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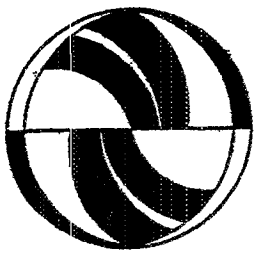

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The Role of Lifestyle and Attitudinal Characteristics in Residential Neighborhood Choice

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Abstract

This paper investigates the importance of attitudinal and lifestyle variables to residential neighborhood choice for 492 residents of three San Francisco Bay Area neighborhoods One neighborhood, North San Francisco (N = 155), was classified as traditional, whereas the other two, Concord (N = 165) and San Jose (N = 172), were classified as suburban. Separate factor analyses identified 10 attitudinal dimensions and 11 lifestyle dimensions Mean factor scores for the three neighborhoods differed significantly for most of the factors For example, consistent with expectations, the mean scores on the pro-high density, pro-environment, pro-pricing, and pro-alternatives attitudinal factors were significantly higher for residents of traditional NSF than for the suburban residents On lifestyle dimensions, NSF residents were significantly more likely to be culture-lovers, and less likely to be nest-builders and altruists, than the suburbanites. These seven factors, together with three sociodemographic variables (number of children under age 16, number of vehicles, and years lived in the Bay Area -- all positively associated with the suburban neighborhoods), were significant in the final binary logit model of residential neighborhood choice. The adjusted ρ^2 for the model was 0.52, and the collective contribution of the attitudinal/ lifestyle factors provides support for the usefulness of this approach to residential choice modeling. In particular, it is suggested that this approach will help illuminate the policy-relevant question as to whether observed differences in travel behavior are induced by the land use configuration of the neighborhood itself, or are derived from intrinsic propensities for different travel choices Evidence is mounting that the second hypothesized mechanism is stronger: that is, that as an explanation for travel behavior, neighborhood type tends to act as a proxy for the "true" explanatory variables with which it is strongly associated, namely attitudinal and lifestyle predispositions

1. INTRODUCTION

It seems self-evident that residential location decisions profoundly influence urban travel patterns, but the precise nature of that influence is not completely understood For example, numerous empirical studies (see, e.g , Frank and Pivo, 1994; Rutherford *et al.*, 1996; and Kitamura *et al* , 1997) have demonstrated that living in higher-density, mixed-use ("traditional") neighborhoods is associated with fewer vehicle trips and smaller distances traveled compared to living in typical low-density suburban environments These encouraging results have supported a growing movement (known as New Urbanism) to use land use planning and design as a tool for reducing travel But whether the land use configuration *"causes"* the observed travel patterns, or whether people with different *a priori* travel propensities select themselves into residential neighborhoods which support those propensities, is impossible to determine from residential location and travel data alone. The difference is important, since if a selection bias is at work, policies designed to induce travel changes through land use changes may not have the expected or desired effect.

To understand the extent to which travel-related predispositions influence residential location, it is necessary to collect data on individuals' attitudes and lifestyle preferences. To our knowledge, only one previous study (Prevedouros, 1992) has rigorously measured personality characteristics and analyzed their association with choice of residential neighborhood type (without developing an explicit choice model). This paper measures a different and more extensive set of lifestyle and attitudinal factors, and employs them together with travel and demographic characteristics as explanatory variables in a model of residential neighborhood choice. We demonstrate that lifestyle and attitudinal factors contribute significant explanatory power beyond the types of variables normally included in models of residential choice, such as distance to work and shopping (Louviere and Timmermans, 1990), commute mode (Horowitz, 1995), and car ownership (Weisbrod *et al* , 1980).

The rest of this paper is organized as follows Section 2 describes the study background, including discussion of the data and the definition of the residential choice dependent variable used in this research The next section compares sociodemographic, travel, and residential characteristics across the three neighborhoods studied. Section 4 develops and analyzes the attitudinal and lifestyle variables Findings from a binary logit model of residential choice are presented in Section 5 The final section provides conclusions and directions for future research

2. STUDY BACKGROUND

The data used for this study were originally collected for a land use-travel behavior project sponsored by the California Air Resources Board in 1992. A sizeable amount of micro-scale data on land use, the roadway network, and public transit was obtained from site surveys of five San Francisco Bay Area neighborhoods (selected sections of approximately one square mile within the cities or areas of Concord, Pleasant Hill, North San Francisco, South San Francisco, and San Jose) In addition, demographic, socioeconomic, attitudinal, lifestyle, and travel-related data were collected through mail-out surveys and travel diaries completed by residents in the same neighborhoods. The main objective of the original study was to examine the impacts of neighborhood type (i e , land use) and individual attitudes on travel behavior Thus, variability of neighborhood type was important in the development of regression-based travel-behavior models (Kitamura *et al* , 1997) To obtain this variability, the five neighborhoods were chosen to represent relatively extreme values in terms of key factors describing land use type. public transit accessibility, land use mix, residential density, and employment mix

Though the original study was aimed at understanding the influence of land use and attitudes on travel behavior, the data set contains an abundance of information germane to residential choice modeling, including the data on attitudes and lifestyles (described in Section 4), which is not normally obtained in such studies For a more detailed description of the data and the study, refer to Kitamura *et al.* (1994)

A respondent in this study lives in one of five neighborhoods, each of which could be considered an indicator of residential choice. Indeed, some residential choice studies, such as Lerman (1975) and Horowitz (1995), take census tracts or other location indicators as the dependent variable. However, to develop residential choice models that are robust and transferable, the generic characteristics of a neighborhood are of greater interest than a specific geographic location itself The trait of "traditionalness" is the defining dimension chosen for this study (though many other traits such as aesthetic appeal could be used).

Two of the five neighborhoods had mixed characteristics, of both suburban and traditional neighborhoods, while the remaining three represented the two extremes of a traditionalness dimension relatively well. North San Francisco (NSF) was characterized by high residential density, a large number of businesses (470), a grid-like street pattern, high public transit accessibility (21 bus routes), and numerous wide sidewalks. The Concord neighborhood was described by low residential density, a moderate number of businesses (149), a mixed curvilinear/grid-like street pattern, low public transit accessibility (3 bus routes), and

discontinuous sidewalk paths. The San Jose neighborhood also exhibited low residential density, the fewest businesses (96), a grid street pattern containing numerous discontinuities, low public transit accessibility (5 bus routes), and few sidewalks.

Since the goals of this study suggested highlighting as sharp a contrast as possible between the two neighborhood types, the two "hybrid" neighborhoods were dropped from the analysis reported here (they were retained for other analyses involving a continuous traditionalness measure itself as the dependent variable) The dependent variable for the residential choice models presented in Section 5 is a binary variable classifying the respondent's residential location as traditional or suburban

The final data set used here contains 492 cases from the three neighborhoods North San Francisco (traditional, N=155), Concord (suburban, N=165), and San Jose (suburban, N=172) Nearly all of the variables have very little missing data (2% or less) due to an initial screening of cases for study use that required full survey data from respondents on attitudinal and lifestyle questions. Variables based on trip diary data had the highest percentage of missing data, but were still valuable. The next two sections highlight the associations between neighborhood type and respondent sociodemographics, attitudes, and lifestyles

3. DESCRIPTION OF THE SAMPLE

Tables 1 and 2 present key sociodemographic, travel, and residential characteristics of the respondents, by neighborhood of residence Table 1 shows that, on average, respondents across the three neighborhoods are similar in some ways. they tend to be college-educated, have managerial or professional occupations, have moderate household incomes, have similar numbers of workers in the household, and be similarly likely to be female This commonality across neighborhoods is valuable for this study in that it reduces the influence of confounding factors often found in research on travel behavior and/or residential location In other words, it allows the focus to be placed on other factors involved in the decision-making process instead of variables like income, education (a proxy for factors such as awareness or availability of job opportunities), gender, or number of workers -- variables which have been found in other studies (e.g., Madden, 1981; Timmermans *et al*, 1992) to influence residential choice. For example, respondents in (traditional) North San Francisco could have chosen to live in either of the other two (suburban) neighborhoods, and variables like income or awareness are likely not to be the main factors in choosing the neighborhood

Table 1: Sociodemographic Characteristics of the Sample (N = 492)

Variable	NSF (N=155[1])	CON (N=165[1])	SJ (N=172[1])
Occupation[2]: number (percent)			
Manager/administrator[3]	25 (17%)	19 (12%)	29 (18%)
Professional/technical[3]	48 (33%)	56 (35%)	66 (41%)
Administrative support[3]	22 (15%)	21 (13%)	21 (13%)
Retired	16 (10%)	35 (21%)	34 (20%)
Household composition: mean (standard deviation)			
Household size	1 83 (0 90)	2 45 (1 09)	2.72 (1 11)
No people over 16[4]	1 75 (0 80)	1 98 (0 66)	2 16 (0 74)
No people under 16[5]	0 11 (0 39)	0 49 (0 89)	0 57 (0 92)
No full-time workers	0 98 (0 70)	0 94 (0 72)	1 00 (0 71)
No workers (part- or full-time)	1 19 (0 61)	1.12 (0 73)	1 26 (0 77)
Personal characteristics: mean (standard deviation)			
Age[6]	43 7 (14 2)	54 1 (14 8)	52 2 (13 9)
Education category[7,11]	4 32 (1 23)	3 58 (1 24)	3 82 (1 28)
Female[8,12]	81 (53%)	83 (50%)	83 (48%)
Household income category[9, 11]	6 14 (1 45)	6 32 (1 26)	6 44 (1 44)
Years lived in Bay Area[10]	19 7 (17 1)	35 2 (18 2)	32 3 (15 3)

[1] Sample sizes vary ..ording to missing data levels and/or applicable cases However, unless otherwise noted, sample sizes for NSF, CON, and SJ are 155, 165, and 172 respectively
[2] Not all job type categories are presented, and consequently, percentages will not sum to 100%
[3] N=147 (NSF), N=161 (CON), N=162 (SJ), [4] N=149 (NSF), N=161 (CON), N=172 (SJ),
[5] N=150 (NSF), N=161 (CON), N=171 (SJ), [6] N=126 (NSF), N=117 (CON), N=132 (SJ),
[7] N=154 (NSF), N=165 (CON), N=169 (SJ), [8] N=152 (NSF), N=165 (CON), N=172 (SJ),
[9] N=152 (NSF), N=161 (CON), N=169 (SJ), [10] N=155 (NSF), N=163 (CON), N=171 (SJ)
[11] Education and household income were collected as ordinal variables For education, a value of 4 represents completion of a 4-year degree, and for income, a value of 6 represents $35,001 to $50,000 a year
[12] The values given for this variable are the number and percentage of the sample that are female

Table 2: Travel and Residential Characteristics of the Sample (N = 492)

Variable	NSF (N=155[1])	CON (N=165[1])	SJ (N=172[1])
General travel information: mean (standard deviation)			
No. of vehicles	1 35 (0 92)	2 15 (1 01)	2 37 (1 08)
No of vehicles /driver	0 91 (0.55)	1 07 (0.50)	1 09 (0.54)
Commute distance[2] (1-way, miles)	6.70 (11.10)	15 98 (14 86)	14.05 (11 76)
Person trips / day (any mode, 3-day average)[3]	4 75 (3 08)	4.16 (2 43)	4 15 (2 14)
Mode choices: number (percent)			
Use public transit[9]	124 (80%)	107 (65%)	83 (48%)
Use bike or walk mode[4, 9]	79 (61%)	40 (28%)	17 (11%)
Residential characteristics: mean (standard deviation)			
Home size (square feet)[5]	1304 (825)	1527 (483)	1678 (398)
No. of bedrooms[6]	2 02 (1.09)	2 98 (0 70)	3 51 (0 63)
Home value category[7, 10]	5.58 (1 25)	3.76 (0 80)	4 53 (0 62)
Monthly rent category[8, 10]	3 42 (1 15)	2.94 (0 97)	3 47 (1 23)
Most important reasons for choosing current neighborhood: number (percent) selecting this among their top three reasons			
Housing cost	85 (55%)	101 (61%)	103 (60%)
Close to shops and services	57 (37%)	31 (19%)	43 (25%)
Close to work	53 (34%)	53 (32%)	29 (17%)
Good school	8 (5%)	26 (16%)	36 (21%)

[1] Sample sizes will vary according to missing data levels and/or applicable cases However, unless otherwise noted, sample sizes for NSF, CON, and SJ are 155, 165, and 172 respectively.
[3] N=112 (NSF), N=99 (CON), N=119 (SJ), [3] N=126 (NSF), N=143 (CON), N=150 (SJ);
[4] N=129 (NSF), N=143 (CON), N=150 (SJ), [5] N=127 (NSF), N=157 (CON), N=166 (SJ),
[6] N=151 (NSF), N=164 (CON), N=172 (SJ), [7] N=50 (NSF), N=148 (CON), N=157 (SJ),
[8] N=104 (NSF), N=17 (CON), N=17 (SJ)
[9] Binary variable equal to one if respondent used public transit or bike/walk, respectively, during the three-day travel diary period, or indicated in a section describing his/her "most common trips" that at least one such trip involved transit or bike/walk
[10] Home value and monthly rent were collected as ordinal categorical variables Reference points for each category include: 4 (home value ranging from $180,001 to $250,000), 5 (home value ranging from $250,001 to $375,000), 2 (monthly rent ranging from $351 to $500), and 3 (monthly rent ranging from $501 to $700), respectively

However, there are also important sociodemographic differences among the neighborhoods. Not surprisingly, households in the two suburban neighborhoods are significantly larger and have more children on average, than households in traditional NSF Respondents in Concord and San Jose are also significantly older and have lived in the Bay Area far longer than NSF residents Thus, the latter group is consistent with the stereotype of the young, upwardly mobile professional single-person or dual-career household with no children – the population segment most likely to be attracted to an urban environment such as that in NSF. It is important to stress, however, that while objective demographic characteristics may be correlated with attitudes, attitudes are expected to be a more reliable indicator of residential choice. Two households may have identical demographic characteristics, but different attitudes prompting them to make different choices Conversely, each neighborhood (representing an "identical" residential choice) is heterogeneous, containing households with a diversity of demographic characteristics

Table 2 presents some travel and residential characteristics of the sample, by neighborhood Again true to form, NSF households own significantly fewer vehicles per driver and use transit and non-vehicular modes far more often than households in suburban Concord and San Jose. (The higher transit use for Concord compared to San Jose is likely due to the BART rail rapid transit station near the western boundary of the neighborhood) Average person trip rates are significantly higher for NSF residents, and their commute distances are less than half as long, compared to respondents in the other two neighborhoods

As for residential characteristics, as expected, North San Francisco residences are smaller but more expensive, on average, than residences in the suburban neighborhoods (except that the average *rented* residence in NSF is about as expensive as its larger counterpart in San Jose) As shown by the footnotes indicating sample sizes, only a third of the NSF respondents owned their homes, compared to 90% for each of the other two neighborhoods

Except for "housing cost", which was the most commonly-selected reason in all three neighborhoods, respondents' primary reasons for choosing their current neighborhood generally differed across location – in expected ways. Being close to shops and services was more important to people living in the traditional neighborhood than to those in the suburban neighborhoods, while having good schools was significantly more important to San Jose respondents than to North San Francisco respondents (who most often had no school-age children). Proximity to work was an important factor to San Jose residents only half as often as it was to residents of the other two neighborhoods Pairwise t-tests between the neighborhoods for each of the variables showed that all differences between neighborhoods

were significant at the 95% confidence level except for "housing cost" (no differences across all neighborhoods) and "close to work" (no difference between NSF and Concord)

4. Attitude and Lifestyle Measurement

To measure attitudes and lifestyles, two factor analyses were performed on responses to numerous survey items related to personal views and activities Factor analysis is a statistical technique for extracting a small number of fundamental dimensions (factors) from a large set of intercorrelated variables measuring various aspects of those dimensions After experimenting with various factor extraction and rotation options, principal components analysis (PCA) and oblique rotation solutions were selected in both cases, with the number of factors chosen based on the eigenvalue-one and interpretability rules of thumb (Rummel, 1970).[1] Tables 3 and 4 present the largest pattern matrix loadings for the final factor solutions. The loading of lifestyle or attitude i on factor j represents factor j's unique contribution to the variance in variable i. In practice, these loadings will generally lie between -1 and 1, and the higher the magnitude of the loading, the more strongly variable i is associated with factor j

Ratings on the original lifestyle/attitude variables were linearly combined to create standardized scores on each factor for each case, where the contribution of each variable to the factor score is approximately proportional to the loading of that variable on the same factor. Mean values for each of the attitudinal and lifestyle factor scores by neighborhood are presented in Figures 1 and 2 respectively, where the factors are arranged roughly in order of degree of significant difference across neighborhood (based on a one-way analysis of variance on each factor score).

4.1 Attitude Measurement

Responses on a 5-point Likert-type scale (strongly disagree to strongly agree) to 39 attitudinal statements relating to urban life (covering topics such as urban transportation, the environment, and housing) were factor analyzed with SPSS (Norusis, 1990) Table 3 shows the largest pattern-matrix loadings for the final 10-factor solution, which accounts for 49.1% of the total variance in the attitude data. One-way ANOVAs performed on each factor indicated that mean scores on all but the last (pro-transit) factor differed significantly by neighborhood However, for brevity, only the four factors significant in the binary logit residential choice models presented in Section 5 will be discussed below. For a more detailed discussion of all ten factors, see Kitamura *et al.* (1994 and 1997)

Table 3: Strongest Pattern Matrix Loadings for Attitudinal Factor Scores[1]

Statement	Loading
Factor 1: Pro-High Density	
I need to have space between me and my neighbors	-0 75
I would only live in a multiple family unit, (apartment, condo, etc) as a last resort	-0 69
It's important for children to have a large backyard for playing	-0 67
High-density residential development should be encouraged	0 55
Factor 2: Pro-Environment	
Environmental protection costs too much	-0 78
Environmentalism hurts minority and small businesses	-0 75
People and jobs are more important than the environment	-0 73
Environmental protection is good for California's economy	0 73
Stricter vehicle smog control laws should be introduced and enforced	0 47
Factor 3: Pro-Pricing	
I would be willing to pay a toll to drive on an uncongested road	0 76
We should raise the price of gasoline to reduce congestion and air pollution	0 38
Traffic congestion will take care of itself because people will make adjustments	-0 25
Factor 4: Pro-Alternatives	
Having shops and services within walking distance of my home would be important to me	0 50
Vehicle emissions increase the need for health care	0 49
I use public transportation when I cannot afford to drive	0 44
We should provide incentives to people who use electric or other clean-fuel vehicles	0 42
More lanes should be set aside for carpools and buses	0 39

(continued)

Table 3: Strongest Pattern Matrix Loadings for Attitudinal Factor Scores[1] (continued)

Statement	Loading
Factor 5: Pro-Driving	
Driving allows me to get more done	0 74
Driving allows me freedom	0 71
I would rather use a clean-fuel car than give up driving	0 66
Factor 6: Pro-Drive Alone	
I like someone else to do the driving	-0.70
I am not comfortable riding with strangers	0 62
Ridesharing saves money	-0 49
Factor 7: Pro-Growth	
We need to build more roads to help decrease congestion	0 59
Too many people drive alone	-0 48
Too much agricultural land is consumed for housing	-0 44
Getting stuck in traffic doesn't bother me too much	0 39
Factor 8: Work-Driven	
I like to spend most of my time working	0 73
When things are busy at work, I get more done by cutting back on personal time	0 71
Factor 9: Time-Satisfied	
I would like to have more time for leisure	-0 74
I feel that I am wasting my time when I have to wait	-0 69
Getting stuck in traffic doesn't bother me too much	0 48
Factor 10: Pro-Transit	
Public transportation is unreliable	-0 70
It costs more to use public transportation than it does to drive a car	-0 59
Buses and trains are pleasant to travel in	0 57
I can read and do other things when I use public transportation	0 43

[1] Some lower and secondary factor loadings are presented when they help improve interpretation of the factors

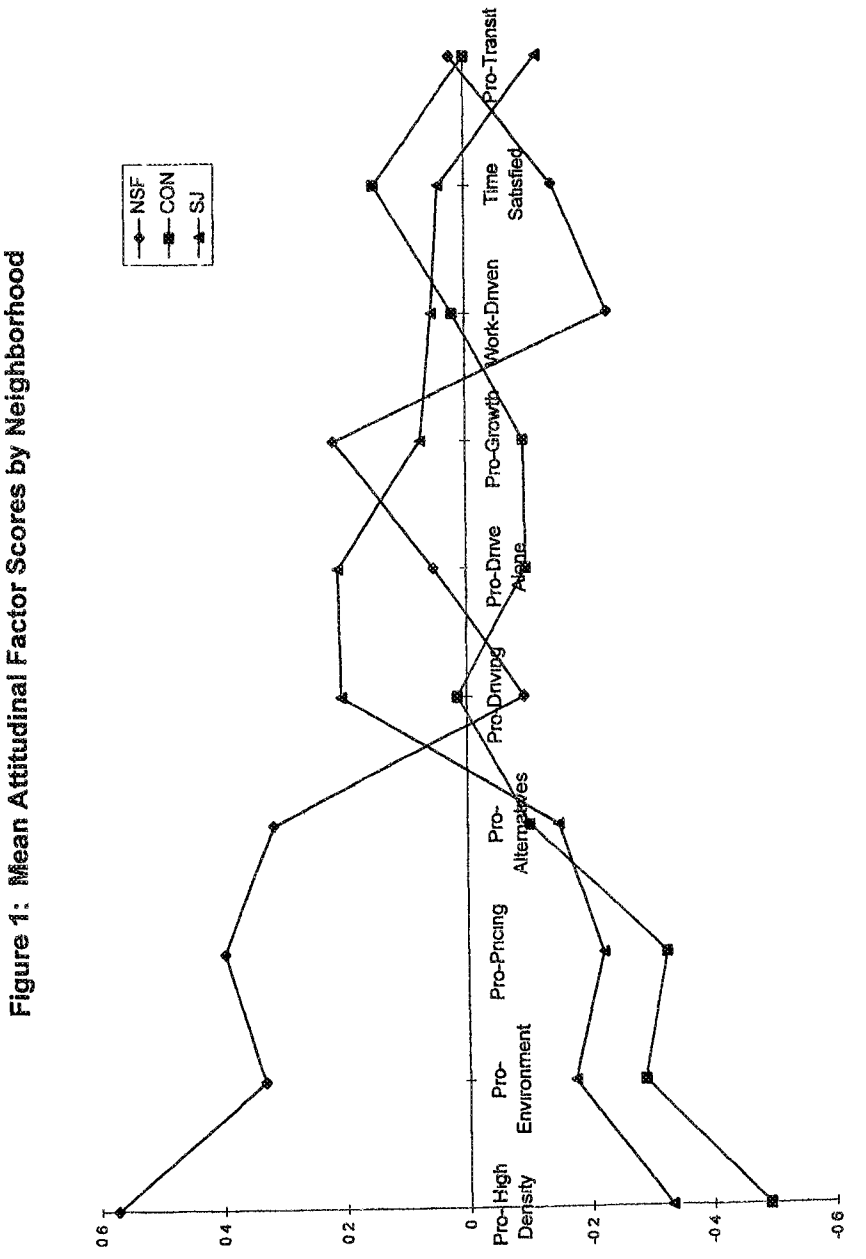

Figure 1: Mean Attitudinal Factor Scores by Neighborhood

The pro-high density factor is based on statements such as, "I need to have space between me and my neighbors" (loading = -0.75) and "High-density residential development should be encouraged" (loading = 0.55) It is hypothesized that a person who has a high score on this factor will be more likely to prefer a residence in a high-density area. As expected, the mean score on this factor for North San Francisco was much higher (0.57) than for Concord (-0 49) or San Jose (-0.33), indicating that respondents in the traditional neighborhood are more favorable toward high-density development than respondents in the suburban neighborhoods of this study.

The pro-environment factor is defined by statements such as "environmental protection costs too much" (loading = -0 78) and "stricter vehicle smog control laws should be introduced and enforced" (loading = 0.47) An individual who is very environmentally sensitive may be more likely to live in a traditional neighborhood, as this type of neighborhood uses land more efficiently and facilitates the use of transportation modes other than the automobile. The mean factor scores shown in Figure 1 support this hypothesis, with the ranking by neighborhood the same as for the pro-high density factor although all means are less extreme for this factor than for the first

Pro-pricing and pro-alternatives are factors relating to regulations and policies concerning transportation and the environment. The pro-pricing factor is characterized by statements such as "I would be willing to pay a toll to drive on an uncongested road" (loading = 0 76) and "We should raise the price of gasoline" (loading = 0 38) The pro-alternatives factor is somewhat heterogeneous, but generally relates to the provision of alternatives to gasoline-powered automobile travel, including statements such as, "We should provide incentives to people who use electric or other clean-fuel vehicles" (loading = 0 42) and "More lanes should be set aside for carpools and buses" (loading = 0 39). It is hypothesized that an individual who favors policies supporting more environmentally-efficient forms of travel will be more likely to live in a traditional neighborhood. Figure 1 supports this hypothesis, showing that, on average, NSF residents scored significantly more highly on both these factors than did residents of the two suburban neighborhoods.

These four attitudes collectively point to major differences between North San Francisco respondents' and Concord and San Jose respondents' views of land use and the environment It is important to understand that this statistically significant difference in and of itself does not imply a particular direction of causality. Do people with different attitudes choose to live in different neighborhoods, or do the different neighborhoods in which people live engender different attitudes? Although the latter direction of influence (residential location causes attitudes) may well occur over the long run, we can only assert that the former relationship

(attitudes cause residential location) appears to be more plausible as the stronger direction of influence in the short term Resolving this question more completely would require a longitudinal study of how the attitudes of residents of different types of neighborhoods change with the length of time that they live in those neighborhoods

4.2 Lifestyle Measurement

Lifestyle was measured based on the responses to three questions in the survey 1) "What types of subjects did you read last month (check all that apply)?", having 30 possible choices plus "other", 2) "What best describes the way you spent last weekend (check as many as apply)?", having 19 choices plus "other", and 3) "From the following lists, check all that you have done within the last 12 months", having 57 possible responses in four categories labeled outdoors/ sports, entertainment/events, travel, and do it yourself/education/hobbies, plus "other" responses for each category. Discarding the "other" responses resulted in a total of 106 binary variables representing a diverse set of lifestyle activities

Factor analysis was performed on these 106 variables (although this procedure is more commonly conducted on variables that are at least approximately continuous, Rummel, 1970 points out that any data whatsoever can be factor-analyzed) The final eleven-factor solution shown in Table 4 explains 29.4% of the total variance in the activity data, indicating that a considerable amount of the total variance in lifestyle indicators falls outside the 11-dimensional space spanned by the identified factors Based on one-way ANOVAs on each factor, mean scores on the first six factors of Table 4 and Figure 2 differed significantly by neighborhood Again, for brevity, only the three lifestyle factor scores that were significant in the models of Section 5 will be discussed below.

The lifestyle factor that differs most significantly across neighborhoods is heavily defined by activities such as. "attended a concert/symphony" (loading = 0 49), "attended the ballet" (loading = 0 46), and "attended the theater" (loading = 0.39). Hence, this is labeled the "culture-lover" factor. It is hypothesized that people with a culture-oriented lifestyle will be more likely to choose a residence that is accessible to many cultural activities (most likely in or near the high-density urban core) This hypothesis is supported by Figure 2, showing that North San Francisco residents have a much higher mean score on the culture-lover factor (0 65) than do residents of the two suburban neighborhoods Concord and San Jose (-0 35 and -0 33, respectively)

Table 4: Strongest Pattern Matrix Loadings for Lifestyle Factor Scores[1]

Activity Description[2]	Loading
Factor 1: Culture-Lover	
Attended a concert or symphony	0 49
Attended the ballet	0 46
Read material on art or architecture	0 44
Attended the theater	0 39
Factor 2: Altruist	
Read material on religion	0.61
Spent last weekend participating in religious activities	0 58
Volunteered to help the community	0 53
Spent last weekend doing volunteer work	0 52
Participated in community events	0 43
Factor 3: Nest-Builder	
Read material on home improvement	0 65
Read material on gardening	0 57
Made house improvements myself	0 57
Put in a flower or vegetable garden	0 55
Spent last weekend doing yard work	0 53
Factor 4: Relaxer	
Spent last weekend reading	0 56
Spent last weekend at home relaxing	0 55
Spent last weekend shopping	0 48
Spent last weekend doing chores	0 47
Factor 5: Traveler	
Traveled to another country	0 47
Took a cruise	0,43
Visited another state	0.37
Visited a wildlife refuge	0.35

(continued)

Table 4: Strongest Pattern Matrix Loadings for Lifestyle Factor Scores[1] (continued)

Activity Description[2]	Loading
Factor 6: Adventurer	
Went hunting	0 53
Used an off-road vehicle	0 51
Went to a shooting range	0 47
Participated in a motor cross	0 41
Factor 7: Fun-Seeker	
Went to a zoo	0 54
Read children's stories	0.51
Visited an aquarium	0 45
Visited an amusement park	0 36
Factor 8. Homebody	
Read materials on women's issues	0 65
Read material on fashion	0 60
Sewed (made clothes, quilts, etc.)	0 58
Read material on cooking or recipes	0 56
Did needlework or embroidery	0 54
Read material on decorating	0 50
Factor 9: Outdoor Enthusiast	
Visited a national park or historic site	0 64
Visited a state park or historic site	0 60
Visited a local park or historic site	0 56
Went hiking or backpacking or camping	0 51
Visited a beach	0 49

(continued)

Table 4: Strongest Pattern Matrix Loadings for Lifestyle Factor Scores[1] (continued)

Activity Description[2]	Loading
Factor 10: Athlete	
Participated in a sports event	0 64
Played tennis or golf	0 59
Attended a professional sports event	0 57
Read material on sports or exercise or health	0 55
Spent last weekend outdoors participating in sports	0 48
Factor 11: Hobbyist	
Read material on science or nature	0 56
Read material on the environment	0 50
Read material on the outdoors	0 45
Read material on history	0 44
Read material on photography	0 41
Read material on humor	0 39
Read material on pets	0 32
Spent last weekend doing hobbies	0 29

[1] Some lower and secondary factor loadings are presented when they help improve interpretation of the factors.

[2] The time frame for these activities is as follows. "Read material on " within the past month, all other activities occurred within the past 12 months except where noted to have taken place the past weekend

The next significant factor is characterized by activities such as: "read material on home improvement" (loading = 0 65), "made house improvements myself" (loading = 0.57), and "spent last weekend doing yardwork" (loading = 0 53). This factor has been named "nest-builder" as it refers to a lifestyle that involves many home-related activities. A person having a high score on this factor is hypothesized to be more likely to live in a low-density neighborhood, where homes and lots are larger and home-ownership is higher. As anticipated, respondents from Concord and San Jose had higher average scores on this factor than did respondents from North San Francisco.

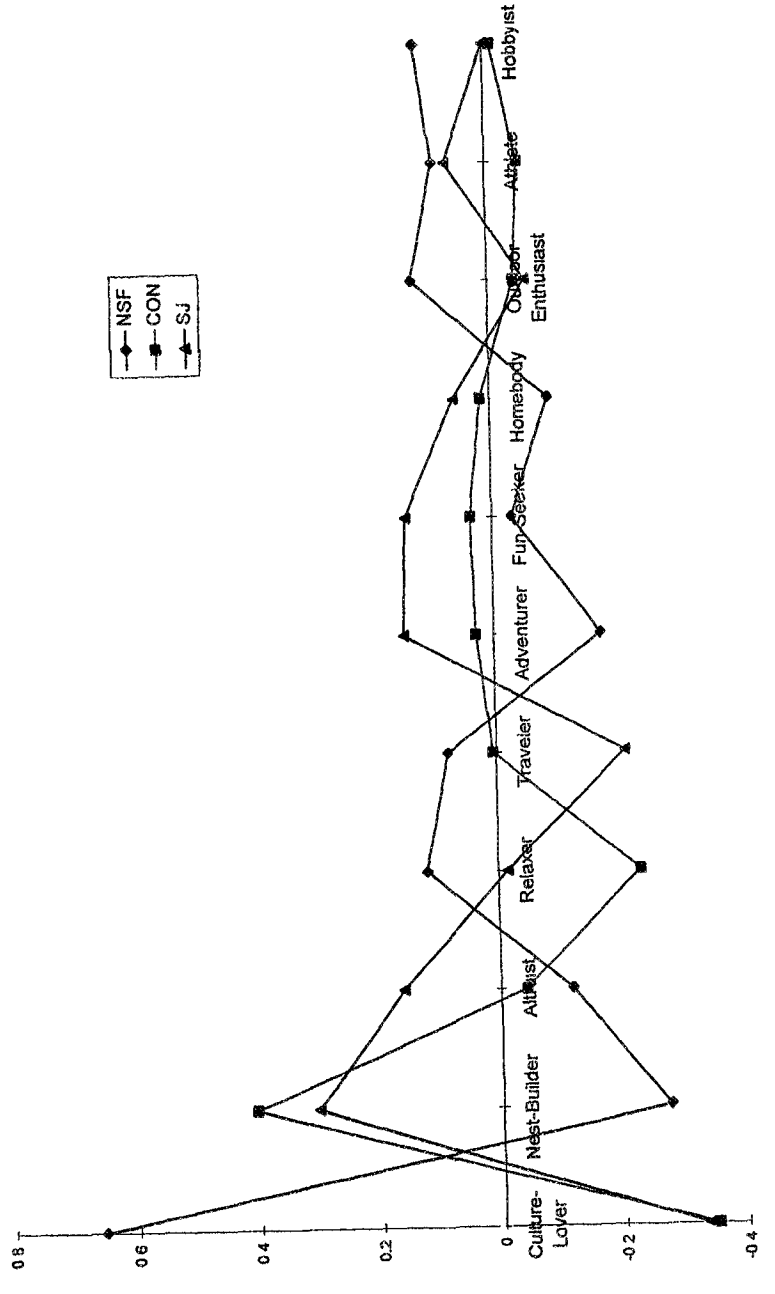

Figure 2: Mean Lifestyle Factor Scores by Neighborhood

The third factor found significant in the residential choice models was labeled "altruist", based on heavily-loading statements such as "Spent last weekend on religious activities" (loading = 0 58), "volunteered to help the community" (loading = 0 53), and "participated in community events" (loading = 0.43). Although we did not have a prior hypothesis about how this factor would differ by neighborhood, Figure 2 shows that San Jose residents scored most highly on this factor, NSF residents scored most negatively, and Concord residents were nearly neutral While the differences are statistically significant according to the one-way ANOVA, the spread between the highest and lowest mean is smaller than for the other two lifestyle factors discussed. It may be that San Jose residents are marginally more conservative and hence – perhaps – more inclined to be religious, it may be that their marginally larger households, higher presence of children, and incomes give them somewhat more motivation and means to participate in community activities (joining the Parents - Teachers Association, a "stay-at-home" parent volunteering time to a charitable organization)

In identifying differences in lifestyle by neighborhood, it is again important to examine the question of the direction of causality The stronger direction of causality here may be more debatable than in the case of attitudes, since neighborhood type could clearly influence the activities undertaken Do "culture-lovers" live in the urban core partly to have ready access to cultural events, or do they live there for other reasons but, after the fact, are induced to take advantage of their greater proximity to those events? Do "nest-builders" engage in home-improvement activities mainly because their large suburban home and yard (which they've chosen for other reasons) require them to do so, or do those who enjoy engaging in home-improvement activities choose to live in such a neighborhood while those who do not enjoy them choose to live in a higher-density, lower-maintenance residence such as a condo or apartment?

Although we acknowledge the "residential location causes lifestyle" link to be potentially important, we suggest that the reverse direction is still quite plausible in this context The specific definition of the lifestyle variables used here supports their interpretation as indicators of predisposition – that is, as causes rather than effects For the most part, the variables represent activities which would be relatively accessible to everyone in a large metropolitan area, regardless of their specific neighborhood type The fact that the time frame for 57 of the activities was "within the last year" even further allows for rough equality of opportunity across neighborhood types. The 30 variables identifying subjects the respondents read about within the last month are likely to reflect intrinsic interests, and again the subjects would be equally available to residents of all neighborhood types.

5. RESIDENTIAL CHOICE MODELS

A binary logit model of residential choice with dependent variable alternatives "suburb" (1) and "traditional neighborhood" (0) was estimated on the data from the three neighborhoods (N=492) More than 60 measures representing travel, residence, employment, attitude, lifestyle, and sociodemographic characteristics were evaluated for inclusion as explanatory variables in the model. In addition to t- and chi-square tests and analysis of variance, stepwise procedures of adding and removing variables (singly or in groups) were conducted to select the final, "best" model shown in Table 5

With an adjusted-ρ^2 statistic of 0 52 (compared to 0 10 for the market share model containing only a constant) the overall model goodness-of-fit is respectable The negative sign for the constant term indicates that unmeasured variables favor the choice of a traditional neighborhood on average. The remaining ten significant variables all had the expected signs, and fall into three categories: sociodemographic variables, attitude factor scores, and lifestyle factor scores.

The three sociodemographic variables – number of people under age 16, number of vehicles, and number of years lived in the Bay Area – are all positively associated with choosing a suburban neighborhood The appeal of the suburbs (larger homes and yards, perceived better schools and safer environment) as a place to raise a family needs no further explanation The association of higher numbers of vehicles with a suburban residence is consistent with findings from the travel behavior/land use literature (see, e g , Cervero, 1996, Rutherford *et al* , 1996), although some mutual causality could certainly be at work here (the move to a suburban home with attached garage and less transit availability may necessitate and/or facilitate the acquisition of tional cars) The last significant sociodemographic variable "years lived in the Bay Area", can be considered a life cycle proxy Specifically, it is hypothesized that people who have large values for this variable are older and more likely to have (or have had) children living at home. Even if a household is now in the empty nest stage and no longer needs the four bedroom home near good schools, inertia may keep it in that location which was optimal in the past. Nijkamp *et al.* (1993) hypothesized that life cycle is the "predominant explanatory factor in residential relocation decisions".

Seven out of the 10 significant variables in the model are attitudinal (4) and lifestyle (3) factor scores, demonstrating the considerable explanatory power of these types of variables As would be expected from Figure 1 and the discussion in Section 4.1, the signs on the four attitudinal variables are all negative, indicating that people scoring highly on the pro-

Table 5: Relative Effects of Sociodemographic Characteristics and Attitude/Lifestyle Factors in a Binary Logit Residential Choice Model (Dependent Variable: Suburb = 1 and Traditional Neighborhood = 0)

Variable Name and Type S = Sociodemographic A = Attitude Factor L = Lifestyle Factor	Full Model		Attitude and Lifestyle Factors Excluded		Sociodemographic Characteristics Excluded	
	β	t (p-val.)	β	t (p-val.)	β	t (p-val)
Constant	-1 36	-3 49 (0 00)	-2.52	-7 66 (0 00)	1 02	7 24 (0 00)
Number of people under 16 (S)	0 83	3 50 (0 00)	0.91	4 77 (0 00)		
Number of vehicles (S)	0 77	4 43 (0 00)	1 01	6.83 (0 00)		
Years lived in Bay Area (S)	0 03	3 38 (0 00)	0 05	6 59 (0 00)		
Pro-pricing (A)	-0.58	-3 34 (0 00)			-0 63	-4 10 (0 00)
Pro-environment (A)	-0 29	-1 87 (0 06)			-0.35	-2 40 (0 02)
Pro-high density (A)	-0 84	-4 86 (0 00)			-0.94	-6 00 (0 00)
Pro-alternatives (A)	-0 63	-3 70 (0 00)			-0 60	-3 85 (0 00)
Altruist (L)	0 32	2 23 (0 03)			0 28	2 17 (0 03)
Culture-lover (L)	-0 76	-4 91 (0 00)			-0 86	-5 95 (0 00)
Nest-builder (L)	0.57	3 83 (0 00)			0 69	5 14 (0 00)
Number of observations	492		492		492	
Initial log-likelihood	-341 03		-341 03		-341 03	
Log-likelihood at convergence	-151 95		-219 04		-181 46	
ρ^2	0 55		0 36		0.47	
Adjusted ρ^2	0 52		0 35		0 44	
χ^2	378 16		243 98		319 16	

pricing, pro-environment, pro-high density, and pro-alternatives factors are significantly more likely to live in a traditional neighborhood The signs for the three lifestyle factor scores are consistent with Figure 2 and the discussion in Section 4.2. those scoring high on the culture-lover factor are more likely to live in a traditional neighborhood, whereas those scoring highly on the nest-builder and altruist factors are more likely to be suburbanites From the final log-likelihoods presented in Table 5, chi-squared tests on the inclusion of each block of variables can be performed. The result is that the addition of each block of variables is significant to the final model, but that the attitudinal/lifestyle block explains more information than does the sociodemographic block

6. Conclusions and Directions for Further Research

This paper investigated the importance of attitudinal and lifestyle variables to residential neighborhood choice for residents of three San Francisco Bay Area neighborhoods It was found that attitudinal measures on topics such as residential density and transportation pricing policies varied significantly between residents of traditional and suburban neighborhoods. Similarly, measures of respondents' lifestyles, based on participation in activities such as cultural events and home improvement, were found to be strongly associated with neighborhood choice. Evaluation of the relative contributions of sociodemographic and attitudinal/lifestyle blocks of variables suggested that the latter category carried greater explanatory power

This effort is currently being extended in two important ways The first way involves the development of an individual-specific, continuous indicator of neighborhood "traditionalness", and the use of that measure as the dependent variable in a residential choice model The dichotomous classification of traditional or suburban used in the current work masks considerable variation within neighborhood, introduces "noise" into the model, and therefore weakens the explanatory power of the model. For example, an individual's observed attributes (explanatory variables) may lead to the prediction that she would choose a traditional neighborhood. In fact she may live in suburban Concord (an "incorrect" prediction based on the binary dependent variable used here), but in an apartment complex near the BART station and shops/services (consistent with her observed explanatory variables). An individual-specific measure of the level of traditionalness *she* experiences – a measure which could vary considerably even within the small geographic areas used in this study – should be more closely related to the explanatory variable attributes she possesses than the binary variable which is identical for all respondents in a given neighborhood, and hence should result in a

goodness of fit even better than the reasonably high adjusted ρ^2 of 0.52 obtained for the best model of this study.

The second important extension of this study is to embed a neighborhood choice model into a system of simultaneous equations (see, e.g., Kain, 1962; Waddell, 1993). A number of interdependencies among neighborhood choice, travel behavior, attitudes/lifestyle, and sociodemographic variables can be identified. The best way to account for these relationships of (potentially) mutual causality is through structural equations modeling. The authors have developed a conceptual model of these interrelationships; work is currently underway to operationalize the structural equations model it implies, using the available data.

Other extensions are also possible and potentially useful. For example, sample segmentation by variables such as presence of children, number of workers, and vehicle availability may improve future models of residential choice by increasing the homogeneity of the resulting segments. Finally, when collection of new data is possible, development of attitudinal and lifestyle variables specifically oriented toward a residential choice context may be even more fruitful than the measures used here, which were taken from a study of travel behavior. Further, as mentioned in Section 4.1, the most rigorous approach to disentangling relationships of mutual causation requires the collection of longitudinal data.

In summary, we believe the approach presented in this paper constitutes an important direction for residential choice modeling. While attitudinal and lifestyle variables are not easy to forecast and hence these models may not yet readily translate into impacts on regional travel demand, they still offer useful policy insight. Examining the impact of such variables on residential choice sheds light on the issue of whether observed differences in travel behavior are induced by the land use configuration of the neighborhood itself, or are derived from intrinsic propensities for different travel choices. Which one of those two claims is true has important implications for new urbanism policies intended to reduce travel through land use planning. In reality, both behavioral mechanisms are likely to be in effect to varying degrees, and only the most sophisticated analysis techniques (structural equations modeling of longitudinal data on residential location, lifestyle/attitudes, travel behavior, and demographics) can properly distinguish the effects of each. Using more limited methods, however, suggestive evidence is mounting that the second hypothesized mechanism is stronger: that is, that as an explanation for travel behavior, neighborhood type tends to act as a proxy for the "true" explanatory variables with which it is strongly associated, namely attitudinal and lifestyle predispositions.

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