to include nontraditional information, through which an understanding of the entire interaction between people and locations may be achieved. In other words, bits of information need to be sought which will give perspective into the subjective experiences and associations with specific locations or places. A subset of this interaction, which can be directly applied to a survey process, is a measurement of the attitude one has toward a spatial setting (2), known in fields such as geography and environmental psychology as sense of place. Sense of place has been theorized and discussed at length, but lacks substantial quantification. Many believe that sense of place is such an experiential process and so highly individualized that it is too much of an undertaking to attempt to quantify it. However, several others have laid foundations for methodologies to quantify this attitude such as Jorgensen and Stedman (examining attitudes associated with lakeshore vacation property ownership, (2) and Sixsmith (examining attitudes about the meaning of 'home', (3)). Sense of place has not been adequately explored in travel behavior research and predictive modeling and a first attempt is made here. Sense of place can be more completely defined as "an experiential process created by the setting, combined with what a person brings to it" (4). Much research has been conducted exploring exactly how to identify different factors contributing to the overall sense of place associated with a location by an individual. Research on sense of place has provided evidence that there are various attributes or associated constructs to sense of place. Jorgensen and Stedman in 2001 provide a review of several studies that explore the construct of sense of place either in its entirety, or in parts, and they identify three place constructs that appear consistently in environmental psychology literature: 1) **Place attachment** which is defined as "the positive bond that develops between a person and their environment" (5), 2) **Place dependence** which is thought of as the "perceived strength of association between a person and a place" (6), and 3) **Place identity** which is "a person's identity with relation to the physical environment" (7). A fourth construct **Place satisfaction** defined as "a person's level of satisfaction with the services, environment and needs provided for by a specific place" (8). Place satisfaction is not often considered a core concept like the other three, but when combined with place attachment they "flesh out the social psychological dimensions of sense of place" (8). To test the structure of sense of place with respect to these sub constructs, Stedman and Jorgensen conducted several analyses on a survey given to owners of lake front vacation properties. The conceptual framework from Stedman's survey served as the foundation for our survey.

In addition to these four aspects contributing to sense of place, several other aspects have been identified in the literature that are worthy of discussion. Sense of place is thought to develop as the person experiences the place, therefore it is important when studying this concept to consider the level of experience or familiarity one has with a specific location. In a location choice model application, it is crucial to first understand the level of interaction one has had with all of the choice locations in order to establish an associated sense of place. The built

environment or physical attributes of a location as well as the founded social and cultural associations to the location are also fundamental in forming these aspects of sense of place.

Lastly, people experience a setting differently depending on the elements that they bring to the setting. This aspect of sense of place has been labeled personal state/individual variation in figure 1, which shows the overall schematic of sense of place. These elements include the intentions and expectations of the person as well as the person's mood. A person can bring both conscious and unconscious expectations to the setting, which impact the interaction one has with a setting. A person's understanding of who he or she is and what the purpose of the activity is in a setting molds the way in which one interacts with that location. This forms the intentions of the person for being there, the expectations of what will be accomplished, and the actions of other people in the setting (4). Accompanying this interaction is a heightened awareness of the artifacts and mentifacts that are most familiar to the person, as there are predetermined expectations of how these will act or can be used, as well as a possible sentimental association between two experiences. It is possible however as Steele states that the same object or aspect of a setting can produce different meaning to different people. This can be attributed to various causes, including cultural differences, individual taste or prior associations. Included in the definition of one's individual sense of place are thoughts that are present in patterns or behavior but are unnoticed. This aspect of sense of place development might have a larger influence in one person's location choice over another. Likewise, the interaction one has with a setting can be influenced by the emotions of the person. Mood acts as a filter on ones perceptions, and reactions to stimuli, and in turn greatly affects the "place" characterization associated with a location (4). For this reason, a person might experience a setting twice, and have completely different interactions as a result of his or her mood. Feeling tired or tense would no doubt illicit different experiences than one would experience when feeling excited or relaxed. In this paper we describe our survey methodology used to quantify sense of place, and offer some statistical findings implicating the application of this theory to travel behavior.

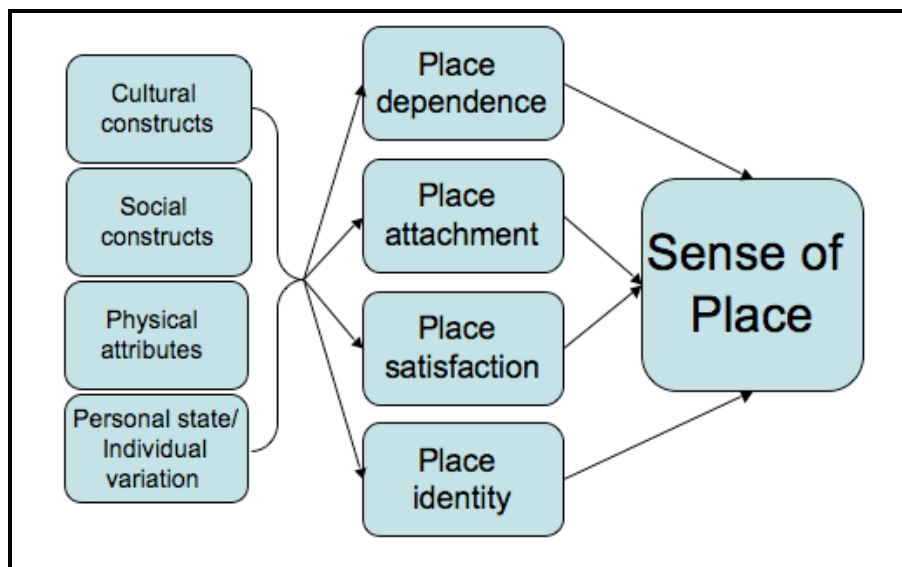


FIGURE 1 Sense of place construct.

## SENSE OF PLACE IN TRANSPORTATION: PILOT STUDY

In this pilot study two shopping locations in Santa Barbara, California were chosen as study areas because of their apparent similarity (e.g., shopping destination) for activity participation. Figure 2 provides a map of the two locations.

### **Study Locations**

Paseo Nuevo is an open-air shopping mall situated within downtown Santa Barbara, and is adjacent to several other business locations as well as residences. It is located on State Street, which is perhaps the most notable street in Santa Barbara. Paseo Nuevo contains two big box department stores, and many other apparel, gift, accessory and specialty stores. In addition, Paseo Nuevo has several dining opportunities within the mall, as well as along State Street and other nearby streets. There is a bus transfer station located less than one mile from Paseo Nuevo, and several bus lines service the area. There is a small amount of street and surface lot parking, however most of the downtown parking is in structures. Most structures are maintained by the city, however the mall management company maintains the adjoining lot to Paseo Nuevo. The associated fee for parking in the area is \$1.50 per hour after the free of charge first 75 minutes. By its downtown nature, Paseo Nuevo has several activities occurring in the surrounding area, and is close to many tourist attractions.

La Cumbre, like Paseo Nuevo is an open-air mall, and is located west of Paseo Nuevo away from the downtown region. It is less than one half of a mile (.8 km) from the US 101, which is an access controlled major connector between San Francisco and Los Angeles. It is also located on State Street, but it is located on upper state, which is less well known and is an area that primarily serves the local community and attracts fewer tourists. La Cumbre also contains two department stores, as well as other apparel, gift, accessory and specialty stores. La Cumbre contains a few dining locations, however the options are not as many or diverse as at Paseo Nuevo. There is another shopping center across the street, known to locals as Five Points, which contains more retail stores as well as several restaurants. It must be stated however that La Cumbre is currently undergoing several changes including aesthetic changes, retail moves as well as dining additions, and is bringing more high-end stores and restaurants to the mall. La Cumbre is surrounded by several large surface lots for parking at no charge. The mall is serviced by two bus lines, which stop in the parking lot. When comparing Paseo Nuevo and La Cumbre in function, La Cumbre functions more closely like a typical suburban mall.



FIGURE 2 Study Locations (Data sources: street level: ESRI, imagery: USGS, photos: K. Deusch).

### Survey Methodology

An intercept survey format was used in data collection at each of the two locations. Patrons were sampled on five days of a seven-day period at each location. Groups of researchers were stationed at spots within each of the malls and solicited participation from passersby. The surveys consisted of three main portions. The first portion of the survey involved questions targeting sense of place. The sense of place portion of the survey asks the respondent to answer several attitudinal questions about their views of both study locations based on a seven point ordinal scale. Previous work by Stedman regarding sense of place served as a foundation in



building the sense of place questions, and was modified for shopping mall reference. These questions for instance asked the respondent to rate his or her attachment or preferences of shopping locations. Several additional questions were posed in attempts to gain a more complete understanding of patrons' attitudes such as physical, cultural and social attributes of the location. A partial list of survey questions and corresponding questions from Stedman's home ownership research can be found in table 1.

**TABLE 1 Survey questions and construct components**

<b>Question (Stedman)</b>	<b>Question (Deutsch) "Paseo Nuevo or La Cumbre...."</b>	<b>Place Construct</b>
<i>"Everything about my lake property is a reflection of me."</i>	reflects the type of person I am."	<b>Identity</b>
<i>"My lake property says very little about who I am."</i>	says very little about me."	<b>Identity</b>
<i>"I feel that I can really be myself at my lake property."</i>	makes me feel like I can be myself."	<b>Identity</b>
<i>"I feel relaxed when I'm at my lake property."</i>	makes me feel relaxed."	<b>Attachment</b>
<i>"I feel happiest when I am at my lake property."</i>	makes me feel happy."	<b>Attachment</b>
<i>"My lake property is my favorite place to be."</i>	is one of my favorite places in Santa Barbara."	<b>Attachment</b>
<i>"For doing the things that I enjoy most, no other place can compare to my lake property."</i>	meets my needs better than any other location in Santa Barbara."	<b>Dependence</b>
<i>"As far as I am concerned, there are better places to be than at my lake property."</i>	I only come when I have specific reasons in mind."	<b>Dependence</b>
<i>"I am satisfied with... (lake attributes such as structures per mile, public access, lake size, average depth, color, chlorophyll and turbidity)"</i>	"I am satisfied with... (mall attributes such as parking, number of people, food options, entertainment options, products and level of service)"	<b>Satisfaction</b>

Respondents were also asked to indicate how often they visit each location to determine familiarity. The second portion of the survey involved questions concerning travel information such as travel companionship, mode used for trip, and previous and post activities. The third section consisted of socio-demographic questions, very similar to those used in the Centresim study (9). The format of the survey and process followed the New KONTIV design developed by Social Data (10,11), making use of strategic shading and grayscale techniques to draw attention to response boxes and easing respondent burden and flow of answering questions. The survey background was shaded with answer boxes white. The survey was created in a landscape format in order to maximize the font size and aid in a more simple design. A secondary component of the survey also includes an activity diary, which is not the subject of this paper.

## ANALYSIS

Qualitative observations of the data collection were made and provide insightful feedback into future intercept surveys. Response rates varied between locations (lower response rate at Paseo Nuevo than at La Cumbre), but also within locations at different spots. For instance, response rates in Paseo Nuevo were higher in less populated, slower moving areas. One of the main surveying stations at Paseo Nuevo was located on the periphery of the mall located on State Street. This was by far the busiest of all surveying stations, and thus had the highest potential survey recruitment, but also received the highest frequency of uninterested responses. This is perhaps due to a “hurried” feel or perhaps the other commotion that was simultaneously taking place. Many passersby simply refused without giving reason, however some voiced refusal thinking that they were being asked to sign petitions for ballot measures, or a variety of other solicitations. This survey location was located on public property, which might have added to this feeling. The response rate at La Cumbre however was much higher. Factors that might contribute to this are the obvious slower and quieter atmosphere of La Cumbre, fewer people, or perhaps fewer tourists. This mall is also completely enclosed with privately owned property (including parking lots, which prevent people from soliciting and begging and has extensive amenities (e.g., tables and chairs with umbrellas), which is in stark contrast to the dynamics of Paseo Nuevo and the downtown area.

A sample of 836 respondents was obtained during the ten-day data collection period. A breakdown of the sample size by location and day is provided in table 2. Of these responses, the sample was reduced for sense of place evaluation on each location by excluding those respondents who had never visited the location of interest. The resulting sample sizes were 767 responses for the analysis of Paseo Nuevo and 718 for analysis of La Cumbre (a reflection of the higher number of tourists who visit the downtown area). Due to a few reporting errors, a total cleaned sample of 823 respondents was used for aggregate analyses.

### Sample Composition

The total sample was composed of 43.1% males and 56.9% females with a mean age of 37.9 years old. When disaggregated by survey location, the male to female ratios were quite different. There was a 57.7% to 42.3% male to female ratio at Paseo Nuevo and 33.9% to 66.1% male to female ratio at La Cumbre. The age statistics between the two locations were comparable, with Paseo Nuevo attracting a slightly younger segment than La Cumbre (mean: 34.8 and 39.8 respectively, median: 28 and 37 respectively, and range: 60 and 70 respectively). The majority of the respondents live in Santa Barbara County. A higher percentage of respondents in the sample at Paseo Nuevo live in a county other than Santa Barbara or Ventura (24% out of town in Paseo Nuevo sample, and 14% out of town in La Cumbre sample). These statistics can be seen in table 2.

TABLE 2 Sample descriptive statistics

	Paseo Nuevo	La Cumbre	
<b>Monday</b>	57	81	
<b>Wednesday</b>	57	92	
<b>Friday</b>	70	93	
<b>Saturday</b>	62	131	
<b>Sunday</b>	76	117	
<b>Total</b>	<b>322</b>	<b>514</b>	
	Aggregate	Paseo Nuevo	La Cumbre
<b>Gender</b> male (female)	43.1% (56.9%)	57.7% (42.3%)	33.9% (76.1%)
<b>Age</b>			
Mean	37.9	34.8	39.8
Median		28	37
Range		60	70
<b>Residence</b>			
Santa Barbara/Ventura		76%	86%
Other		24%	14%

### Sense of Place

A univariate analysis of the sense of place questions revealed several findings, which allude to the contribution of specific location attributes in a sense of place. Questions were evaluated by the respondent on a seven point ordinal scale ranging from strongly disagree to strongly agree, with a rating of four being neither agree nor disagree. Means and standard deviations of the aggregate sample's responses to each question are provided in table 3. These statistics show a much lower degree of satisfaction for some services such as food options, as well and entertainment options at La Cumbre, and a slightly higher ranking of the aesthetic and physical features of Paseo Nuevo over La Cumbre. Several aspects of each location reveal similar averages in participants' responses.

TABLE 3 Sense of place response means

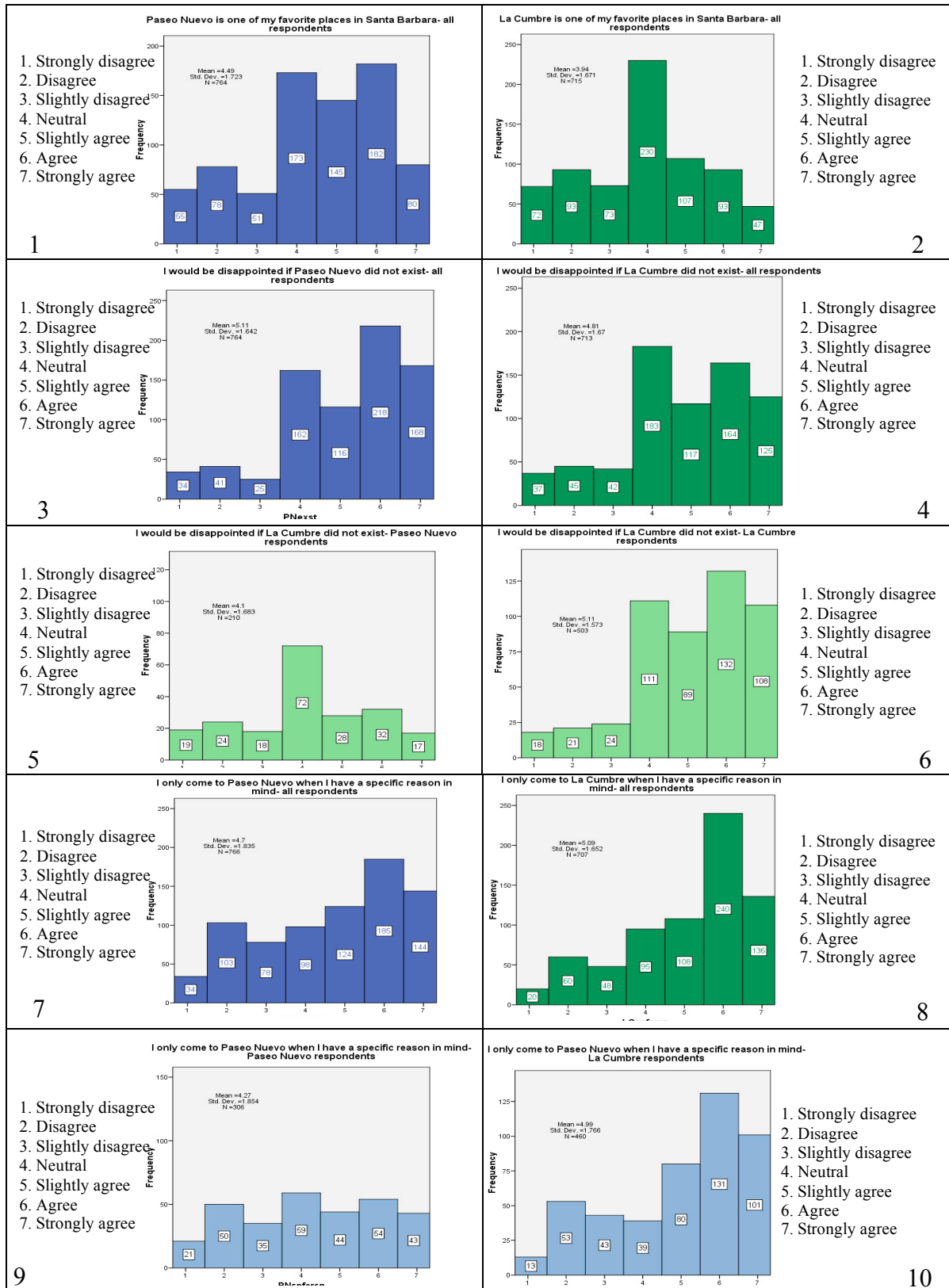
	Paseo Nuevo		La Cumbre	
	Mean	S.D	Mean	S.D.
<b>“I am satisfied with the food options”</b>	5.35	1.412	3.90	1.653
<b>“I am satisfied with the products offered”</b>	5.52	1.194	4.89	1.434
<b>“I am satisfied with the parking”</b>	4.41	1.904	5.97	1.229
<b>“I am satisfied with the level of services”</b>	5.30	1.176	5.26	1.240
<b>“I am satisfied with the entertainment options”</b>	5.26	1.300	3.49	1.558
<b>“I am satisfied with the amount of people.</b>	5.07	1.464	5.06	1.450
<b>Has visually appealing architecture.”</b>	5.98	.960	4.64	1.571
<b>Has a peaceful and relaxing atmosphere.”</b>	5.12	1.442	5.43	1.240
<b>is a beautiful mall.”</b>	5.75	1.078	4.72	1.548
<b>Has a good balance of decorative features and businesses.”</b>	5.64	1.079	4.70	1.445
<b>Has artistic value.”</b>	5.45	1.183	4.31	1.557
<b>Has a definite social atmosphere.”</b>	5.80	1.063	4.28	1.507
<b>is a great family friendly place to be.”</b>	5.19	1.347	5.24	1.228
<b>is a kid friendly place to be.”</b>	4.81	1.363	5.22	1.230
<b>Has generally friendly people around.”</b>	5.32	1.182	5.43	1.063
<b>reflects the culture of Santa Barbara.”</b>	5.57	1.262	4.58	1.410
<b>involves a risk of unpleasant encounters when traveling to it.”</b>	3.79	1.699	2.67	1.453
<b>is always overcrowded.”</b>	3.95	1.494	2.34	1.249
<b>Has too much going on at it.”</b>	3.49	1.411	2.37	1.205
<b>makes me afraid to walk around.”</b>	2.20	1.294	1.94	1.157
<b>makes me feel relaxed.”</b>	4.67	1.437	4.98	1.316
<b>makes me feel happy.”</b>	4.98	1.233	4.70	1.287
<b>I would be disappointed if it did not exist.”</b>	5.11	1.642	4.80	1.656
<b>is one of my favorite places in Santa Barbara.”</b>	4.49	1.723	3.90	1.653
<b>meets my needs better than any other location in Santa Barbara.”</b>	4.34	1.584	3.67	1.601
<b>Has better diversity in activities than any other place in Santa Barbara.”</b>	4.20	1.548	3.19	1.420
<b>Has stores that lack specific things.”</b>	4.25	1.388	4.49	1.365
<b>reflects the type of person I am.”</b>	3.84	1.532	3.72	1.419
<b>makes me feel comfortable because I identify with the atmosphere.”</b>	4.30	1.502	4.22	1.455
<b>makes me feel too self-conscious.”</b>	2.93	1.541	2.62	1.374
<b>says very little about me.”</b>	4.32	1.483	4.28	1.514
<b>makes me feel like I can be myself.”</b>	4.65	1.323	4.70	1.305
<b>is a good reflection of my identity.”</b>	3.87	1.464	3.82	1.441
<b>I only come when I have specific reasons in mind.”</b>	4.70	1.835	5.10	1.656

Note 1 : Responses from strongly disagree (1) to strongly agree (&)

A further analysis of various questions yielded differences between attitudes of each location as well as differences in attitudes among respondents who were visiting Paseo Nuevo and respondents who were visiting La Cumbre. Several questions aimed at understanding and measuring the perceived importance that the locations had to the respondent. These questions fell into the place attachment portion of the overall sense of place construct. Histograms 1 and 2 in figure 3 detail the response to the question “(Paseo Nuevo/ La Cumbre) is one of my favorite places in Santa Barbara.” From the responses to this question, it can be inferred that there is a stronger attachment to Paseo Nuevo than there is to La Cumbre. Both locations have a large number of respondents who neither agree nor disagree with the statement (rating of 4); however, Paseo Nuevo has a much greater percentage of respondents who have a positive regard to the location than La Cumbre (rating of 5, 6 or 7). Approximately 54% of respondents agreed to some degree with the statement that Paseo Nuevo is one of their favorite places, compared to approximately 35% for La Cumbre.

Similar distributions to the aggregate sample were found for each disaggregate respondent group (e.g. Paseo Nuevo respondents about both Paseo Nuevo and La Cumbre, and La Cumbre respondents about both Paseo Nuevo and La Cumbre), with a small positive skew for all distributions except the Paseo Nuevo respondents answering about La Cumbre (mean response of 3.42). This result hints that there might be a more general attachment of all respondents to Paseo Nuevo, with those who are at Paseo Nuevo having a more positive response, and a split in attitudes regarding La Cumbre. Those at Paseo Nuevo seem to have either no attachment or a lower regard for the establishment than those at La Cumbre.

Several other questions were posed which targeted place attachment, one of which was the question “I would be disappointed if (Paseo Nuevo/La Cumbre) did not exist” (histograms 3 and 4 in figure 3). The responses for this question were very similar for each location on an aggregate level of all the respondents in the pool. Approximately 66% of the respondents agreed to some degree that they would be disappointed if Paseo Nuevo did not exist, compared to approximately 57% when asked about La Cumbre.



**FIGURE 3 Sense of Place distribution.**

However, there is more to these responses. When they are disaggregated into the locations at which respondents were surveyed, it is apparent that respondents have similar views about Paseo Nuevo regardless of the location where they were surveyed, but very different views about La Cumbre (histograms 5 and 6 of figure 3). These graphs show that there is a stark difference between the responses of Paseo Nuevo respondents, which show a central tendency toward the response of neither agree nor disagree, and the La Cumbre respondents, which has a much larger percentage of respondents who agree to some degree with the statement (65% of respondents). These results may indicate that those at La Cumbre are more attached to La Cumbre than those at Paseo Nuevo, however both groups are almost equally attached to Paseo Nuevo.

Histograms were also created to examine the respondents' stated motivation of trips to both La Cumbre and Paseo Nuevo. Distributions of response frequencies to the question "I only come to (Paseo Nuevo/La Cumbre) when I have specific reasons in mind" are given in histograms 7 and 8 of figure 3. These distributions have similar appearances for each location, with a skew to the right (agreeing with the statement). The disaggregated groups of Paseo Nuevo and La Cumbre respondents once again provide further insight to this question. These histograms indicate that the respondents at La Cumbre are more likely to go to Paseo Nuevo only when a specific purpose is in mind (histograms 9 and 10 of figure 3). However, attitudes towards trip reasons to Paseo Nuevo for the respondents who were at Paseo Nuevo differ. Approximately 46% of these respondents agree that they only visit when they have a reason, but there is also a large percentage (35%) that disagree with the statement and do not have a reason for visiting Paseo Nuevo. There are many possible explanations for this finding, one of which is that this activity location could indeed be a location where people come to spend aimless time. However, this percentage could also be inflated because of the tourists that are drawn to the area (although this accounts for only 24% of responses at Paseo Nuevo and still 14% at La Cumbre), or could be due to the business men and women who are taking breaks from work. Further regression analysis of these ordinal responses are likely to provide further insight and will be explored in future work.

In addition to these variables, responses towards parking satisfaction indicate larger differences in opinions of the parking at Paseo Nuevo versus the parking at La Cumbre. The top two histograms of figure 4 show the distributions of responses to the question "I am satisfied with the parking at (Paseo Nuevo/ La Cumbre). Through this analysis, it is clear that all respondents have a much more positive attitude toward the parking at La Cumbre, which is free of charge as mentioned above. A much larger percentage of respondents agreed that they were satisfied with parking at La Cumbre than for Paseo Nuevo (87.8% for La Cumbre vs. 56.3% for Paseo Nuevo). The distribution of attitudes regarding Paseo Nuevo is significantly more dispersed than that of La Cumbre. A disaggregation of the respondent pool into location of data collection yielded more interesting results. Distributions of responses for both La Cumbre and Paseo Nuevo when questioned about La Cumbre yielded similar results, which reflected the distribution of the aggregate sample. For this reason, the histograms will not be shown. However, the distributions of responses for each group when questioned about Paseo Nuevo showed that these two groups were very different in their attitudes and shed light onto the shape of the aggregated distribution. The bottom left histogram of figure 4 shows the bimodal distribution that was produced from the respondents surveyed at the La Cumbre location. It is

evident that there is not one single consensus like that of the parking satisfaction of the La Cumbre location, but rather two—either satisfied or dissatisfied (agreeing with or disagreeing with the statement that the respondent is satisfied with parking). This however is not the case with those respondents who were surveyed at Paseo Nuevo. The bottom right histogram of figure 4 indicates that larger portions of the respondents are satisfied with the parking.

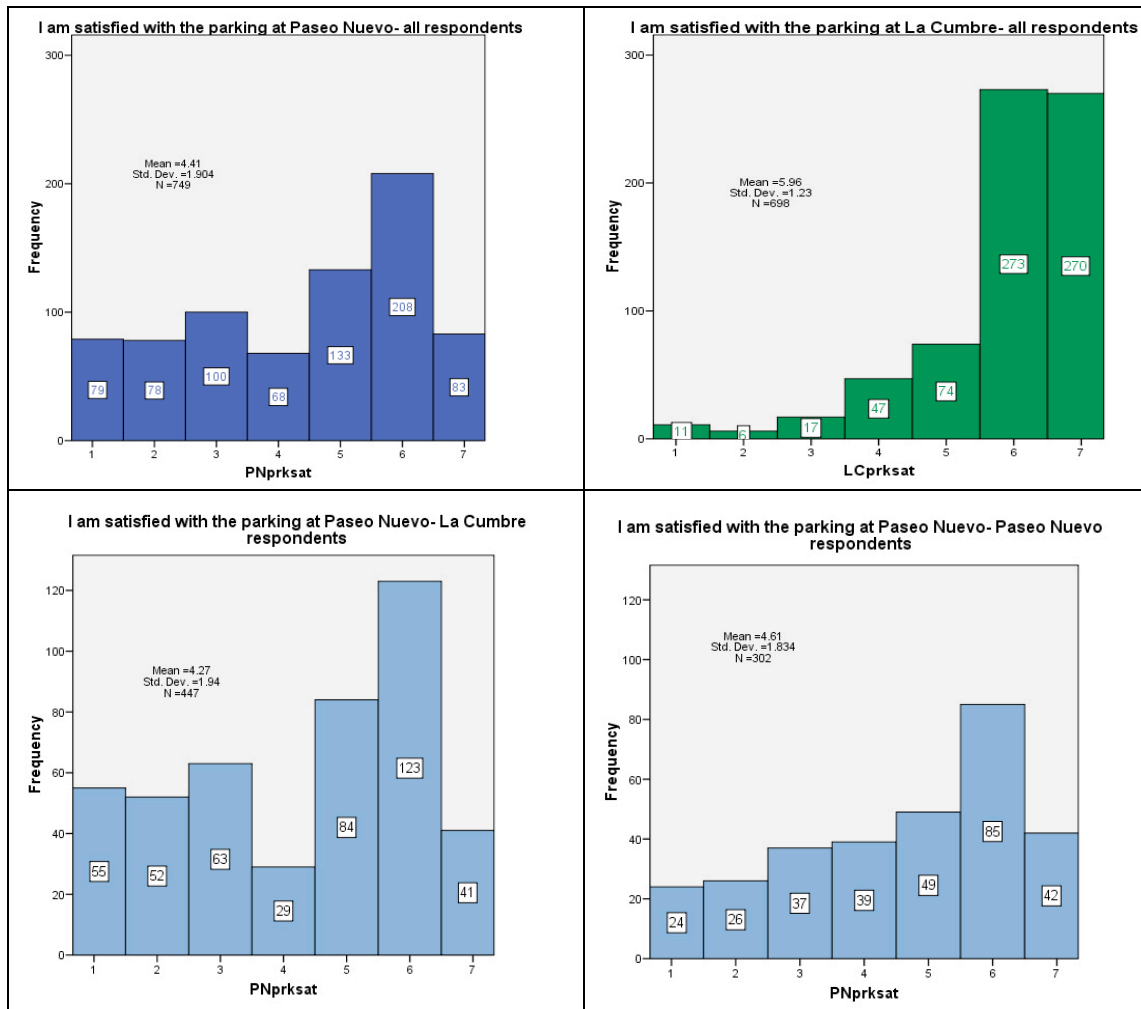


FIGURE 4 Parking satisfaction distribution.

To enhance understanding of the dynamics between mode and parking satisfaction (ultimately a portion of place satisfaction as described previously), several additional statistical models and tests were employed. Table 4 provides a breakdown of the mode of transportation used for each location. This revealed that there is a much larger percentage of respondents who used a non- motorized mode of transportation to get to Paseo Nuevo, which was expected because of its downtown location and the overall urban design surrounding this mall. The distribution of modes used could offer some explanation to the bimodal distribution seen in the responses from Paseo Nuevo respondents regarding the parking at Paseo Nuevo. To further investigate parking satisfaction, ordinal regression was used to better understand respondents' attitudes. By inclusion and exclusion of different socio-demographic indicators, several models were produced. The significant results of the best fitting model are presented in table 5.



**TABLE 4 Travel to location by mode**

		Mode						Total	
		walk	bike	car	bus	motorcycle	skateboard, rollerblades		motorized scooter
Location	Paseo Nuevo	93 (29%)	15 (5%)	178 (56%)	28 (9%)	1 (.3%)	1 (.3%)	1 (.3%)	317
	La Cumbre	16 (3%)	3 (1%)	471 (92%)	18 (4%)	1 (.2%)	0 (0%)	0 (0%)	510
<b>Total</b>		109	18	649	46	2	1	1	827

**TABLE 5 Ordinal logistic model for parking satisfaction**

		Estimate	Std. Error	Wald	Sig.	95% Confidence Interval		Exp(B)
						Upper Bound	Lower Bound	
						“I am satisfied with the parking at Paseo Nuevo”		
Threshold	Strongly disagree	-2.392	0.225	113.333	0.000	-2.832	-1.951	0.091
	Disagree	-1.582	0.211	56.162	0.000	-1.995	-1.168	0.206
	Slightly disagree	-0.896	0.205	19.031	0.000	-1.298	-0.493	0.408
	Neither agree nor disagree	-0.518	0.204	6.467	0.011	-0.917	-0.119	0.596
	Slightly agree	0.190	0.203	0.877	0.349	-0.208	0.588	1.209
	Agree	1.870	0.220	72.574	0.000	1.440	2.301	6.490
Location	age18_24							
	age25_29							
	inchhigh	0.375	0.151	6.184	0.013	0.079	0.670	1.455
	Student	-0.470	0.244	3.696	0.055	-0.948	0.009	0.625
	Employed full time	-0.318	0.181	3.080	0.079	-0.674	0.037	0.727
	Employed part time	-0.511	0.238	4.611	0.032	-0.977	-0.045	0.600
	2 or more kids							
	Loc (1=La Cumbre)	-0.430	0.150	8.189	0.004	-0.724	-0.135	0.651
	Drive and Paseo Nuevo interaction							

-2 log likelihood= 1015.965, Chi-squared= 21.141, 9 degrees of freedom (critical value at .05 sig. level is 16.92).

The outcome of this model indicates that respondents from a high income household are more likely to be more satisfied with Paseo Nuevo’s parking, while being employed (full time, part time or as a student), and being a respondent at La Cumbre have a negative influence on one’s satisfaction of Paseo Nuevo parking. The log odds ratios show that the high-income indicator is the most influential factor in the model (even over choice of location), while the other remaining significant variables each contribute similarly to the overall probability. Interestingly, gender, number of vehicles in the household, age and mode of transportation used were not significant in the models. Significance of mode was tested using a combination of several indicators. Dummy indicators for car, and for walk were initially included in estimations, but were not significant.

An interaction indicator for driving and traveling to Paseo Nuevo was also included but results were also not significant in table 5. To determine whether these results were similar for parking satisfaction with regards to the location of travel, a more generalized model of parking satisfaction was estimated. Similar results with respect to significance of mode indicators were achieved, and therefore will not be presented in detail. Lack of significance of mode in explaining parking satisfaction suggests interesting results with regard to the interaction between these two variables. It is very possible that the use of certain modes of transportation do not impact attitudes, but rather the inverse, that attitudes impact mode used.

To gain better understanding of the relation of parking satisfaction and travel behavior, an analysis of mode with respect to parking satisfaction responses was conducted. First, a cross classification table was created indicating counts and percentages of parking satisfaction response by mode. Due to the limited number of observations occurring using bike, motorcycle, skateboard and motorized scooter, these observations were combined with bus to create an “other” category. The cross classification presented in table 6 indicates that walkers and people using “other” modes of transportation are the people who in fact are less satisfied with parking. Percentages show that 21% of walkers are not satisfied (to some varying degree) with the parking at the location that they visited, versus approximately 10% of those who arrived by car. Furthermore, a chi-squared statistic was used to prove that the distributions of responses in this cross-classification are significantly different than a random distribution.

**TABLE 6 Cross classification of mode and parking satisfaction**

			Mode			Total
			walk	car	Other	
I am satisfied with the parking at [location of patronage]	strongly disagree	Count	10	18	5	33
		% within mode2	9.4%	2.9%	6.6%	4.1%
		% of Total	1.2%	2.2%	.6%	4.1%
	disagree	Count	5	19	7	31
		% within mode2	4.7%	3.0%	9.2%	3.9%
		% of Total	.6%	2.4%	.9%	3.9%
	slightly disagree	Count	12	34	3	49
		% within mode2	11.3%	5.5%	3.9%	6.1%
		% of Total	1.5%	4.2%	.4%	6.1%
	neither agree nor disagree	Count	12	37	18	67
		% within mode2	11.3%	5.9%	23.7%	8.3%
		% of Total	1.5%	4.6%	2.2%	8.3%
	slightly agree	Count	16	70	6	92
		% within mode2	15.1%	11.2%	7.9%	11.4%
		% of Total	2.0%	8.7%	.7%	11.4%
	agree	Count	35	221	19	275
		% within mode2	33.0%	35.5%	25.0%	34.2%
		% of Total	4.3%	27.5%	2.4%	34.2%
strongly agree	Count	16	224	18	258	
	% within mode2	15.1%	36.0%	23.7%	32.0%	
	% of Total	2.0%	27.8%	2.2%	32.0%	
Total	Count	106	623	76	805	
	% within mode2	100.0%	100.0%	100.0%	100.0%	
	% of Total	13.2%	77.4%	9.4%	100.0%	

**Chi-squared: 68.72, 12 degrees of freedom (critical value for 12 d.f. and .001 sig level= 32.91)**

To further examine the relationship between mode and parking satisfaction (and other sense of place indicators), a multinomial logit model of modal split was constructed. Results indicate that sense of place indicators (such as parking satisfaction) are significant in predicting mode. Several indicators contribute significantly to the probabilities of both walk and car outcomes. Results can be found in table 7.

**TABLE 7 Multinomial logit- modal split**

	B	Std. Err.	Wald	Sig.	Exp(B)	95% Conf. Int. for Exp(B)	
<b>Walk</b>							
Intercept	.486	.656	.549	.459			
female	-.569	.334	2.896	.089	.566	.294	1.090
age40_65	.848	.404	4.410	.036	2.335	1.058	5.153
Resident of Santa Barbara county	-1.026	.459	4.989	.026	.358	.146	.882
Married/ domestic partnered							
2 or more kids in household							
1 car in household	1.376	.426	10.452	.001	3.960	1.719	9.120
2 cars in household	1.052	.496	4.491	.034	2.862	1.082	7.570
3 or more cars in household	1.137	.477	5.689	.017	3.117	1.225	7.934
"I am satisfied with the parking" (sl. ag, ag)							
"I am satisfied with the parking" (st. ag)							
"I am satisfied with the entertainment" (neut.)							
"I am satisfied with the amount of people" (ag, st. ag)	1.084	.360	9.043	.003	2.956	1.458	5.989
"[Loc] has a peaceful and relaxing atmosphere" (sl. ag,ag)	-.588	.351	2.802	.094	.556	.279	1.106
"[Loc] has a definite social atmosphere" (ag, st. ag)	-.929	.373	6.198	.013	.395	.190	.821
"[Loc] makes me feel relaxed" (ag)							
"[Loc] makes me feel happy" (neutral)							
"I am not afraid to walk around at [loc]' (sl. dis, neut. sl. ag)*	.823	.497	2.744	.098	2.277	.860	6.026
<b>Car</b>							
Intercept	1.538	.567	7.363	.007			
female							
age40_65							
Resident of Santa Barbara county	-1.445	.416	12.081	.001	.236	.104	.532
Married/ domestic partnered	1.109	.399	7.703	.006	3.030	1.385	6.630
2 or more kids in household	-1.002	.411	5.927	.015	.367	.164	.823
1 car in household	1.549	.358	18.698	.000	4.707	2.333	9.500
2 cars in household	1.734	.416	17.345	.000	5.664	2.504	12.810
3 or more cars in household	2.019	.397	25.924	.000	7.532	3.462	16.386
"I am satisfied with the parking" (sl. ag, ag)	.951	.333	8.177	.004	2.588	1.349	4.966
"I am satisfied with the parking" (st. ag)	.846	.352	5.766	.016	2.330	1.168	4.648
"I am satisfied with the entertainment" (neut.)							
"I am satisfied with the amount of people" (ag, st. ag)							
"[Loc] has a peaceful and relaxing atmosphere" (sl. ag,ag)							
"[Loc] has a definite social atmosphere" (ag, st. ag)	-1.349	.316	18.231	.000	.259	.140	.482
"[Loc] makes me feel relaxed" (ag)							
"[Loc] makes me feel happy" (neutral)	.624	.366	2.912	.088	1.867	.912	3.823
"I am not afraid to walk around at [loc]' (sl. dis, neut. sl. ag)*							

Reference category is other. LOC is an index for La Cumbre or Paseo Nuevo. -2 Log- Likelihood= 883.318, Chi-Squared= 215.981, d.f.= 34, 823 total obs.

Indicators with a 0.05 or higher level of significance are indicated in black; those between 0.05 and 0.1 are indicated in gray. Results indicate that being a resident of Santa Barbara County has

a negative influence on both walking and using a car. This might be due to the tourist influence captured mostly in Paseo Nuevo respondents, as they are less likely to use the bus or bike (the two major modes in the other category). This indicator has a relatively low contribution to the likelihood as indicated by the log odds, so it is most likely due to the tourist population in the sample. Being married or domestic partnered has a significant and positive contribution to the likelihood of a person to use a car. Interestingly, having 2 or more kids in the household negatively impacts a person from using a car (although the contribution of this indicator is low). Car ownership has a positive impact on ones likelihood of using both a car and walking, and contributes largely to the overall likelihood, as indicated by the odds ratio. Despite the impact of car ownership in walking, parking satisfaction is only a significant indicator in instances of car usage. This result has implications, showing that choice of car as a mode is not only impacted by the ownership of vehicles, but also by the perceived availability, cost and overall satisfaction with parking which is the end result of the decision to use a car. In addition to parking satisfaction, several other sense of place indicators were significant. Satisfaction with the amount of people at the location positively impacts the likelihood of walking, with a relatively high contribution indicated by the log odds ratio. Interestingly, agreeing/strongly agreeing with the statement that the location has a definite social atmosphere has a negative impact on traveling by car and walking. This might be due to the fact that 49 respondents out of the 68 who used another mode reported as agreeing or strongly agreeing with the statement (most being bicyclists or bus riders). Though this variable was significant and had a negative impact, the overall contribution to the likelihood for each of these modes was low.

From these results it is evident that sense of place can be measured using an intercept survey design. Perception of different aspects and attributes can be captured in this way activity locations can be described in terms of their distinct meaning to people. Moreover, it has been seen that this place meaning differs by person and by location as expected. Motivation of travel to an activity location also depends heavily on the specific location and the perceived attributes of the location. There is indeed a quantifiable difference between the two locations selected for this pilot study. An ever-present goal of the travel behavior community is to produce models that are able to explain more variation among observations. In order to do this, we must consider additional ways to capture differences among people. As seen through these analyses, sense of place offers a mechanism by which additional variation can be quantified and attributed to behavioral outcomes. This research has been applied to observed modal split, but can be broadened into a location or destination choice model, which seems more intuitively to be intertwined with sense of place.

## **CONCLUSION**

It is evident that sense of place is indeed identifiable and can be adequately quantified for modeling purposes. Including information regarding the dynamic between places and people is very likely to improve model estimations, as it begins to include more qualitative aspects of the location choice and mode utility in the decision making process. This research project provided an in depth study of the quantification of sense of place and proved that it is indeed possible and applicable to an everyday setting and has potential for travel behavior research, modeling and simulation. It was proven that sense of place indicators are significant in models of modal split, and it is thus a reasonable assumption that sense of place will be all the more applicable to location and destination choice models. As with any data collection, well thought out and

efficient methods of data collection must be used to maximize the data quality and quantity while minimizing the respondent burden. While the survey methods used in this project are based on thoroughly designed techniques, it is unknown if this survey can be expanded into a full location choice study. A survey of all locations in a choice study would involve a highly burdensome and extensive survey of numerous questions for each location unless a more efficient mechanism of identifying the sense of place attributed to locations by individuals is developed. In a society of ever increasing web knowledge, several possible solutions exist. With the development of Web 2.0, and increased user involvement in social networking communities and geoinformation websites, possibilities arise in using web information to serve as a basis to build sense of place questionnaires. Commonly accepted attitudes regarding sense of place can be identified more simply, and questionnaires can be used to targeting individual attitudes and target smaller details without high respondent burden. Methods of integrating more traditional data collection methods (like the one seen in this study) with relevant spatial information are currently being explored as a result of this pilot study.

Further analysis on this data is likely to reveal several additional key aspects of sense of place. As discussed previously, an analysis exploring the structure of the sense of place construct (place dependence, place identity, place satisfaction and place attachment) and the transferability of the structure explored in Stedman and Jorgenson's work (2001 and 2003) will provide further insight into how to apply the theory of sense of place to transportation research. Further regression analyses of responses to questions as well as trip attributes will be constructed in effort to examine the additional value of including sense of place indicators. In addition to this, identification of relatively homogeneous groups of people by sense of place views can be used to create taxonomies that in turn will help us with the needed simplifications for large scale studies.

Extensions of this project will focus on integrating this measurement of sense of place into a location choice model. It is clear from the most basic analysis of the data that sense of place does indeed differ per person and is very likely to be included in one's decision making process of location choice. This is yet another fruitful direction of research, which will further efforts being made to integrate transportation and land use into one model, and take into account highly important but often forgotten dynamics of human behavior such as human spatial interaction.

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