This is to certify that the

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SOCIAL ATTITUDES TOWARD
CULTIVATED LANDSCAPE TREES
FOCUSING ON SELECTED CHARACTERISTICS
OF STREET TREE PLANTINGS
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SOCIAL ATTITUDES TOWARD CULTIVATED LANDSCAPE TREES FOCUSING ON SELECTED CHARACTERISTICS OF STREET TREE PLANTINGS

By

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ABSTRACT

SOCIAL ATTITUDES TOWARD CULTIVATED LANDSCAPE TREES
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A fundamental lack of empirical research pertaining to aesthetic preferences of the public regarding urban landscape content has led to the evolution of widely accepted intuitive assumptions which may be to a large extent inaccurate.

Examination of societal attitudes toward landscape trees and selected characteristics of street tree plantings by means of survey techniques utilizing verbal questions, photograph preference selection and the semantic differential in five Midwestern cities indicates that:

1) Trees are aesthetically desireable in urban settings.
2) Street trees over 25 feet tall are aesthetically preferable to smaller trees.
3) Street tree planting densities of one tree per home appear satisfactory to a large component of the population.
4) Street tree size preference is largely independent of age, level of education and sex. If special grouping techniques are employed,

however, the age and education factors indicate the existence of relationships regarding tree size preference.

To

Debra

My Wife

PREFACE

Life in urban environments strikes one as becoming increasingly complex, specialized, congested, and artificial. Yet many of the fundamental requirements of human existence remain unchanged including the need for pure air to breathe, shade from the summer sun, and all of the other positive attributes we have come to associate with landscape trees.

The relative amount of time, expertise, and money spent on the study of the environment is at an all time high. Never before have we known so much about ourselves and the good and bad of our own creations.

The compelling social movement to upgrade urban environments is beginning to be felt in our cities and towns. One cannot help but wonder if such a force isn't, to a great extent, rooted in something as fundamental as the devastating losses to Dutch elm disease which have ravaged the countenance of large portions of urban America.

Among the activities spurred on by groups interested in the "regreening" of America and "Keeping America Beautiful" is increased emphasis on tree planting.

Which trees are to be planted and how best to

maintain them is the ongoing challenge addressed by several allied professions, among them being the fields of utility and urban forestry, nursery science, tree breeding, and landscape planning and design which brings us to the study at hand.

Claims have been made over the past twenty years by patriarch spokesmen from various facets of the landscape tree industry (nurserymen, municipal arborists, academicians, and horticultural curators) to the effect that low growing trees are the answer to the planting question in urban situations based on principles of design and ease of management. Shorter trees fit in with the decor of ranch-type homes and reduce interference with utility lines (Pirone 1972). Questioning whether what is good for the architect and good for the tree manager is good for the taxpayer/inhabitant, we have attempted to address this question and others in an empirical study of social attitudes toward landscape trees in urban settings giving prime consideration to street trees in particular.

It is hoped that the information uncovered by this study will serve as a springboard for others interested in unraveling portions of the relationship between man and his environment.

The approach taken in this study was very straight forward using the most appropriate simple tools available. Description of the study and discussion of its results is intended as much for the use of the practitioner as for the researcher.

For assistance received in the undertaking of this study, I am indebted to several scores of people. Heading the list is my dear wife, whose encouragement and personal sacrifices provided me with the determination and precious hours needed to complete this undertaking.

I wish to thank my adviser, Dr. J. James Kielbaso, whom I was able to call on with little regard as to the day of the week or hour of the day over the course of the last 3½ years for assistance and guidance.

Special thanks to my secretary, Joanne Atkinson, who typed innumerable tables and large portions of the text for this and related papers and to my employer, Doug Chapman, and the Dow Gardens for providing me time away from work for carrying out tasks associated with the project and for financial assistance in completing course work for my Masters program.

I would like to acknowledge the assistance afforded by the Parks Departments in Flint, Lansing, and Saginaw, and to thank city foresters Dennis Bowles, Nino Mauro, and Bob Cool, and Flint forestry technician John Nugent, for helping me locate tree plantings used in survey photographs.

Thanks is extended to Ted Myers, Bill Collins, and Bruce Roberts for contibuting slides of street scenes for possible use in the survey.

I am indebted to my mother and the other canvassers, Barb Mayeda, Brock LaMarca, and Marshall Baeckeroot, who

took the survey to the streets and into the homes of interviewees.

I also want to express my gratitude for statistical advice and computer programming assistance provided by Mark Williamson and Anne Oribello.

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CHAPTER I

INTRODUCTION

Impetus for Investigation

The impetus for this study stems from the popular touting of small ornamental trees for use as street trees and as major components of urban landscapes by tree managers and nurserymen at the expense of what they have termed missplaced "forest giants" or the traditional medium and large trees found on Midwestern city streets. In addition to the obvious attributes of small size, not the least of which is low maintenance in many instances, claims that people actually prefer small trees led us to question the basis on which these claims were made.

Unaware of any concerted attempts to obtain the thoughts of the public on the size or number of street trees that appealed to them, a survey was developed that would begin to sketch the meaning that trees hold for people in urban environments with strong emphasis on street trees, focusing on the size variable in particular. The underlying hypothesis for this study was that the public, in fact, had no preference as to large or small street trees, with large being defined as over twenty-five

feet in height at maturity.

Of major concern in the development of the study was collection of data that would have practical import for municipal tree care bodies so that they could better serve their citizens. Further intent included the establishment of a general data base for future study of public preference in urban landscape considerations.

CHAPTER II

LITERATURE REVIEW

Literature reviewed prior to and in the course of this investigation comes from several fields. It should be noted that research relating to perceptual phenomena in urban environments relating to vegetation is not abundant.

The literature cited in this paper can be broken down into four categories. However, some references fulfill the requirements of more than one category.

Categories:

(1) Related works encompassing perceptual aesthetic and physical content features of essentially urban environments and their relationships with man.

(2) Works done on societal attitudes and values concerning trees in urban settings pertaining to the general public and special interest groups.

(3) Technical literature for use in survey design, interpretation, and analysis techniques.

(4) Literature identifying specific intuitive assumptions which form the basis for this investigation.

Individual works are briefly described below. They are grouped in the order of the four listed categories, with each being placed in the most appropriate category.

Many of the works of E.L. Shafer (Shafer and Richards 1974) have dealt with the use of photographs as a means of assessing people's attitudes and reactions toward scenes in urban and rural settings. These works have provided the basis for many other studies, including the one being discussed and others cited herein.

Other works involving perceptual phenomena include a study by Legg and Hicks (1976) which incorporated the use of line drawings and photos in studying public preference regarding desirable attributes and species of shade trees in Texas.

The Legg and Hicks study examined local nurserymens' and residents' attitudes toward shade tree attributes, such as growth rate, shape and form, susceptibility to insect, disease, or hazard problems, amount of shade provided (crown density), autumn coloration and/or production of attractive flowers or fruits, and nuisance factors, such as leaf and fruit drop, sap dripping, or sprouting.

Their results showed among other things that consumers considered all of the listed attributes to be of some importance, rating them all between 1.6 and 2.4 on a scale of one to three, with three being most important. Consumers ranked shade as the single most important attribute, followed in descending importance by insect, disease, and hazard susceptibility, longevity, growth rate, shape, flowers and fall color, ease of establishment, and nuisance. Whether the tree was evergreen was

the least important.

Ranking of crown shape desirability based on respondent reactions to line drawings of six common crown forms shows spreading branched and vase shaped to be the most popular, with broad oval and globe shaped being slightly less popular. Columnar and narrow conical were significantly less popular than the four other shapes.

Also, in the realm of human perceptions and responses to the visual environment is literature from the disciplines of architecture and psychology which support the need for research of the type proposed in this thesis. Selected passages from two authors will complete the literature listed under category 1.

Trends in modern urban development, urban aesthetic quality, formulation of design concepts, and the need for additional research pertaining to perceptual phenomena have been noted by Sanoff (1969) in studying the socio-psychological aspects of the physical environment.

> There is evidence to indicate that individuals have a requirement for sensory intake of appreciably varied perceptions while an extreme lack of external stimulation can have deleterious consequences.
>
> Our vernacular past is rich with visually satisfying communities whose development was based on a leisurely sequence of growth. Today's development is rapid and changes come swiftly. Urban environments alter their character within a few years. The population increase and mania for speed outweighs consideration of quality, and environments are created with very little forethought. With this increasing urban development, there appears to be a loss of aesthetic quality where the environment becomes monotonous, impersonal, and standardized.

> . . . Rarely is visual satisfaction experienced (by people today) and, as a result, individual's aesthetic sensitivity remains unawakened (Sanoff 1969).

Mentioning designers and the state of their art, Sanoff continues,

> . . . Designers of man's environment have little more to rely upon as a basis for their decisions than their own intuition and their own response to the environment. Though the designer today may be dissatisfied with the appropriateness of his solution, he is still unable to predict the consequences of his decisions with any degree of accuracy. The rationale for the design of visual impact of the environment has not been based on a systematic analysis of the user's perceptions, but on a group of aesthetically inclined individuals who have formalized their intuitions into heuristics (Sanoff 1969).

Turning to the future, the importance of understanding how people perceive their physical world and the need for further study in this area is noted.

> . . . To alleviate the visual poverty in urban areas, a body of knowledge about perceptual phenomena is necessary to increase the sensitivity of the interrelation between behavior and the physical environment. . . .
>
> . . . How people perceive their everyday physical world, their distinctions about it and the significant factors affecting comprehension are all questions which are of great importance to architects and urban designers and require immediate attention (Sanoff 1969).

Similar thoughts concerning the infancy of behavioral research on human responsiveness to environment and a need for more research of this type are expressed by Kenneth Craik (1969).

The dearth of psychological research relating to human responses to the physical environment and the lack

of scientific basis for environmental behavioral assumptions is discussed by Craik below:

> . . . The lack of a system of metrics for describing and systematically varying complex environmental displays is one reason for the neglect of the everyday physical environment in psychological research. Psychologists have readily made use of physical variables provided by physicists, such as temperature, luminance, hue, and amplitude, but have not made use of complementary environmental variables which geographers and environmental designers might be able to contribute to the common effort. . . .
>
> Throughout all levels of environmental design, management, and policy formation, there is embedded a structure of assumptions about the interplay between human behavior and the everyday physical environment. . . . These environmental-behavioral assumptions, usually functioning implicitly in the design and the decision-making process, are seldom grounded in systematic empirical knowledge. . . .
>
> Behavioral research on human responsiveness to landscape is in an early stage of development (Craik 1969).

Inclusion of these passages was intended to indicate a need for empirical studies involving societal perceptions of different aspects of the physical environment, such as the one undertaken.

Works examined concerned with measuring attitudes and values of trees in urban settings include a study by Wilson (1962) indicating that large shade trees rank ahead of such things as:

(1) parking space on a residential lot,

(2) garbage and trash disposal service,

(3) natural gas service to the home, and

(4) increased yard size.

These findings were indicated by spending patterns

exhibited by people in North Carolina participating in a survey game requiring them to spend a hypothetical municipal budget to their own satisfaction, within parameters, simulating real life budgetary decision making.

Kielbaso (1971) noted that:

> Homes and building sites with trees usually sell more quickly and at higher prices than properties with no trees. Realty authorities have attributed an increased valuation per home to areas beautified by a sound street tree program.

A recent outgrowth of sincere interest in improving "the quality of landscape trees grown in metropolitan regions" was the formation of the Metropolitan Tree Improvement Alliance (METRIA). Membership in the alliance is composed of nurserymen, municipal and highway arborists, landscape planners, tree breeders, and other specialists, who are interested in working together for the improvement of trees for metropolitan landscapes. The cornerstone of the organization is the free exchange of information among specialists on a somewhat regular basis, to avoid duplication of effort, to keep members up to date on technical matters, and to give direction for future research efforts.

Current activities include design and implementation of a tree performance testing project to be integrated later with soil testing and disease and insect surveys. Selection and preservation of germplasm of selected trees for breeding purposes is being explored as well as coordination among nurserymen and breeders in developing, testing, and releasing new varieties (Gerhold 1978).

Although a very young organization, METRIA shows promise of providing a well rounded approach to urban tree improvement for years to come.

References falling in category three consisted primarily of texts describing considerations of importance for survey design. Dawes (1972) provided information pertaining to ubiquitous rating scales, such as the semantic differential. Hamburg (1970) was sought out for basic information pertaining to the establishment of sample size for surveys of this type.

One lone source relating to category four is mentioned in passing in the preface of this paper. Pirone (1972) alludes to the existence of a concept prescribing the use of short trees in urban planting.

Rather than try and discuss all of the intertwined similarities and related supportive ramifications these studies and articles have with the current study, pertinent points will be discussed in greater detail later in the body of this paper as their relevance becomes apparent. Let it suffice to say at this point that this study does not hinge extensively on any other known research done to data except in the area of survey technique.

CHAPTER III

METHODS AND PROCEDURES

Development of the Survey Instrument

Original Considerations

The survey in its final form was an outward expansion of one fundamental question, that being: Is there any substance to the claim that the general public prefers small ornamental street trees?

The work of Shafer and Richards (1974) spawned the idea for a photo comparison format to address this question. Their findings indicate that when color photographs and slides of scenes capture "most of the variation of natural and man-made environments, the adjective-pair measurement of response to the picture presentations agrees favorably with similarly measured on-site responses to the same scenes."

Taking the use of photographs a step further, it was projected that persons are able to formulate overall reactions to photographed scenes and would be able to perform forced rankings of pairs of photographs based on aesthetic preference. Thence, the photo selection format used to examine street tree size preference was formulated.

The goal was to obtain pairs of photographs

depicting street scenes of equivalent content with one fundamental difference, that being the size of street trees shown.

Expansion of Scope

After deciding on a method of dealing with this question, the decision was made to expand the scope of the survey, since the data collection effort would remain essentially the same and because it would allow for a more complete assessment of the overall attitude of people toward cultivated landscape trees and street trees.

Conversations with Michigan State University associate professor of Psychology Dr. Ralph Levine (personal conversation 1977), indicated a need for data reflecting attitudes toward the attributes embodied by street trees in the form of verbal questions. After developing lists of positive and negative attributes of street trees in urban environments for use in such a question, we decided to incorporate the use of photographs and the semantic differential to address this question for several reasons:

1) Work done by Legg and Hicks (1976) had already addressed a significant portion of the questions related to the attributes of shade trees, a very similar subject.
2) The list of pertinent positive attributes compiled was longer than the list of negative attributes. Having no scientific basis on

which to assign weighted values as to the relative importance of individual attributes, it was believed that response patterns would tend to be interpreted in an overall positive connotation no matter how negatively a person responded to the question.

3) Since the semantic differential rating scale offered a measurement of personal reaction to a scene, it was inferred that characteristic scenes of individual trees and street tree plantings could be used to gather a general attitude measurement as to the aesthetic desirability of trees in urban environments that would be flavored by individuals' feelings about the attributes of trees as well.

4) Incorporation of a widely used and accepted tool such as the semantic differential in our survey was strongly suggested by Michigan State University computer institute specialist for social science Dr. Robert Miley (personal conversation 1977) as being desirable from the standpoint of contributing to the universal body of scientific social research. Use of a standard tool adds versatility in providing a common denominator for comparison with other contemporary research and for future analysis in some other form as interpretive analyses

evolve.

The semantic differential is a tool widely used by social psychologists and others interested in measuring the meaning concepts hold for individuals. Devised by Osgood, Suci, and Tannenbaum (1957), the differential consists of three basic elements:

1) a concept to be evaluated in terms of its semantic or attitudinal properties.
2) a bipolar adjective pair which anchors the two extremes included on a scale.
3) undefined graduations imposed on a continuum consisting of a series of steps in the form of dashes or boxes usually numbering between five and nine, with seven steps appearing to be the optimal number.

In the research leading to the final development of the technique, Osgood et al. (1957) factor analyzed 76 pairs of polar adjectives (opposite in meaning). Findings from among twenty-six different cultures demonstrated that three principle factors accounted for most of the semantic loadings (Dawes 1972). These factors are (1) evaluation (i.e. good-bad), (2) potency (i.e. strong-weak), and (3) activity (i.e. active-passive). An individual's rating of a concept on these three factors, will fairly accurately predict his rating of the concept on a wide variety of bipolar semantic scales.

The semantic differential is commonly utilized in

two different ways: (1) to measure the semantic properties of words and concepts objectively in a tri-dimensional semantic space and (2) more frequently as a simple attitude scale, focused on the affective domain or the evaluative dimension.

In the current survey, the semantic differential was used as an attitude scale to elicit personal attitudes regarding small and large shade trees as well as the amenity value trees hold for individuals when associated with residential street plantings. In particular, examinations of the desirability of a pair of street scenes with and without a planting of street trees were made. Also, responses to a twenty-five foot tree and a sixty foot tree of similar form depicted in specimen situations on golf courses were measured.* Subjects viewed scenes reproduced as 5" x 7" color photographs.

Scenes were evaluated on the 27 adjective scales used by Shafer and Richards (1974) for their study of viewer reactions to outdoor scenes and photographs of those scenes. A similar set of scales was used by Sanoff (1969) for evaluation of urban environments.

To minimize introducing response bias resulting from survey design, the scales were presented in four different orders corresponding to the four different scenes and the order in which the four photographs were viewed

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*Copies of photos used in semantic differential portion of the questionnaire are included in Appendix 2.

was varied for the three different forms of the survey. The word pairs were arranged as illustrated by Shafer and Richards (1974) in a manner that appears to place the more desirable of the two adjectives on the right hand side of the scale most of the time.

Analysis of data has been confined to a graphic representation of the arithmetic mean obtained for the 27 scales by photograph for each sample population.

Final additions to questionnaire content involved verbal questions pertaining to tree plantings on the streets where respondents resided (to be compared with photo preferences) and some very fundamental demographic data.

Pilot Study

A pilot study simulating the proposed photo preference ranking portion of the survey was conducted since it was a major component of the survey and because it was an uncommon technique possibly having unforeseen design or presentation flaws. Study participants consisted primarily of friends, fellow workers and acquaintances with whom the interviewer could converse freely, in hopes that an accurate assessment of the technique could be made.

No design or presentation problems were noted by the twenty-one participants. Remarks made by one or two people concerning their photo selection criteria did lead to a content change in the wording of survey instructions.

This revision was the inclusion of a note in the finalized questionnaire directing respondents not to let themselves be influenced by photo quality and content, but to concentrate on the trees shown. Persons administering the survey were instructed to emphasize this point in their explanations as well.

Determination of Sample Size

Since the pilot study was composed of the size question forming the basis for the entire investigation, response patterns obtained from the pilot were used to determine the sample size required for the survey as a whole.

Respondents sampled in the pilot study indicated an 87% large tree scene photo selection rate, as opposed to 13% for small trees.

The method selected for determination of sample size was suggested by Hamburg (1970).

$$n = \frac{z^2 \ (p) \ (1-p)}{e^2}$$

n = number of samples to be taken

z = the range of standard errors specified

p = the proportion of the population responding to a given stimuli in one of two ways expressed as a decimal

1-p = the proportion of the population responding in a manner opposite to p expressed as a decimal

e = the percentage of allowable specified sampling error

For purposes of this survey, the original number of questionnaires to be completed was derived from values of: z = 2 for a 95% confidence specification, p = .87, 1-p = .13, and e = .05.

Applying the above formula, a minimum of 181 completed questionnaires were needed to obtain generalizeable data pertaining to selected urban populations in the Midwest as a whole.

Further investigation of the subject indicated that sample sizes of 100 for taking generalizable measurements of individual urban populations are not uncommon according to statistical advisers consulted.

It is interesting to note that reducing the sample size to 100 is possible with the Hamburg formula by increasing the amount of allowable sampling error to 6.75% as opposed to the standard 5%.

Applying the small pilot study sample size and p value to the sample size formula, it was determined that further sampling should have yielded p values ranging from .7232 to 1.0168 in 98 out of 100 cases with an allowable sampling error of 14.68%.

From these determinations, samples of 100 and 105 were obtained in the first two cities surveyed to permit the extrapolation of tendencies within the specific populations and to test or further establish the proportion

of large tree photos selected.

The results obtained in Midland and Saginaw indicated p values of .89 and .60 respectively. Since the proportion of large tree scenes selected in Saginaw was outside of the range expected as indicated by the pilot sample allowing for sampling errors as great as 14.68%, it was concluded that the 87% large tree preference value obtained in the pilot was probably higher than the actual value and that perhaps the population examined in the pilot sample was somewhat abnormal.

Based on the Saginaw response, the decision was made to substitute a lower p value in the formula to determine a more accurate minimum sample size. Thus a p of .70 was chosen since it lay between the two values and was located on the conservative end of the range of possible p values.

Using a p of .70 with a 95% confidence specification and 5% allowable sampling error a minimum sample size of 336 was obtained. Completed survey findings are based on 344 interviews in five cities. The observed five city large tree selection rate obtained was 72.75%.

The Finalized Questionnaire

Design Features

In an effort to combat the effects of respondent fatigue or apathy, steps were taken to reduce built-in survey instrument bias.

The questionnaire was produced in three versions, identical in content but having varied presentation sequences for the various sections.* The photo preference pairs grouped by season were presented in different orders for the three survey forms. Photograph order for the semantic differential scenes was also varied as were the verbal components of these questions. The order of presentation for the photo preference section and the semantic differential section was varied on one of the three versions of the questionnaire.

The intent of these measures was to more evenly distribute responses that for some reason were not representative of the participants' true feelings.

Description of Major Parts

The questionnaire was composed of four basic parts. Each is briefly described below:

1) Verbal questions were used to get an idea of the respondent's current neighborhood street tree situation as a point of reference. They were asked about dominant size class present, the density or spacing of street trees, and whether they were satisfied with these two characteristics of their neighborhood street tree planting, or if they would prefer to see

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*A copy of the questionnaire is included in appendix 1.

alterations.

2) Another portion of the questionnaire utilized semantic differential adjective pairs or attitude scales to determine respondent reactions to a large and a small tree of similar form and to see if street trees favorably affect perceptions of residential street scenes.

3) People were asked to view 28 paired street scenes and select the scenes "most pleasing to the eye" based on the trees shown. Each pair was composed of a scene with street trees less than 25 feet tall and a scene with trees over 25 feet tall. Since the trees were shown at some distance, scenes of immature, potentially large trees, were sometimes used to represent small trees, with the expectation that the average person would not be noticeably affected by the substitution. Photographs were all taken in residential settings. Deciduous trees were represented in all four seasons of the year. Pairs were matched as nearly as possible in qualities other than size of trees. Difficulties were experienced in obtaining perfect matches.

4) Respondents were asked to supply some basic demographic data as to their age, sex, level

of education, and whether they lived in a city, town, suburb, or rural area.

Administration of the Survey

Populations Sampled

To date five Midwestern cities in the two-state area of Michigan and Illinois have been studied. The Michigan cities surveyed were East Lansing, Midland, and Saginaw. In Illinois, the Chicago suburbs of Highland Park and Wheeling were examined.

Average completion time for the questionnaire was approximately fifteen to twenty minutes. Personal reactions to taking the survey were mixed at first. However, by the time the questionnaire was completed most people expressed, or implied, attitudes of interest and/or enjoyment as a result of having taken the time to complete it.

Numbers of persons interviewed ranged from highs of 105 and 100 for Saginaw and Midland, respectively, to 71 in Highland Park, 43 in East Lansing, and 25 in Wheeling.

Sampling Technique

As is often the case, a combination of sampling methods was used in the four cities sampled in a door to door manner. The combination of sampling techniques used could aptly be termed stratified cluster samplings.

Cities selected as sample populations were not chosen completely at random. Instead, selection was

based on locational convenience and manpower availability.

Cities were roughly stratified into four basic geographic quadrants, within which interviewers selected random neighborhoods to take their cluster samples. A cluster unit was composed of a neighborhood of a given age with a discernable street tree population such as even age large, even age small, uneven age large and small, and no street trees. Sampling concentration was heaviest in neighborhoods with even age large and small trees, where 120 interviews with persons having small street trees and 121 interviews with persons having large street trees were obtained.

Primary sampling units were individual homes. Strict adherence to a random pattern of home selection was not possible in all samples due to the number of people not at home. Frequently every home on a street was called on just to obtain an average of one completed questionnaire on one side of an average city block.

The fifth city (Midland) was sampled in a shopping mall where both volunteers and enlistees responded to questionnaires. It had been hoped that the mall sampling format would have been a relatively simple and rapid method of administering the survey. However, as it turned out administrative policies adhered to by mall managements made it difficult and extremely time consuming to continue sampling in this manner.

Subtle Differences in Questionnaires

Slight modifications exist between the questionnaires used in the Saginaw-Midland surveys and the East Lansing, Highland Park, and Wheeling surveys. Some of the questionnaires used in the latter three cities contained repetition of the questions involving verbal size and density preference in order to explore the possibility that the survey instrument could affect verbal preferences in a short time frame. Also, the semantic differential questions were omitted or only spot checked in East Lansing, Highland Park, and Wheeling to expedite the survey procedure.

Analysis Methods

Computer Analysis

Data processing was conducted at the Michigan State University Computer Science Laboratory in East Lansing. Programming and consultative assistance was obtained from Applications Programming computer service.

The canned program selected for use in analysis of the survey was the Statistical Package for the Social Sciences (SPSS). This program was selected because of ready adaptability to our needs and because of the wide acceptance and use of this program.

The most commonly used features of the program were the simple two axis crosstabulation with and without control of a third variable and the frequency count.

Figures generated by the computer were used in some hand calculations involving several aspects of trends in photo selection.

CHAPTER IV

RESULTS AND DISCUSSION

Semantic Differential

Responses to an open grown twenty-five foot silver maple (Acer saccharinum) and a sixty foot black maple (Acer nigra) of similar form growing on golf courses elicited remarkably similar responses from sample populations in Midland and Saginaw. The fact that there was no evident preference difference attributable to tree size may be due to the lack of an object providing a sense of scale in the photographs.

Surprisingly, the street scene with street trees was viewed essentially identically to the single tree specimen photos in both cities.* Variation was limited to minor points attributable to obvious scene differences like symmetry, degree of monotony, and amount of variation present. Differences between the street scene and either of the two specimen photos for any semantic pair never exceeded one full step on the seven-step scale.

Response to the residential scene devoid of a

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*Graphic response patterns by photo for Midland and Saginaw are included in Appendix 2.

street tree planting was radically different from the three scenes containing one or more trees. In fact, average responses for this photo reflected what would normally be considered the more negative concepts present on the differential scales. A composite graph depicting the responses to all four scenes in Midland and Saginaw is given in Figure 1.

Semantic responses obtained from the eight people in East Lansing answering this portion of the survey differed on some points with Midland and Saginaw. However, the overall trend of favoring tree scenes is readily discernable.

The results of the semantic differential analysis strongly suggests that in the minds of residents trees do enhance urban settings.

Observational Note on the Use of the Semantic Differential

Response patterns to the semantic differential rating scales display some similarity to those obtained by Sanoff (1969) in his study of urban environments. Points of commonality include:

1) Scenes which were "liked" to any extent received ratings for semantic pairs which tended to cluster around the middle of the response range, indicating slight amounts of emotion associated with scenes eliciting favorable responses.

2) Response patterns for scenes which were "disliked" to any extent, in contrast, polarized much more frequently, indicating greater amounts of emotion present in response to these scenes.

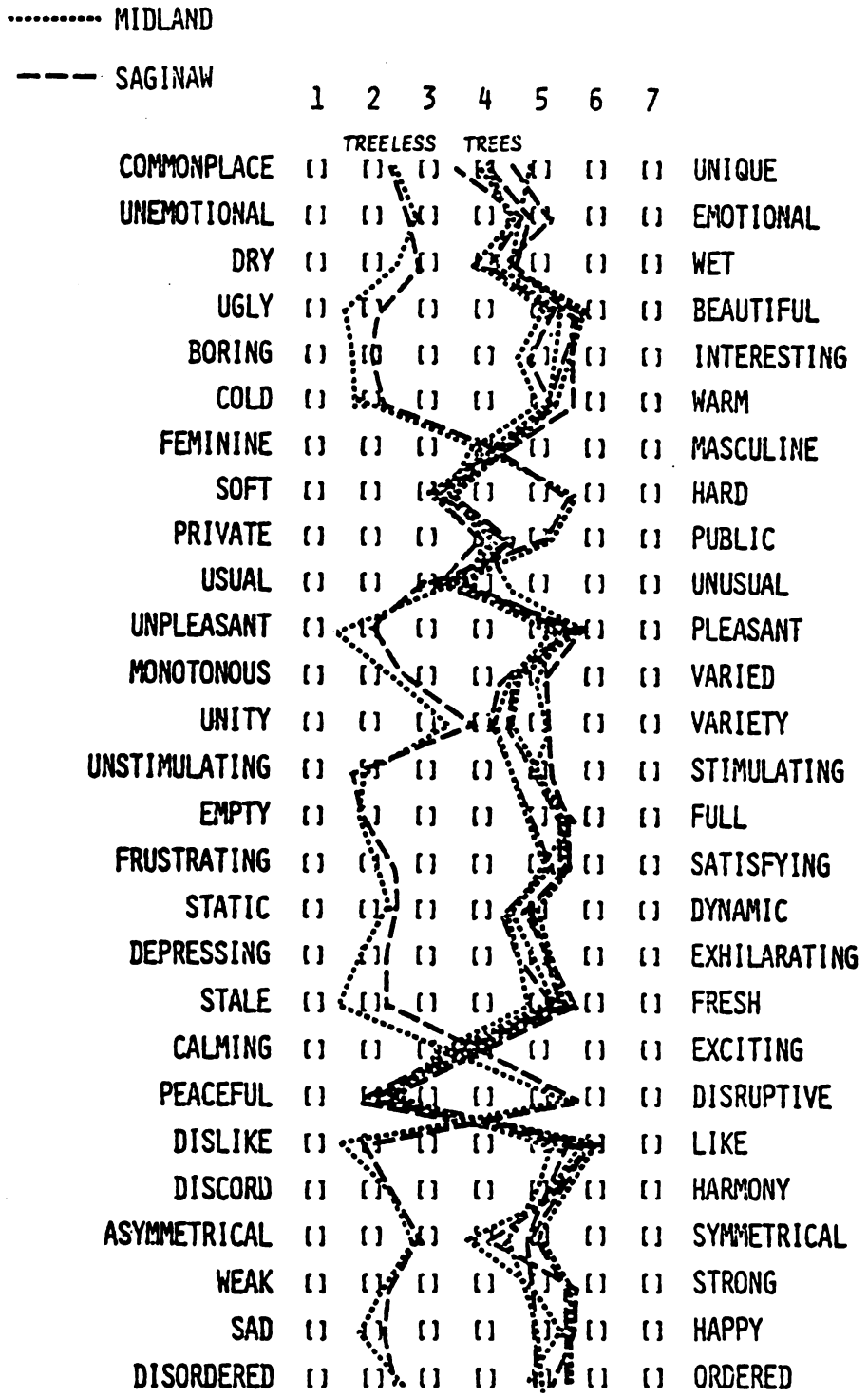

Figure 1. Composite semantic differential responses for two cities

These trends may be coincidental or they may possibly be peculiar to scenes illustrating architectural and landscape components of urban environments. Shafer and Richards (1974) experienced a wider range of response to their "liked" scenes most of which were in rural settings.

Verbal Size Preference

Comparison of respondents' existing tree size and their verbal preference (Table 1) suggests that the preference for a change in tree size is four-to-one in favor of larger tree size over a smaller tree size. It appears that people having large trees are verbally more content with their existing tree size than people having small trees as evidenced by 57% of those having large trees indicating a preference for their existing tree size in comparison to 40% of those having small trees and preferring their small trees.

Saginaw was an exception to these trends, exhibiting no strong preference for either larger or smaller trees. Verbal preference for smaller trees was indicated 1.4 to 1 over larger trees. For the persons in Saginaw preferring their existing tree size, the small tree group had a 57% preference percentage compared to 49% for the large tree group.

Overall, 50% of those with small trees, indicated a preference for larger trees while only 11% of those having large trees indicated a preference for smaller

Table 1. Comparison of Existing Neighborhood Tree Size Description and Verbal Size Preference for Five Midwest Cities[1] - 1978

Existing Tree Size	Verbal Preference				Total #/%
	Same Size	Smaller Trees	Larger Trees	Uncertain	
25' tall or less	48	5	60	7	120/36
Over 25' tall	69	13	28	11	121/36
½ - 25' tall or less ½ - over 25'	21	3	31	5	60/18
No street trees	4	10	14	8	36/11
Total #/%	142/42	31/9	133/40	31/9	377

Chi square significance - .0000

[1]Saginaw, Midland, E. Lansing, Michigan and Highland Park and Wheeling, Illinois

trees. Once again, the City of Saginaw deviated from the trend, having 24% of the small tree owners preferring smaller trees than they currently had. By way of explanation, it has been suggested that the effects of a 1976 ice storm are still fresh in the minds of many Saginaw citizens who suffered the loss of electrical power, telephone service and in some cases damage to homes and autos when large trees were broken by the ice burden.

Photo Selection Choices

When asked to select appealing street scenes based on street tree size (Table 2), 78% of the respondents selected over 50% large tree scenes, opposed to 18% selecting a majority of small tree scenes.* By individual sample population, the percentages of people favoring majorities of large tree photographs ranged from a low of 56% for the small sample in Wheeling to a high of 89% in Midland. Sixty-six percent of the persons verbally uncertain as to preferred tree size selected a majority of large tree scenes. People having existing mixed plantings of large and small trees favor large trees 9.5 to 1.

A more detailed analysis of those verbally preferring the "same" size trees is made in Table 2 by subdividing "same" into "existing" sizes and then comparing verbal preference with photo selection preference. This provides opportunity for examination of their photo selection tendencies as well as to see which groups demonstrated the most consistency between verbal and photo selection preferences.

The major points of interest include:

1) Of the 49 respondents verbally preferring existing small trees, 52% selected a majority of large tree scenes. Wheeling, Illinois was the only exception to the trend with no one in

*Representative photographs of paired scenes are included in Appendix 3.

Table 2. Comparison of Preferred Tree Size by Verbal and Photo Selection Techniques in Five Midwest Cities[1] - 1978

Verbal Preference	Photo Selection Preference[2]					Number/% Total Sample
	Small			Large		
	0-3	4-6	7	8-10	11-14	
Same	8	18	5	22	90	143/42
Existing[3]						
Small	*8*	*13*	*3*	*9*	*16*	*49*
Large		*3*	*1*	*8*	*57*	*69*
Mixed		*1*	*1*	*5*	*14*	*21*
None		*1*			*3*	*4*
Small(er)	16	3	2	5	6	32/9
Large(r)	4	5	4	21	101	135/39
Uncertain	8	1	2	5	17	33/10
Total	36	27	13	53	214	343/100
% of Total	10%	8%	4%	16%	62%	

[1]Saginaw, Midland and East Lansing, Michigan and Highland Park and Wheeling, Illinois.

[2]Number of large tree photos selected of 14 possible: Chi square significance - .0000

[3]"Existing" categories shown as subsets of "Same."

this category selecting over 50% large tree scenes.

2) Of those verbally preferring existing small trees, a surprising 33% actually chose 11-14 large tree scenes.
3) Of the 69 respondents verbally preferring existing large trees, 94% selected a majority of large tree scenes.
4) Of the three preferring existing large trees and selecting substantial numbers of small, none selected over 42% small tree scenes.

Attempting an explanation of large tree preference, we have noted that shade was considered the most important attribute exhibited by shade trees in the Legg and Hicks study. Perhaps shade is one, if not the most important, function of a street tree in the minds of residents. Obviously, large trees shade greater areas than small trees. Growth rate, crown shape, and longevity were also considered important attributes by participants in the Legg and Hicks study. Perhaps rapid growth, spreading and vase-like growth habits*, and long life are associated with large trees by individuals.

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*Attempts to substantiate crown shape preference with photographs used in the current study were fruitless.

Selection Responses by Age, Education, and Sex

Examined individually, cities demonstrated no significant tendencies in photo selection based on age, education or sex. Statements relating to these variables will be confined to the five-city average.*

No apparent differences concerning tree size preference exist between female and male respondents. Five-city data showed males selected large trees 80% of the time compared to 76% for females.

Differences exist for education groups when combined into the broad classifications "up through high school" and "more than high school" (Table 10). Persons receiving additional training beyond high school were slightly more likely to select larger trees than persons receiving up to and including a high school education. Selection rates were 83% large for those with "more than a high school" education as compared to 63% large for the "up thru high school" group. No significant relationships were found unless the above classifications were used.

A relationship exists between tree size preference and a person's age only when respondents are divided into two groups; age 49 years and below and over 50 years (Table 11). Further breakdown of age classifications proved insignificant. The younger group selected an average of 83% large tree scenes compared to 66% for the fifty

*Copies of computer printouts for these factors are in Appendix 4.

and over age group. Perhaps fixed income, impending fixed income, inability to rake a tree lawn, bad experience with large trees, etc. could have an influence on photo selection tendencies for middle-aged and senior citizens. Again, the figures are not significant for any individual city but an overall relationship exists.

Residential Planting Density Preference

Overall, 59% of interviewees favored more trees in their particular residential street planting (Table 3). Only 2% of the respondents preferred fewer trees, while thirty-seven percent preferred their existing planting density. The relationship between existing planting density and the number of trees desired is somewhat inversely proportional in nature. As might be expected, the desire for more trees is strongest among the groups having no street trees or an occasional street tree, 82% and 92% respectively favoring more trees. People living on streets having approximately one tree for every other home preferred more street trees 80% of the time. Streets averaging one tree per home satisfied 58% of the sampled residents and streets averaging more than one tree per home satisfied 59% of the residents; leaving 40% and 33% of these two groups preferring even more trees.

The inference from Table 3 is that the satisfaction level for a majority of persons is reached with planting densities of approximately one tree per home.

Table 3. Preference for Numbers of Trees on Street Compared by Existing Numbers for Five Midwest Cities - 1978

Existing Trees Per Home	Preferred Number[1]				#/% Raw Total
	Same	More	Fewer	Uncertain	
None	3/11	22/82	1/4	1/4	27/8
Occasional	1/3	35/92	0/0	2/5	38/11
App. One-Half	15/16	75/80	3/3	1/1	94/27
One	70/58	48/40	1/1	1/1	120/35
More than One	38/59	21/33	2/3	3/5	64/19
#/%	127/37	201/59	7/2	8/2	343/100

Chi square significance - .0000

[1]Numbers in cells are number in category and % of row total--i.e. #/%.

Survey Effect on Verbal Tree Size and Density Preferences

Responses to the before and after questions concerning tree size preference and planting density preference registered very little change for the 54 persons sampled in this manner. If anything, larger trees were slightly more favored afterwards. Spacing or density responses were virtually identical on both occasions.

Trends in Photo Selection

The five cities differed on photo pair preference selections on five of fourteen possible occasions, meaning that at least one of the five cities selected a majority of small tree scenes for five of the fourteen photo pairs. This indicates that at the very least 35% of the photo pairs were of roughly equivalent quality and contained no insurmountable undetected visual "disqualifiers."* This amount of difference is considered desirable from the aspect of producing an unbiased survey instrument.

It is impossible to completely validate the survey instrument based on the response patterns of interviewees after the fact. Instead, reliance was placed on results obtained from the pilot study which revealed no flagrant reoccurring comments from persons consulted concerning scene pairing. Contrary to the actual survey interview format, persons participating in the pilot study were asked to comment on the photo selection component and its makeup.

Obviously, some photos were more popular than others as would be expected when searching for some type of trend or lack thereof concerning the attempted control of a single variable. Therefore, it is not surprising that in several cases cities' response patterns were similar in

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*Visual "disqualifier" is defined here as an aspect of photo quality or content which causes a given photograph to be selected abnormally either more or less often than if the "disqualifier" was not present.

the sense that the majorities were frequently of relatively high or low magnitudes concurrently for individual photos. Theoretically, the relative popularity of a scene should be the result of the tree size variables depicted in a given pair; at worst it is hoped that preference decisions are only modified to a small extent by subtle tree characteristics not controlled for in matching photo pairs. A not-so-subtle example of this nature that was controlled would be the profuse flowering depicted on small trees in the spring, versus nonapparent or nonshowy flowering on large shade trees at that time of year. While small flowering trees were preferred by only one city of five from among three photo pairs depicting spring flowering on small trees, large tree majority preference margins were noticeably lower than in summer (green leaved) and winter (leafless) photo depictions.

The least popular large tree scene was selected by a majority of people in only two of the five cities. This particular scene was chosen 37% of the time by the city preferring it the least, East Lansing. The least popular small tree scene was selected 6% of the time and was not selected by a majority of people in any one city.

Analysis of photo selection responses indicates that photograph quality was not a strong, if even a discernable, influence on individual responses.

In general, the photographs of large trees were of slightly lower quality than their small tree counterparts,

due mainly to poor differentiation (washout) in high contrast situations involving dense shade, pavement glare, and cloudy skies. The problem stemmed partially from the automated photo printing operation used to print pictures from color slides, which was too expensive to have repeated or done by hand originally. Respondents were not to let photo quality and several other variables influence their choices, and some doubt still exists as to whether these variables, in fact, caused any bias in photo selection. Of the two most questionable large tree photographs, one was selected second to its paired small tree photo in two of five cities, Saginaw and Wheeling, and was among the four least chosen large tree majority selections in East Lansing and Midland. The other large tree photo of lowest quality was preferred by a majority of persons in each city and appeared among the four least selected in only two of five cities. To say that photo quality either affected or failed to affect photo selection is not possible to determine. In either case, the effect would be considered minimal.

Three of the five least popular large tree scenes overall were from the fall color pairs, making fall the least desirable large tree season. One of the three scenes was the least desirable large tree scene in the study, being selected only 48% of the time in comparison to 52% for its corresponding small tree counterpart. The other four least popular large tree photos were

selected either 63 or 64 percent of the time.

By season, the large tree photo selection popularity range appears as follows: 80% summer, 76% winter, 70% spring, 64% fall.

Notes on Photo Content and Subsequent Selection Patterns

A line of thought posed early by persons consulted during the design phase of the study concerned possible effects that variations among structure and spacial factors present in street scenes could have on survey responses regarding preferred tree size.

Ideally, the variable factors of house height, front lawn depth, tree lawn width, and street width would have been matched identically in photo pairs as would have tree shape, tree color, number of visible telephone poles, street signs, fire hydrants, parked cars, etc.

Unfortunately, locating fully stocked streets of well maintained, uniform street trees was difficult to accomplish at best, so that "perfect" matches based on the physical attributes of neighborhoods suffered to some degree.

An attempt was made to depict the full gamut of tree size, and yard depth situations. However, it was found that certain situations such as any combination of tree size and a deep yard was difficult to locate if the other prerequisites of planting uniformity, etc. were met. Selections were made closely approximating these

situations. At least one representation of each combination was obtained. Lawn or yard depth was broken down into three classifications:

1) shallow,

2) medium,

3) deep.

The variables of tree lawn or boulevard width, as well as street width, were combined irrespective of each other in a few situations when the other criteria were being satisfied. The impact of these differences was considered small.

Landscape architects apply principles of scale and proportion with regard to tree size and proximity to a home. How far reaching these principles are in the minds of the public is not known. Combining this question with the possibility that house size may be associated with economic status by respondents as indicated by the pilot study, examination of responses was undertaken to determine if response patterns could be biased due to the houses depicted in photographs. Although people were asked not to let themselves be influenced by the type of home they might prefer in a pair of scenes, it was considered necessary to examine responses in this vein since the possibility of some response bias exists due to photo quality as discussed earlier.*

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*Comparison of tree size photo preference selections and corresponding house heights based on visual analysis of photographs and recorded responses is in Appendix 3.

Since Midland and Highland Park preferred large trees in all 14 photo pairs, statements referring to preferred tree size and accompanying house height will reflect the Saginaw, East Lansing, and Wheeling data.

In photo pairs where the houses in the small tree photographs were taller than the houses in the corresponding large tree photos, the large tree photos were selected 100% of the time.

Selection of photos from pairs depicting homes of similar height was dominated by large trees in three of four situations.

For six photo pairs where the large trees were shown in front of taller homes than the small trees were, large tree photos were selected unanimously for three pairs with small trees winning out on 3 of 6 and 2 of 6 occasions on the remaining three pairs in Saginaw and Wheeling respectively.

In short, if all other factors are considered to be constant, the combined three-city photo selection data involving house size implies one of two things: 1) either that people were not influenced by house height and made their photo selections based solely on the tree they preferred or 2) that if home height had an influence on photo selection, large trees in front of one story homes were not viewed as an undesirable combination, being preferred four of five possible times, whereas, a small tree planting in front of 1½-2 story homes was never preferred from

among four such possible offerings.

Societal responses in photo selection tend to discount the argument that large trees dwarf small (low) homes and are considered less aesthetically pleasing in these situations than they are in front of taller homes. Also, home height is either not associated with overall home size and ultimate value assuming large homes are the most desireable, or again interviewees were not influenced in their photo selections by the height of the homes depicted.

CHAPTER V

CONCLUSIONS

Now to combine survey findings into a meaningful message for urban foresters, municipal arborists, social psychologists, nurserymen, horticulturists, landscape architects, academicians, and urban environmentalists.

Conclusions may be divided into six major parts. Relevant discussion is interjected on a point-by-point basis.

(A) Man's requirement for a green, tree enriched environment is not only a biological and reported psychological need, but also an aesthetic need. The current survey examines responses to urban scenes with and without the presence of trees. The message obtained is that trees ameliorate urban surroundings, thereby giving rise to a sense of need in situations devoid of trees.

(B) In residential situations, people favor large street trees 25 feet tall and over by photo selection in 78% of the cases when only aesthetic considerations are addressed. Qualifications to be noted regarding this figure are:

(1) Survey respondents were not made aware of any

economic implications associated with large trees as opposed to small trees.

(2) Utilities and other site factors were intentionally omitted from the scope of the survey and consequently responses do not directly reflect these considerations.

Professional tree managers should have a strong grasp of local site factor constraints and should know how to deal with these variables effectively without input from a less qualified source. The intent was to find out what people liked so that the tree manager could use that information as an input in the planting decision process. Obviously, trees over 25 feet tall at maturity are not suitable in every situation, but when site factors and economic conditions permit, these trees should be considered.

(C) Even persons having small trees and verbally preferring them actually seem to prefer large trees based on their photo selections. Despite the appealing attributes small trees possess for their owners, there is something about a medium sized or large tree that is aesthetically more attractive.

(D) Photo selection responses tend to discount the argument that large trees drawf one-story (ranch-style) homes and are considered less aesthetically pleasing in these situations than they are in front of taller homes.

(E) The variables of age, education, and sex appear to have minimal influence on tree size preference when based on photo selection. There is a definite trend, however, for young, more educated persons to prefer large trees more consistently than older less educated persons.

(F) A planting density of one tree per home may be a viable rule of thumb for the average residential lot as far as general resident satisfaction is concerned. One tree satisfies a majority, whereas one tree per two homes satisfies only 16% of respondents.

Once again, these conclusions pertain to deciduous tree plantings and sample resident populations in the Midwest. Conclusions drawn, are not intended to encompass areas having vastly different climates and tree types.

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APPENDICES

APPENDIX 1

EXAMPLE OF SURVEY QUESTIONNAIRE

APPENDIX 1

EXAMPLE OF SURVEY QUESTIONNAIRE

STREET TREE VISUAL PREFERENCE SURVEY

LIST OF DEFINITIONS USED IN THE SURVEY

1.) **street tree:** tree growing along a street or road, usually between the curb and sidewalk. In rural areas, these trees may be up to 15 feet from the pavement.

2.) **small tree:** in this survey a small tree is 25 feet tall or less at maturity.

3.) **large tree:** in this survey a large tree is one that is over 25 feet tall at maturity.

_____ (1-4

* This survey was filled out by a _____volunteer

_____enlistee (5)

A. Residential Street Tree Description

Turn to page one in the notebook where there is a picture of a neighborhood having street trees approximately 25 feet tall. Circle the number of the statement below best describing the size of the majority of street trees in your neighborhood. (6)

A majority of the street trees in my neighborhood are the same size or smaller than those pictured on page one. (1)

A majority of the street trees in my neighborhood are larger than the trees pictured on page one. (2)

The street trees in my neighborhood are about equally divided between the small and large size classes. (3)

There are no street trees to speak of in my neighborhood. (4)

Which of the following statements best describes the street trees in front of the homes on your street or road? (Circle one) (7)

No street trees (1)

An occasional street tree (2)

A street tree in front of half of the homes (3)

A street tree in front of each home (4)

More than one street tree in front of each home (5)

B. Residential Street Tree Density and Size Preference

If it were possible to alter the street trees in your neighborhood, would you like to see: (circle one on both lines)

same number of trees	more trees	fewer trees	uncertain	(8)
1	2	3	4	

the same sized trees	smaller trees	larger trees	uncertain	(9)
1	2	3	4	

C. Scene Description Exercise

Directions:

The next four pages of this questionnaire are to be used to give your impressions of the four scenes on pages 2, 3, 4, and 5 of the notebook. The questionnaire pages in this section have 27 pairs of words separated by a series of seven boxes. To register your reactions, place a check mark in one of the seven boxes between each pair of words.

A mark in box number 4 implies a neutral reaction which isn't associated with either of the two words. Marks in boxes numbered 1 or 7 imply a strong feeling associated with one of the two words. Boxes (2 and 3) and (5 and 6) indicate some degree of feeling is associated with one of the two words.

REACTION TO PHOTO PAGE 2.

	1	2	3	4	5	6	7		
COMMONPLACE	[]	[]	[]	[]	[]	[]	[]	UNIQUE	(10)
UNEMOTIONAL	[]	[]	[]	[]	[]	[]	[]	EMOTIONAL	(11)
DRY	[]	[]	[]	[]	[]	[]	[]	WET	(12)
UGLY	[]	[]	[]	[]	[]	[]	[]	BEAUTIFUL	(13)
BORING	[]	[]	[]	[]	[]	[]	[]	INTERESTING	(14)
COLD	[]	[]	[]	[]	[]	[]	[]	WARM	(15)
FEMININE	[]	[]	[]	[]	[]	[]	[]	MASCULINE	(16)
SOFT	[]	[]	[]	[]	[]	[]	[]	HARD	(17)
PRIVATE	[]	[]	[]	[]	[]	[]	[]	PUBLIC	(18)
USUAL	[]	[]	[]	[]	[]	[]	[]	UNUSUAL	(19)
UNPLEASANT	[]	[]	[]	[]	[]	[]	[]	PLEASANT	(20)
MONOTONOUS	[]	[]	[]	[]	[]	[]	[]	VARIED	(21)
UNITY	[]	[]	[]	[]	[]	[]	[]	VARIETY	(22)
UNSTIMULATING	[]	[]	[]	[]	[]	[]	[]	STIMULATING	(23)
EMPTY	[]	[]	[]	[]	[]	[]	[]	FULL	(24)
FRUSTRATING	[]	[]	[]	[]	[]	[]	[]	SATISFYING	(25)
STATIC	[]	[]	[]	[]	[]	[]	[]	DYNAMIC	(26)
DEPRESSING	[]	[]	[]	[]	[]	[]	[]	EXHILARATING	(27)
STALE	[]	[]	[]	[]	[]	[]	[]	FRESH	(28)
CALMING	[]	[]	[]	[]	[]	[]	[]	EXCITING	(29)
PEACEFUL	[]	[]	[]	[]	[]	[]	[]	DISRUPTIVE	(30)
DISLIKE	[]	[]	[]	[]	[]	[]	[]	LIKE	(31)
DISCORD	[]	[]	[]	[]	[]	[]	[]	HARMONY	(32)
ASYMMETRICAL	[]	[]	[]	[]	[]	[]	[]	SYMMETRICAL	(33)
WEAK	[]	[]	[]	[]	[]	[]	[]	STRONG	(34)
SAD	[]	[]	[]	[]	[]	[]	[]	HAPPY	(35)
DISORDERED	[]	[]	[]	[]	[]	[]	[]	ORDERED	(36)

REACTION TO PHOTO PAGE 3.

	1	2	3	4	5	6	7		
COMMONPLACE	[]	[]	[]	[]	[]	[]	[]	UNIQUE	(37)
DRY	[]	[]	[]	[]	[]	[]	[]	WET	(38)
BORING	[]	[]	[]	[]	[]	[]	[]	INTERESTING	(39)
FEMININE	[]	[]	[]	[]	[]	[]	[]	MASCULINE	(40)
PRIVATE	[]	[]	[]	[]	[]	[]	[]	PUBLIC	(41)
UNPLEASANT	[]	[]	[]	[]	[]	[]	[]	PLEASANT	(42)
UNITY	[]	[]	[]	[]	[]	[]	[]	VARIETY	(43)
EMPTY	[]	[]	[]	[]	[]	[]	[]	FULL	(44)
STATIC	[]	[]	[]	[]	[]	[]	[]	DYNAMIC	(45)
STALE	[]	[]	[]	[]	[]	[]	[]	FRESH	(46)
PEACEFUL	[]	[]	[]	[]	[]	[]	[]	DISRUPTIVE	(47)
DISCORD	[]	[]	[]	[]	[]	[]	[]	HARMONY	(48)
WEAK	[]	[]	[]	[]	[]	[]	[]	STRONG	(49)
DISORDERED	[]	[]	[]	[]	[]	[]	[]	ORDERED	(50)
UNEMOTIONAL	[]	[]	[]	[]	[]	[]	[]	EMOTIONAL	(51)
UGLY	[]	[]	[]	[]	[]	[]	[]	BEAUTIFUL	(52)
COLD	[]	[]	[]	[]	[]	[]	[]	WARM	(53)
SOFT	[]	[]	[]	[]	[]	[]	[]	HARD	(54)
USUAL	[]	[]	[]	[]	[]	[]	[]	UNUSUAL	(55)
MONOTONOUS	[]	[]	[]	[]	[]	[]	[]	VARIED	(56)
UNSTIMULATING	[]	[]	[]	[]	[]	[]	[]	STIMULATING	(57)
FRUSTRATING	[]	[]	[]	[]	[]	[]	[]	SATISFYING	(58)
DEPRESSING	[]	[]	[]	[]	[]	[]	[]	EXHILARATING	(59)
CALMING	[]	[]	[]	[]	[]	[]	[]	EXCITING	(60)
DISLIKE	[]	[]	[]	[]	[]	[]	[]	LIKE	(61)
ASYMMETRICAL	[]	[]	[]	[]	[]	[]	[]	SYMMETRICAL	(62)
SAD								HAPPY	(63)

REACTION TO PHOTO PAGE 4.

	1	2	3	4	5	6	7		
UNEMOTIONAL	[]	[]	[]	[]	[]	[]	[]	EMOTIONAL	(64)
UGLY	[]	[]	[]	[]	[]	[]	[]	BEAUTIFUL	(65)
COLD	[]	[]	[]	[]	[]	[]	[]	WARM	(66)
SOFT	[]	[]	[]	[]	[]	[]	[]	HARD	(67)
USUAL	[]	[]	[]	[]	[]	[]	[]	UNUSUAL	(68)
MONOTONOUS	[]	[]	[]	[]	[]	[]	[]	VARIED	(69)
UNSTIMULATING	[]	[]	[]	[]	[]	[]	[]	STIMULATING	(70)
FRUSTRATING	[]	[]	[]	[]	[]	[]	[]	SATISFYING	(71)
DEPRESSING	[]	[]	[]	[]	[]	[]	[]	EXHILARATING	(72)
CALMING	[]	[]	[]	[]	[]	[]	[]	EXCITING	(73)
DISLIKE	[]	[]	[]	[]	[]	[]	[]	LIKE	(74)
ASYMMETRICAL	[]	[]	[]	[]	[]	[]	[]	SYMMETRICAL	(75)
SAD	[]	[]	[]	[]	[]	[]	[]	HAPPY	(76)
COMMONPLACE	[]	[]	[]	[]	[]	[]	[]	UNIQUE	(77)
DRY	[]	[]	[]	[]	[]	[]	[]	WET	(78)
BORING	[]	[]	[]	[]	[]	[]	[]	INTERESTING	(79)
FEMININE	[]	[]	[]	[]	[]	[]	[]	MASCULINE	(80)
PRIVATE	[]	[]	[]	[]	[]	[]	[]	PUBLIC	(81)
UNPLEASANT	[]	[]	[]	[]	[]	[]	[]	PLEASANT	(82)
UNITY	[]	[]	[]	[]	[]	[]	[]	VARIED	(83)
EMPTY	[]	[]	[]	[]	[]	[]	[]	FULL	(84)
STATIC	[]	[]	[]	[]	[]	[]	[]	DYNAMIC	(85)
STALE	[]	[]	[]	[]	[]	[]	[]	FRESH	(86)
PEACEFUL	[]	[]	[]	[]	[]	[]	[]	DISRUPTIVE	(87)
DISCORD	[]	[]	[]	[]	[]	[]	[]	HARMONY	(88)
WEAK	[]	[]	[]	[]	[]	[]	[]	STRONG	(89)
DISORDERED	[]	[]	[]	[]	[]	[]	[]	ORDERED	(90)

REACTION TO PHOTO PAGE 5.

	1	2	3	4	5	6	7		
DISORDERED	[]	[]	[]	[]	[]	[]	[]	ORDERED	(91)
SAD	[]	[]	[]	[]	[]	[]	[]	HAPPY	(92)
WEAK	[]	[]	[]	[]	[]	[]	[]	STRONG	(93)
ASYMMETRICAL	[]	[]	[]	[]	[]	[]	[]	SYMMETRICAL	(94)
DISCORD	[]	[]	[]	[]	[]	[]	[]	HARMONY	(95)
DISLIKE	[]	[]	[]	[]	[]	[]	[]	LIKE	(96)
PEACEFUL	[]	[]	[]	[]	[]	[]	[]	DISRUPTIVE	(97)
CALMING	[]	[]	[]	[]	[]	[]	[]	EXCITING	(98)
STALE	[]	[]	[]	[]	[]	[]	[]	FRESH	(99)
DEPRESSING	[]	[]	[]	[]	[]	[]	[]	EXHILARATING	(100)
STATIC	[]	[]	[]	[]	[]	[]	[]	DYNAMIC	(101)
FRUSTRATING	[]	[]	[]	[]	[]	[]	[]	SATISFYING	(102)
EMPTY	[]	[]	[]	[]	[]	[]	[]	FULL	(103)
UNSTIMULATING	[]	[]	[]	[]	[]	[]	[]	STIMULATING	(104)
UNITY	[]	[]	[]	[]	[]	[]	[]	VARIETY	(105)
MONOTONOUS	[]	[]	[]	[]	[]	[]	[]	VARIED	(106)
UNPLEASANT	[]	[]	[]	[]	[]	[]	[]	PLEASANT	(107)
USUAL	[]	[]	[]	[]	[]	[]	[]	UNUSUAL	(108)
PRIVATE	[]	[]	[]	[]	[]	[]	[]	PUBLIC	(109)
SOFT	[]	[]	[]	[]	[]	[]	[]	HARD	(110)
FEMININE	[]	[]	[]	[]	[]	[]	[]	MASCULINE	(111)
COLD	[]	[]	[]	[]	[]	[]	[]	WARM	(112)
BORING	[]	[]	[]	[]	[]	[]	[]	INTERESTING	(113)
UGLY	[]	[]	[]	[]	[]	[]	[]	BEAUTIFUL	(114)
DRY	[]	[]	[]	[]	[]	[]	[]	WET	(115)
UNEMOTIONAL	[]	[]	[]	[]	[]	[]	[]	EMOTIONAL	(116)
COMMONPLACE	[]	[]	[]	[]	[]	[]	[]	UNIQUE	(117)

D. Visual Preference Sequence

In this portion of the survey, you are asked to indicate street trees that are appealing to you by viewing paired photographs. Efforts have been made to match similar scenes so that the main difference between the photos in a given pair is the trees shown. We are not asking that you judge photo quality, sky color, or the homes you prefer, but to concentrate on the trees alone.

Directions:

Turn to pages 6 and 7 in the notebook and select the scene having street trees most pleasing to your eye as you look down the street.

Indicate your preference by circling either (L) for left photograph or (R) for right photograph next to the page number below..

Proceed through the notebook in this manner selecting one of the photos in each pair.

pages	6 & 7	L R	(118-119)
pages	8 & 9	L R	(120-121)
pages	10 & 11	L R	(122-123)
pages	12 & 13	L R	(124-125)
pages	14 & 15	L R	(126-127)
pages	16 & 17	L R	(128-129)
pages	18 & 19	L R	(130-131)
pages	20 & 21	L R	(132-133)
pages	22 & 23	L R	(134-135)
pages	24 & 25	L R	(136-137)
pages	26 & 27	L R	(138-139)
pages	28 & 29	L R	(140-141)
pages	30 & 31	L R	(142-143)
pages	32 & 33	L R	(144-145)

Background Data

What is your sex? Male_____(1) (146)
Female_____(2)

Place a check ( ) beside the category which includes your age. (147)

Under 20_____ (1)
20 - 29 _____ (2)
30 - 39 _____ (3)
40 - 49 _____ (4)
50 - 59 _____ (5)
60 - 69 _____ (6)
over 69 _____ (7)

Please check the highest level of education you have completed:

Some Grade School _____ (1) (148)
Grade School_____ (2)
Some High School_____ (3)
High School_____ (4)
Some College_____ (5)
Associate Degree_____ (6)
Bachelor Degree_____ (7)
Other_____ (8)

E. Background Data (continued)
(Please check only one item.)

Occupation: Which of the following best describes your usual occupation?

Laborer or operator (truck driver, assembly line worker, etc.)...____(1)
Farmer.....____(2)
Clerical or sales (bookkeeper, clerk, etc.).....____(3) (149-150
Unemployed.....____(4)
Professional (doctor, lawyer, teacher, etc.).....____(5)
Retired.....____(6)
Service worker (barber, cook, policeman, etc.).....____(7)
Homemaker.....____(8)
Craftsman (skilled worker, mechanic, carpenter, etc.).....____(9)
Student.....____(10)
Manager or proprietor (store owner, office administrator, etc.)..____(11)

Do you live in: (circle one) city (1)
town (2) (151)
suburb (3)
rural (4)

THANK YOU FOR YOUR COOPERATION.

APPENDIX 2

SUPPORTIVE MATERIAL FOR SEMANTIC DIFFERENTIAL DISCUSSION

APPENDIX 2

SUPPORTIVE MATERIAL FOR SEMANTIC DIFFERENTIAL DISCUSSION

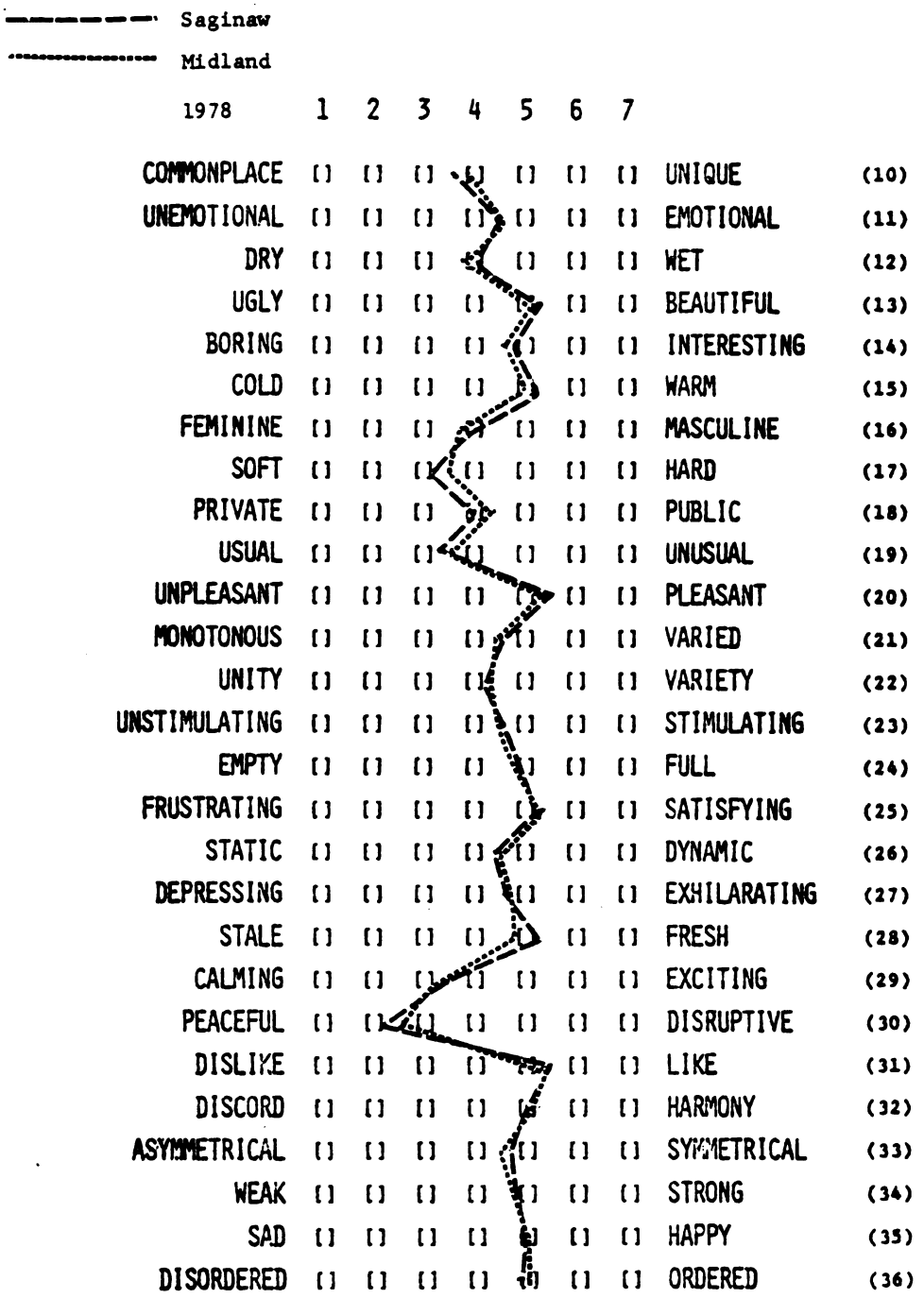

Figure 2. Semantic differential response to a 25' silver maple (Acer saccharinum) for two cities

Figure 3. Silver maple (25') in height(Acer saccharinum)

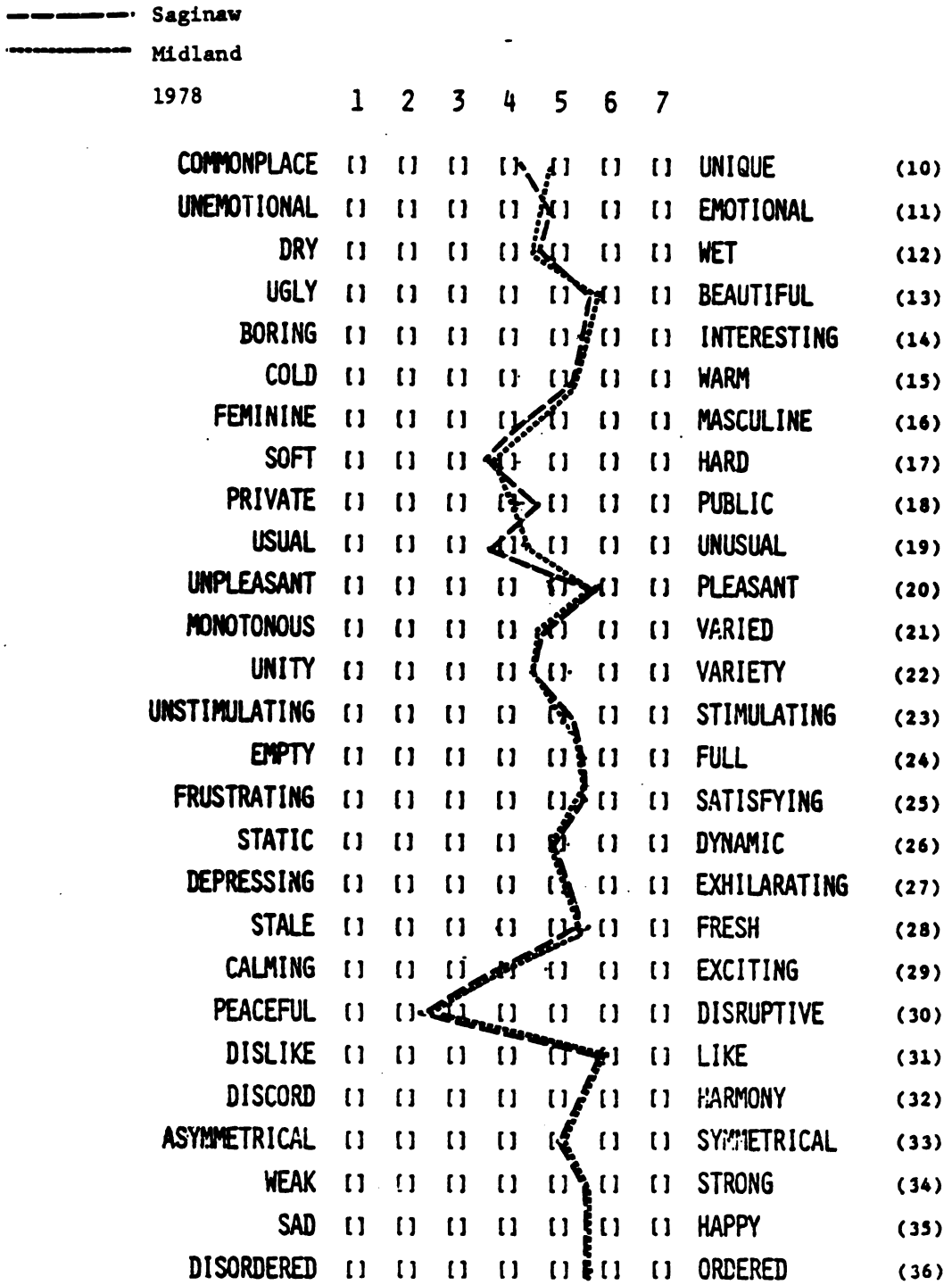

Figure 4. Semantic differential response to a 60' black maple (Acer nigra) for two cities

Figure 5. Black maple (60') in height (Acer nigra)

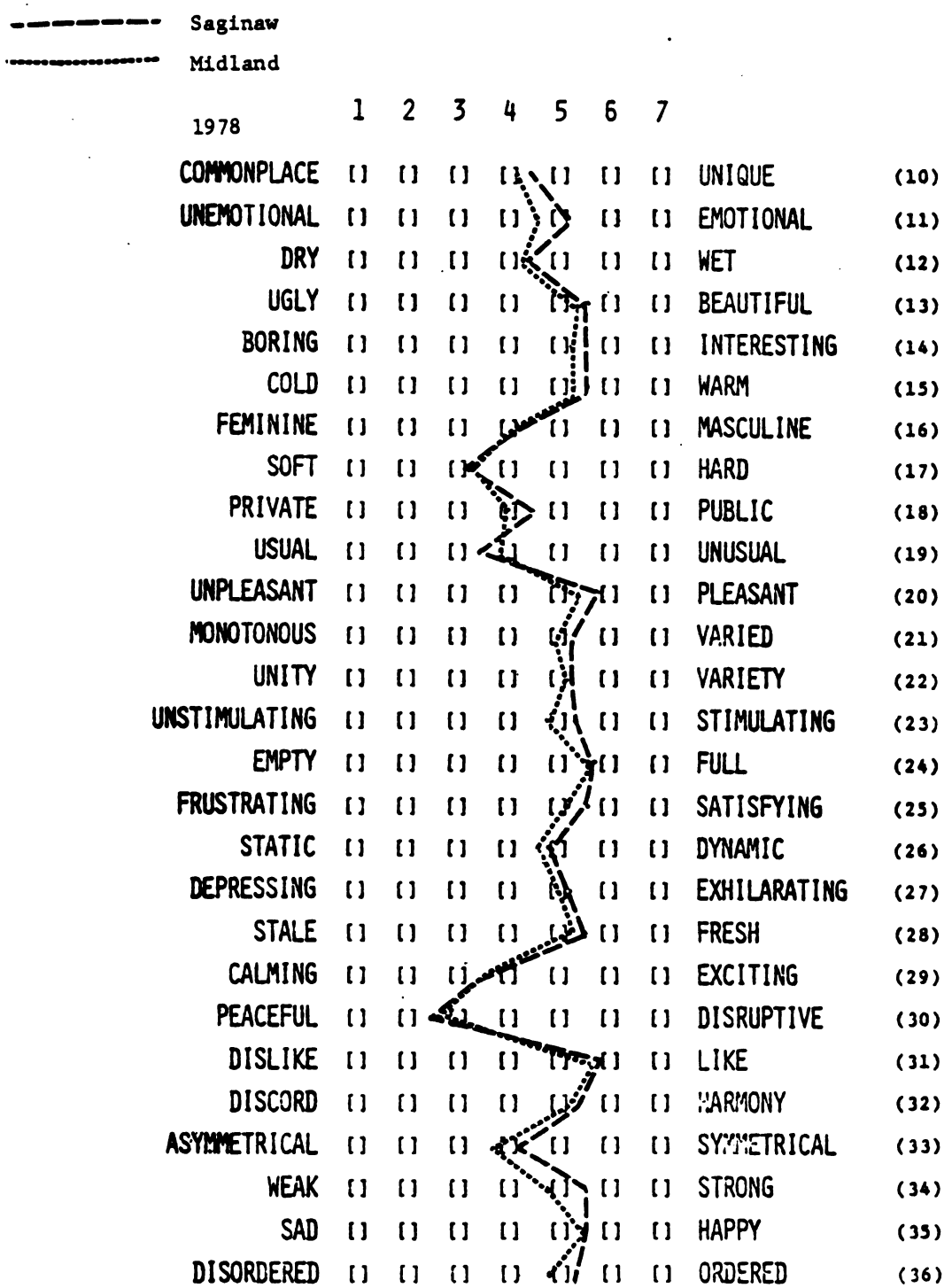

Figure 6. Semantic differential response to a street planted to trees

Figure 7. Scene of street planted to trees

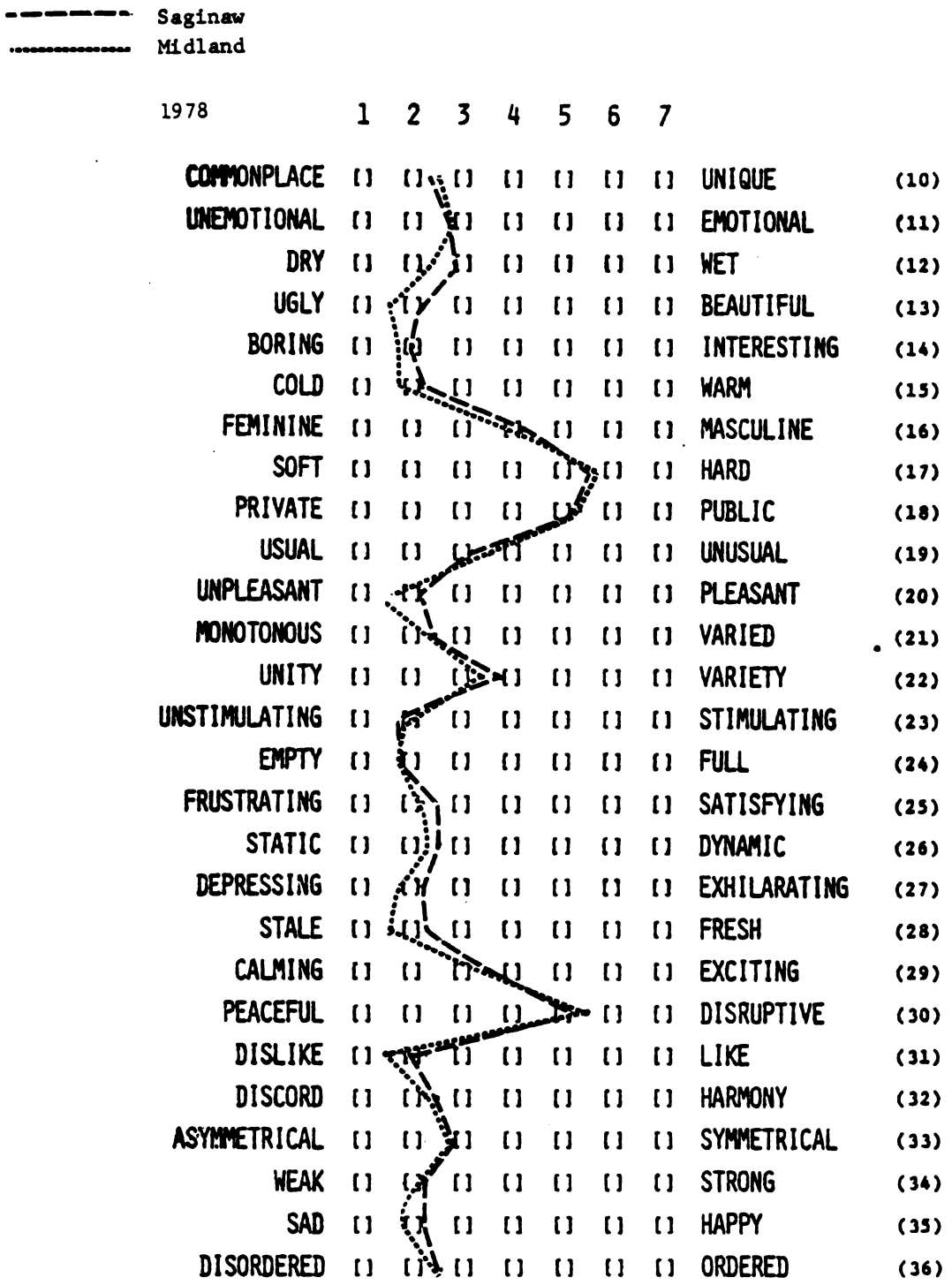

Figure 8. Semantic differential response to a street scene devoid of trees

Figure 9. Scene of street devoid of trees

APPENDIX 3

SUPPORTIVE MATERIAL FOR PHOTO SELECTION DISCUSSION

APPENDIX 3

SUPPORTIVE MATERIAL FOR PHOTO SELECTION DISCUSSION

Summer

Winter

Figure 10. Representative photographs of paired street scenes for two seasons

Table 4.

PHOTO SELECTION RATES BY PAIR IN RAW NUMBERS

TREE SIZE	PAIR NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
	L	45	68	62	75	76	72	52	43	76	54	45	64	70	70	SAGINAW
	S	60*	37	43	30	29	33	53*	62*	29	51	60*	41	35	35	
	L	76	86	80	85	89	92	78	60	85	68	80	90	94	92	MIDLAND
	S	24	14	20	15	11	8	22	40	15	32	20	10	6	8	
	L	26	35	29	39	40	38	30	17	32	31	28	38	39	41	E. LANSING
	S	19	10	16	6	5	7	15	28*	13	14	17	7	6	4	
	L	61	63	63	58	64	60	46	37	52	55	58	62	65	64	H. PARK
	S	10	8	8	13	7	11	25	34	19	16	13	9	6	7	
	L	11	15	14	20	17	14	15	12	14	15	12	13	18	16	WHEELING
	S	14*	10	11	5	8	11	10	13*	11	10	13*	12	7	9	
	L	219	267	248	277	286	276	221	169	259	223	223	267	286	283	FIVE CITY
	S	127	79	98	69	60	70	125	177	87	123	123	79	60	63	TOTAL
		SPRING			SUMMER			FALL				WINTER				

Script numerals indicate among the four least selected large tree scenes for a given city.

Asterisk indicates small tree scenes selected over 50% of the time in a given city.

L = Large tree scene S = Small tree scene

Table 5.

PHOTO SELECTION RESPONSE PATTERNS FOR INDIVIDUAL PAIRS GROUPED BY HOME HEIGHT

The three photo pairs where the homes in the small tree scenes are taller than the homes in corresponding large tree scenes.

Home Height[1]	Photo Selection Frequency									
	1-1½	75	1-1½	62	1½-2	68				
L										SAGINAW
	1½-2	30	2	43	2	37				
S										
	1-1½	85	1-1½	80	1½-2	86				
L										MIDLAND
	1½-2	15	2	20	2	14				
S										
	1-1½	39	1-1½	29	1½-2	35				
L										E. LANSING
	1½-2	6	2	16	2	10				
S										
	1-1½	58	1-1½	63	1½-2	63				
L										H. PARK
	1½-2	13	2	8	2	8				
S										
	1-1½	20	1-1½	14	1½-2	15				
L										WHEELING
	1½-2	5	2	11	2	10				
S										
	1-1½	277	1-1½	248	1½-2	267				
L										FIVE CITY TOTAL
	1½-2	69	2	98	2	79				
S										

[1]Home height described in stories and half-stories.

L = Large tree scene S = Small tree scene

Table 6.

PHOTO SELECTION RESPONSE PATTERNS FOR INDIVIDUAL PAIRS GROUPED BY HOME HEIGHT

The six photo pairs where the homes in the large tree scenes are taller than the homes in corresponding small tree scenes.

Home Height[1]	Photo Selection Frequency											
L	1½	45	2	72	2	52	2	45	2	64	2	70	SAGINAW
S	1	60	1	33	1	53	1	60	1	41	1	35	
L	1½	76	2	92	2	78	2	80	2	90	2	92	MIDLAND
S	1	27	1	8	1	22	1	20	1	10	1	8	
L	1½	26	2	38	2	30	2	28	2	38	2	41	E. LANSING
S	1	19	1	7	1	15	1	17	1	7	1	4	
L	1½	61	2	60	2	46	2	58	2	62	2	64	H. PARK
S	1	10	1	11	1	25	1	13	1	9	1	7	
L	1½	11	2	14	2	15	2	12	2	13	2	16	WHEELING
S	1	14	1	11	1	10	1	13	1	12	1	9	
L	1½	219	2	276	2	221	2	223	2	267	2	283	FIVE CITY TOTAL
S	1	127	1	70	1	125	1	123	1	79	1	63	

[1]Home height described in stories and half-stories.

L = Large tree scene S = Small tree scene

Table 7.

PHOTO SELECTION RESPONSE PATTERNS FOR INDIVIDUAL PAIRS GROUPED BY HOME HEIGHT

The four photo pairs where the homes in large and small tree scenes were of equivalent height.

Home Height[1]	Photo Selection Frequency									
	1	43	1	54	1	76	1½-2	70		
L										SAGINAW
	1	62	1	51	1	29	1½-2	35		
S										
	1	60	1	68	1	85	1½-2	94		
L										MIDLAND
	1	40	1	32	1	15	1½-2	6		
S										
	1	17	1	31	1	32	1½-2	39		
L										E. LANSING
	1	28	1	14	1	13	1½-2	6		
S										
	1	37	1	55	1	52	1½-2	65		
L										H. PARK
	1	34	1	16	1	19	1½-2	6		
S										
	1	12	1	15	1	14	1½-2	18		
L										WHEELING
	1	13	1	10	1	11	1½-2	7		
S										
	1	169	1	223	1	259	1½-2	286		
L										FIVE CITY TOTAL
	1	177	1	123	1	87	1½-2	60		
S										

[1]Home height described in stories and half-stories.

L = Large tree scene S = Small tree scene

Table 8.

PHOTO SELECTION RESPONSE PATTERNS FOR INDIVIDUAL PAIRS GROUPED BY HOME HEIGHT

The photo pair where homes were not visible in looking down the street.

Home Height[1]	Photo Selection Frequency						
L	76						SAGINAW
S	29						
L	85						MIDLAND
S	15						
L	32						E. LANSING
S	13						
L	52						H. PARK
S	19						
L	14						WHEELING
S	11						
L	259						FIVE CITY TOTAL
S	87						

[1]Home height described in stories and half-stories.

L = Large tree scene S = Small tree scene

APPENDIX 4

SUPPORTIVE MATERIAL FOR DISCUSSION OF DEMOGRAPHIC DATA

APPENDIX 4

SUPPORTIVE MATERIAL FOR DISCUSSION

OF DEMOGRAPHIC DATA

Table 9.

Comparison of Large Tree Photo Selection Rates by Sex

LARGE	SEX: male (1.)	female (2.)	keypunch error (5.)	ROW TOTAL
3.	17	19	0	36
	47.2	52.8	0	10.6
	10.4	10.8	0	
	5.0	5.6	0	
6.	9	18	0	27
	33.3	66.7	0	7.9
	5.5	10.2	0	
	2.6	5.3	0	
7.	7	6	0	13
	53.8	46.2	0	3.8
	4.3	3.4	0	
	2.1	1.8	0	
10.	22	35	1	53
	41.5	56.6	1.9	15.5
	13.4	17.8	100.0	
	6.5	8.8	.3	
14.	109	103	0	212
	51.4	48.6	0	62.2
	66.5	58.8	0	
	32.0	30.2	0	
COLUMN TOTAL	164	176	1	341
	48.1	51.6	.3	100.0

RAW CHI SQUARE = 9.61864 WITH 8 DEGREES OF FREEDOM, SIGNIFICANCE = .2928

NUMBER OF MISSING OBSERVATIONS = 5

Table 10.

Comparison of Large Tree Photo Selection Rates by Eduction Level

KEVIN KALMBACH 07/2
CROSSTABS D-SCORES VS R2
FILE TREE (CREATION DATE = 07/28/78) STUDY

* C R O S S T A B U L A T I O N O F *
LARGE BY EDUC
* *

	EDUC			
COUNT / ROW PCT / COL PCT / TOT PCT	keypunch error (0)	high school or less (1)	more than high school (2)	ROW TOTAL
LARGE 3.	0	17	19	36
	0	47.2	52.8	10.5
	0	19.3	7.5	
	0	5.0	5.6	
4.	0	15	12	27
	0	55.6	44.4	7.9
	0	17.0	4.7	
	0	4.4	3.5	
7.	0	1	12	13
	0	7.7	92.3	3.8
	0	1.1	4.7	
	0	.3	3.5	
10.	1	12	40	53
	1.9	22.6	75.5	15.5
	100.0	13.6	15.8	
	.3	3.5	11.7	
14.	0	43	170	213
	0	20.2	79.8	62.3
	0	48.9	67.2	
	0	12.6	49.7	
COLUMN TOTAL	1	88	253	342
	.3	25.7	74.0	100.0

No. of Large Trees selected

RAW CHI SQUARE = 32.58987 WITH 8 DEGREES OF FREEDOM, SIGNIFICANCE = .0001

NUMBER OF MISSING OBSERVATIONS = 4

Table 11.

Comparison of Large Tree Photo Selection Rates by Age Group

KEVIN KALMBACH 07/2

FILE TREE (CREATION DATE = 07/29/78) STUDY

* * * * * * * * * * * * * * * * * * * CROSSTABULATION OF * LARGE BY AGE *

COUNT / ROW PCT / COL PCT / TOT PCT	AGE 49 years and under (1.)	50 years and over (2.)	ROW TOTAL
3.	17	19	36
	47.2	52.8	10.5
	7.3	17.6	
	5.0	5.6	
4.	13	14	27
	48.1	51.9	7.9
	5.6	13.0	
	3.8	4.1	
7.	9	4	13
	69.2	30.8	3.8
	3.8	3.7	
	2.6	1.2	
10.	34	19	53
	64.2	35.8	15.5
	14.5	17.6	
	9.9	5.6	
14.	161	52	213
	75.6	24.4	62.3
	68.8	48.1	
	47.1	15.2	
COLUMN TOTAL	234	108	342
	68.4	31.6	100.0

RAW CHI SQUARE = 18.13655 WITH 4 DEGREES OF FREEDOM; SIGNIFICANCE = .0012

NUMBER OF MISSING OBSERVATIONS = 4

APPENDIX 5

SUPPORTIVE MATERIAL FOR STREET TREE PLANTING DENSITY DISCUSSION

APPENDIX 5

SUPPORTIVE MATERIAL FOR STREET TREE PLANTING DENSITY DISCUSSION

Table 12.

Comparison of Desired Planting Density and Current Planting Density

A2	ROW PCT / COL PCT / TOT PCT	Desire: same number (1.)	more trees (2.)	fewer trees (3.)	uncertain (4.)	ROW TOTAL
Now Have	1. no street trees	3 11.1 2.4 .9	22 81.5 10.9 6.4	1 3.7 14.3 .3	1 3.7 12.5 .3	27 7.9
	2. occasional street tree	1 2.6 .8 .3	35 92.1 17.4 10.2	0 0 0 0	2 5.3 25.0 .6	38 11.1
	3. trees in front of half the homes	15 16.0 11.8 4.4	75 79.8 37.3 21.9	3 3.2 42.9 .9	1 1.1 12.5 .3	94 27.4
	4. trees in front of each home	70 58.3 55.1 20.4	48 40.0 23.9 14.0	1 .8 14.3 .3	1 .8 12.5 .3	120 35.0
	5. more than one tree in front of each home	38 59.4 29.9 11.1	21 32.8 10.4 6.1	2 3.1 28.6 .6	3 4.7 37.5 .9	64 18.7
	COLUMN TOTAL	127 37.0	201 58.6	7 2.0	8 2.3	343 100.0

RAW CHI SQUARE = 90.81532 WITH 12 DEGREES OF FREEDOM, SIGNIFICANCE = .0000

NUMBER OF MISSING OBSERVATIONS = 3