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EVALUATION OF HYPOTHETICAL EARLY MARKET SEGMENTS' RESPONSE TO ELECTRIC VEHICLES:

RESULTS OF TEST DRIVE CLINICS AND FOCUS GROUPS

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by

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EXECUTIVE SUMMARY

Drive clinics and follow-up focus groups were held with members of two hypothetical early market segments for electric vehicles -- EV innovators and environmentalists. These two groups are often cited as likely initial buyers of new, original equipment manufacturer (OEM) EVs. As the first buyers, these people would be influential in setting the course of EV sales. These assumptions about early market segments raise several questions. First, can "innovator" and "green" market segments be identified prior to the existence of an EV market? Will these people actually be among the early buyers of OEM EVs? If the answers to both these questions are affirmative, then what attributes of EVs act as incentives or barriers to purchase? And, which attributes affect choices between particular EVs?

This study alone will not answer these questions, rather it serves as one in a series of studies at ITS-Davis which attempt to address these issues. But, assuming the participants in this study have been correctly identified as innovators and environmentalists, their responses to various vehicles and vehicle attributes do address the questions whether they will be the initial buyers of EVs and what incentives and barriers could most affect their purchase choices.

Little evidence is found to support the supposition that our samples of EV innovators or environmentalists are willing to pay a purchase price premium to be among the first buyers of OEM EVs. While innovators show greater faith in the potential of EVs to address air quality problems, the two groups otherwise show few differences in their general perceptions of EVs. For members of both groups, choices between a free EV and an EV for which respondents must pay were strongly affected by the offered prices. When forced to pay for the EV, nearly half the participants chose none of the vehicles. A third of all the participants chose a Geo Metro conversion rather than an OEM prototype.

The converted vehicle was considered attractive for two reasons. First, some innovators viewed the converted vehicle as one they would be willing to modify to their personal tastes. Second, within the relative purchase price structures offered to the participants, the conversion was the least expensive freeway-capable vehicle. Freeway capability was a distinguishing feature between groups of EVs and both market segments showed a strong preference for freeway capable vehicles.

Among those who indicated a willingness to buy one of the vehicles, tradeoffs between top speed and driving range and specific vehicle styling issues drove choices between vehicles.

Among the styling issues, passenger and load carrying capacity, driver comfort, sound levels, and body style preferences influenced choices of specific vehicles.

The "green" market segment is virtually indistinguishable from the innovator segment on a broad spectrum of measures -- EV perceptions, socio-demographic characteristics and environmental activism. This adds to a growing body of evidence that environmental issues do not identify a specific group of people, but cut across many groups. Based on this conclusion, a research agenda based on identifying new strategies of market segmentation to identify early markets for OEM electric vehicles appears appropriate. Segmentation according to percieved vehicle use environments is suggested.

STUDY DESCRIPTION

This is a study of the perceptions and reactions of hypothetical early market segments to a variety of EVs. EV hobbyists and environmentalists are frequently discussed as likely early buyers of EVs. In the first case, EV hobbyists are assumed to be knowledgeable regarding EV technology, the performance characteristics of the vehicles, and to be habituated to the shorter range and long recharge time of EVs. This familiarity is hypothesized to translate into a greater willingness to buy OEM EVs. Environmentalists are assumed to be extremely motivated by the potential for clean air -- so motivated they will be willing to pay some premium price to be among the early buyers of EVs.

In order to test these suppositions members of the Sacramento chapter of the Electric Automobile Association (EAA) and recruits at the Davis Whole Earth Festival (WEF) were given the opportunity to see, ride, and drive a variety of EVs. While at the drive clinic, participants completed a pre-survey, and were then conducted through a tour of the vehicles by an interviewer who recorded their responses to the vehicles. Participants then filled out a post-test drive questionnaire and scheduled a time to return for a focus group. In the focus groups, participants were guided through a series of questions on how each of the types of vehicles they had seen at the drive clinic would fit into their lives. This discussion focused on vehicle attributes and the specific travel behavior of the participants. The group then discussed in a more general way the advantages and disadvantages of EVs. Lastly, vehicle purchase intentions were explored in the context of the information base built up through the drive clinic and the group discussions. A total of 26 people completed the entire process.

Vehicles

EAA members reviewed the following vehicles:

City-El;
Kewet;
Solectria Geo Metro conversion;
Horlacher City and Sport;
Esoro.

WEF recruits reviewed these same vehicles with the exception of the Kewet.

These vehicles represent a broad spectrum of performance and body styles. The City-El represents the lowest performance level on several scales: it seats only one person, has a top speed of 30 to 35 miles per hour, a driving range of 20 to 30 miles and a total payload capacity

which was exceeded by a few of the test drivers without any other cargo. The Kewet offers two seats, a more traditional, upright driving position, a top speed of 40 miles per hour and a driving range of 40 miles. The remaining vehicles are all freeway capable, with top speeds in the range of 65 to 75 mph and driving ranges of 60 to 80 miles. All the freeway capable vehicles seat at least two people. Only the Esoro offers 2+2 seating. All six vehicles can charge from a standard 110 volt outlet.

Participants

EV Innovators

EV innovators were drawn from the membership of the Sacramento chapter of the EAA. EAA members were informed at their meeting on 22 May 1993 that they would be afforded the opportunity after the meeting to ride and drive several EVs. They simply had to be willing to spend the time that afternoon to attend the clinic and attend a focus group on the evening of 25 May. 20 EAA members stayed for the drive clinic and 17 of these attended the focus groups.

The sample of EAA members included four persons who now own EVs they had converted or built themselves. All the other EAA members had joined within the past 18 months. These newer members had joined the EAA to inform themselves about EVs. Some had joined because they wished to convert a vehicle themselves, but most had joined simply to learn more about EV technology and characteristics in hopes of making more informed choices about a future EV purchase.

Green Market

A City-El mini-electric vehicle was put on display at the 1993 Whole Earth Festival (WEF) held May 7-9 on the University of California, Davis campus. ITS-Davis staff collected names and addresses of persons interested in driving the vehicle and other examples of small EVs. The recruits filled out a brief questionnaire which provided some background information and elicited responses to questions which were designed to identify those persons who are both most concerned with air quality problems and active in environmental organizations.

The "green market" segment is assumed to be made up of those people who strongly agreed or agreed that air quality is an important problem in their communities and that reducing petroleum consumption will benefit the environment and that actions taken by individuals can affect air quality and who had donated their time or money to an environmental

organization in the past year. Of a total of 89 WEF recruits, 17 were selected for the "green market" drive clinic and 11 of these actually participated.

Drive Clinics

The test drives were conducted on a three-tenths mile course on the local streets at the SMUD headquarters in Sacramento for EAA members and on a half mile course on the UCD campus for the WEF recruits. Each participant drove the City-El. EAA members drove the Solectria or the Kewet. WEF recruits drove the Solectria. All participants chose one of the two Horlacher vehicles or the Esoro which they wished to ride in. Vehicles in which participants rode or drove were given static and riding/driving evaluations. All vehicles in both clinics were given static evaluations by each participant. The static evaluations included styling, entry/egress, comfort, exterior visibility, and instrumentation. The riding/driving evaluations included acceleration, braking, sound, steering, stability and safety perceptions.

The question whether the members of these two groups would ever buy an EV, much less be among the first buyers, must be asked in an information context which provides the participants the opportunity to reflect on and confront vehicle attributes with which they are largely unfamiliar, in particular driving range, recharging regimes and the alternative of buying a small, non-freeway capable vehicle. The four EAA members who now drive their own EVs are well informed regarding most of these attributes. Despite their interest in EVs, the remaining EAA members do not have direct experience by which to judge the affect of say, limited range, on their ability to access desired activities. Thus they may not have the requisite information to assess their vehicle purchase intention. The WEF recruits are even further removed from this information context. The drive clinics, questionnaires and focus groups are explicitly designed to: allow for the limited testing of a variety of vehicles and elicit initial impressions; allow a few days for reflection upon this experience; and engage participants in discussion of the vehicles within a social setting. In this way the information context is enriched by each persons experience and the experience of the other people in the focus group. Only at the end of this process are people asked to discuss their purchase intention.

ARE EAA MEMBERS AND WEF RECRUITS LIKELY TO BE EARLY BUYERS OF EVs?

The end result is this: there is little evidence to suggest either EAA members or the WEF recruits are willing to pay a premium price to be among the first owners of new OEM electric vehicles. There is a great deal of enthusiasm for OEM EVs, especially among the newer EAA

members. But all participants expressed purchase intentions which were sensitive to purchase price and the ability of the various vehicles to provide adequate transportation services. Table 1 shows the transitions for each focus group participant from their first choice of a "free" EV to their second, to their EV choice at prices given by the focus group moderator. The absolute price levels were intentionally varied from group to group to observe the types of trade-offs made. In each group the rank order of prices was maintained -- from least to most expensive (City-El, Kewet, Solectria conversion, Horlacher City, Horlacher Sport and Esoro (tie)).

Table 1: Transition Table of EV Choices

Sample	First Choice of a Free EV	Second Choice of a Free EV	EV Choice to Purchase at Specified Prices
EAA	Esoro	Solectria	Esoro
EAA	Esoro	Solectria	Solectria
EAA	Esoro	Sport	**none**
EAA	Esoro	Sport	Solectria
EAA	Solectria	Esoro	City
EAA	Solectria		**none**
EAA	Solectria	City	Solectria
EAA	Kewet		Kewet
EAA	Esoro	Solectria	Solectria
EAA	Esoro	Sport	City
EAA	Esoro	Sport	**none**
EAA	Esoro	Sport	**none**
EAA	Esoro	Solectria	**none**
EAA	Esoro	City	City-El
EAA	Esoro	Solectria	Solectria
EAA	Esoro	Sport	Solectria
EAA	Sport	Esoro	**none**
WEF	Esoro	Sport	**none**
WEF	Esoro	Solectria	Solectria
WEF	Sport		**none**
WEF	Esoro	City	Esoro
WEF	Esoro	Sport	**none**
WEF	Esoro	Sport	Esoro
WEF	Esoro		**none**
WEF	Esoro	City	Solectria
WEF	Solectria	Sport	**none**

Eleven of the twenty-six people who completed the focus groups chose not to buy any of the EVs. Some of these expressed a desire to do their own conversions. Seven other participants also chose to buy the Solectria conversion, one person chose to buy a City-El, and one a Kewet. The Solectria conversion was the least expensive freeway capable vehicle. It should be noted that the prices used in the focus group were on the order of one-half the current price of that conversion. Only five people opted to buy the other EV prototypes at the prices offered. If there is any good news in this, it is that the five "buyers" of the Esoro or Horlacher City expressed a willingness to pay prices for these vehicles on par with existing small, two seat gasoline cars -- that is, they did not appear to need to be compensated for range and speed limitations.

The choices of EAA members reflect their current EV ownership status. Three of the four members who now own EVs chose to do their own conversionrather than purchase an OEM EV. No price was specified as this choice was volunteered by these participants. The fourth current EV owner chose to "buy" an EV that was more expensive than his first choice of a "free" vehicle. This person had initially chosen the Solectria conversion because it was a vehicle he felt free to work on and modify. Two other EAA members who chose to buy the Solectria expressed this same desire and interest to modify the vehicle. The Horlacher and Esoro vehicles were viewed as finished products, less amenable to modification.

More than half the WEF recruits rejected the purchase of any of the EVs they reviewed at the drive clinic. None of them were interested in non-freeway capable vehicles. As residents of Davis, a primary reason to drive any car was to travel out-of-town. Bicycling and walking suffices for much of their in-town travel and adding another vehicle such as the City-El and Kewet for local travel is not viewed favorably. The rejection of the freeway capable vehicles was linked to vehicle price, current vehicle ownership patterns and the perception there exist better options than EVs to address air quality. More of the WEF recruits live in one car households or in households of unrelated adults who each own their own vehicles. Thus ownership of an EV entailed adding cars to the household fleet, not replacing an existing car. Since, buying any other car was viewed as unlikely, buying an EV was also viewed as unlikely.

Thus, as a group, the participants do not appear to belong to market segments which are so strongly motivated to be among the first owners of OEM EVs that they are willing to pay a premium price over that of gasoline vehicles. An examination of each sample both separately and in contrast to each other provides some explanations for this.

CHARACTERISTICS OF THE INNOVATOR AND ENVIRONMENTALIST SAMPLES

Electric Vehicle Perceptions

Specific product innovators are usually identified after the fact. Retrospective histories of sales of new products distinguish the earliest buyers, who by definition are the innovators, from later buyers. These early buyers may be motivated by a particular knowledge of, or interest in, the new product. Socio-economic and attitudinal measures may be used to differentiate earlier from later buyers. Lastly, the information sources used by earliest buyers are likely to be different from those used by later buyers.

These differences are expected to also appear between different early market segments. If EAA members do possess "special" or "advanced" knowledge regarding EVs, we expect them to hold different perceptions of EVs than do the WEF recruits. This should be especially true since some EAA members had seen and driven some of the EVs in the drive clinic on previous occasions.

Both groups were asked to compare their perception of EVs to the gasoline cars and trucks they now drive on scales which measured perceptions of: size, speed, safety, pollution, convenience, cost to run, cost to buy, practicality, style and contemporariness (Figures A1 to A20). The only difference in group mean values occurs on the perception of the cost to run EVs as compared to conventional gasoline vehicles. Both groups believe EVs are cheaper to run, but EAA members believe EVs are much cheaper to run (Figure A6). On average members of both groups believe EVs are: smaller, slower, and much less polluting; as safe, convenient, and practical; and somewhat more expensive to buy, more stylish and more futuristic than the gasoline vehicles they are now driving. A visual inspection of the distributions reveals no other apparent differences between the groups. Despite their additional exposure to EVs and information regarding EVs, EAA members hold very similar general perceptions as do the WEF recruits.

When asked about the impact of EVs on air quality, a few subtle differences emerge between the groups. In regards to the preparedness of EVs to replace gasoline fueled vehicles, EAA members on average are more likely to disagree with the statement "EVs are <u>not</u> yet practical to replace gasoline fueled vehicles" than are WEF recruits. 13 of 20 of EAA members disagreed or strongly disagreed with this statement, while only 3 of 11 WEF recruits disagreed or strongly disagreed (Figures A21-A22). When asked to agree or disagree with the statement "EVs are the key to solving air pollution in the Davis-Sacramento area", no EAA member and only one WEF recruit disagreed with this statement. However among those who agreed, a greater percentage of EAA members strongly agreed than did WEF recruits, so that the average level of

agreement that EVs are the key to solving air quality problems was significantly higher among EAA members.

Immediately following their test drives both groups were asked again to agree or disagree whether EVs are not yet practical to replace gasoline vehicles. The change in responses before and after the drive clinic measure the impact of the drive clinic experience on this important building block of purchase intention. On average, WEF members opinions of EVs were improved by the drive clinic. They showed a statistically significant shift toward disagreement with the statement, while EAA members on average showed no change (Figure A23). The actual distributions (Figure A24) reveal that half the WEF recruits remained unchanged in their assessment of the practicality of EVs, but the other half shifted 1, 2 or 3 points on the 5-point scale of agreement. Among EAA members, half showed no change. Among the other half, some indicated the drive clinic led them to believe EVs were more practical than previously, but some EAA members came away from the drive clinic with worse assessments of the practicality of EVs replacing gasoline vehicles.

Information Sources

Simply by their membership in the EAA, the innovators sample is expected to use different information sources regarding EVs than the WEF recruits. The distribution of information sources in Figure A25 shows this is true. "Electric vehicle clubs" were listed as a primary information source by 18 of the 20 EAA members; only one WEF recruit mentioned electric vehicle clubs. SMUD's involvement with the Sacramento chapter of the EAA likely explains the high number of EAA members who listed their electric utility as an important information source. Again, only a few WEF recruits cited their electric utility. Among the WEF recruits the most important sources were television news and specials, newspapers and environmental organizations.

Given the differences in information sources, the similarity in pre-test drive electric vehicle perceptions of the two groups is all the more remarkable. The more generalized sources of information -- television, newspapers and other mass media -- appear to be portraying EVs in a manner which is not inconsistent with the more specific information available to EAA members through the Association.

Personal and Household Characteristics

The two samples show few differences on personal and household characteristics. All but one EAA member described themselves as particularly handy in a way which makes them more adaptable to owning and using EVs (Figure A26). WEF recruits were also more likely than not to describe themselves as handy. There is no substantive difference in the average number of vehicles per driver in the households, but only in the EAA households is the number of vehicles per driver ever greater than 1 (Figure A27). Despite this and the fact noted above that the WEF sample contains a higher number of households of unrelated adults, WEF households are only slightly less likely to engage in vehicle swapping than are EAA households (Figure A28). Vehicle swapping is an important adaptive behavior identified in other studies at ITS-Davis. Household incomes are similar and the median and modal income group is $25,000 to $40,000 (Figures A29, A30). The environmentalists who participated in the drive clinic were all Davis residents with one exception. As a group they were younger than the EAA group.

The two groups do show differences in employment and residential tenure. Whereas 75 percent of the EAA sample was employed either in or out of their home, 60 percent of the WEF sample were students (Figure A31). EAA members have lived in their current residence for an average of 8.6 years, but this average is inflated by two households whose tenure is 31 and 40 years. The student population in the WEF group is largely responsible for the shorter residential tenure of 4.4 years. The length of time these groups have lived in the Sacramento-Davis areas is even more disparate. EAA members average 20.7 years in the area and WEF recruits, 5.1 years (Figure A32). But generally, members of both groups plan on remaining in the area (Figure A33).

Identifying A Green Market

An initial premise of this study was that a specific group of environmentalists could be identified and that these people are likely first buyers of EVs. The WEF sample is intended to be this green market segment. Given the difficulty of identifying green markets in other studies, the issue of how the WEF sample differs from the EAA sample warrants some attention.

In fact, based on the attitudes and perceptions used to identify the WEF recruits as environmentalists, there is little difference between the two samples. Nearly identical proportions of both samples identify themselves as belonging to, or working for, environmental groups (Figures A34, A35). More than 75% of both groups agree or strongly agree that air quality is an important problem in their community (Figure A36). 90% of each group agrees or strongly agrees that reducing petroleum consumption will benefit the environment (Figure A37). Both groups believe motor vehicles are a significant source of air pollution (Figure

A38). More than 80% agree or strongly agree that they buy environmentally "friendly" products whenever possible (Figure A39). Lastly, every person in both groups agrees or strongly agrees that actions taken by individuals can affect air quality (Figure A40).

In short, these two samples are virtually indistinguishable on these measures of environmentalism. Note that support for a new gas tax to improve air quality does not identify an environmentalist, nor does the distribution of support for a new gas tax distinguish the EAA group from the WEF group -- 60% of both groups do support such a gas tax. The other 40 percent of EAA members do not support such a tax and the other 40 percent of WEF recruits either do not support such a tax or are indifferent (Figure A41).

ATTRIBUTES DRIVING SPECIFIC VEHICLE CHOICES

The attributes which determine choices between vehicles are of two basic types -- those that determine a class of vehicles and those that determine a choice within a given class. The most important attributes which define classes of vehicles are speed, range and load carrying capacity. The City-El and Kewet are distinguished from other vehicles primarily by their exclusion from freeways and highways because of their lower top speeds. Freeway travel also opens up new, more distant, destinations which also serves to limit the perceived usefulness of these two, shorter range, vehicles. Lastly, the City-El in particular is viewed as far too limited in its passenger and load carrying capacity. The social aspect of travel with another person, regardless of how infrequently this actually occurs, and the limited load carrying capability of this vehicle made it all but unusable to all but one of the participants.

The four freeway capable vehicles -- the Solectria Metro conversion, Horlacher City and Sport, and Esoro -- are chosen by half the respondents as the vehicles they would buy at prices offered at the end of each focus group. These vehicles meet (in some cases minimal) expectations of a vehicle this person would be willing to buy. Even within this class, some respondents choices were driven by which of the vehicles offered the highest top speed or greatest driving range. More generally though, once the participants had determined they could use a vehicle of the minimum speed (60mph) and range (50 miles) capabilities of these vehicles, their choice between vehicles was determined by driver comfort, exterior and interior styling, color -- in short, those attributes by which they already choose cars.

Purchase price primarily affected the choice whether to "buy" any of the EVs. Choices between the freeway capable vehicles were typically based on the driving range and styling

features of the vehicles and the attitudes toward, and experience with, vehicle conversions of the respondent. 7 of the 19 people who chose the Esoro as their first choice of a free EV switched to the Solectria when asked to express a purchase choice, and 7 more of those 19 chose none of the vehicles.

Overall lifestyle choices determine consumers' vehicle type choices -- sports car, minivan, family sedan, or perhaps EV. Once this choice has been made, individual vehicle features, brand loyalty, dealer reputation and brand experience drive choices of a specific vehicle of the general vehicle type. Approximately half the participants in the study saw, rode and drove an electric vehicle which appears to satisfy their lifestyle criteria for the choice of a type of car. The choice of vehicles based on lifestyle considerations was expressed repeatedly in the focus groups. Several participants expressed their choice of vehicles would be the Horlacher Sport, if they were single. But the presence of spouses and children influenced choices toward the Esoro, with its 2+2 seating or the desire for a modified Solectria with a back seat.

CONCLUSIONS

This study asks, and attempts to answer, three questions. First, can we identify members of early market segments for electric vehicles prior to the existence of markets for vehicles? Second, if we can identify those people, do they express positive purchase intentions when presented with the opportunity to ride and drive a variety of electric vehicles? And third, what attributes of the vehicles determine choices between the vehicles?

The first question is of fundamental importance because most studies of new products are based on retrospective histories -- this study differs in that it examines two hypothetical market segments for a product not yet widely available. The only definitive answer to the question is that as the terms "innovator" and "early adopter" are used in the diffusion of innovation literature, they cannot be identified a priori because the very definition depends on comparisons of persons in these groups to later buyers of the product. This circular reasoning highlights the importance of the type of market analysis performed in this study. Hypothetical groups must be identified, their responses to electric vehicles assessed, and adjustments made to either or both our hypotheses or the product.

It should be noted that the group of "environmentalists" cannot be distinguished from the "EV innovators" on several attributes, most notably those characteristics which were to have identified them as environmentalists. This fact indicates that concern with air quality and the desire to do something about it has become a part of the more general social fabric of Sacramento

and Davis. We may no longer be able to differentiate consumers based on this definition of "environmentalist". The search for early buyers of electric vehicles will have to find new ways to segment the market.

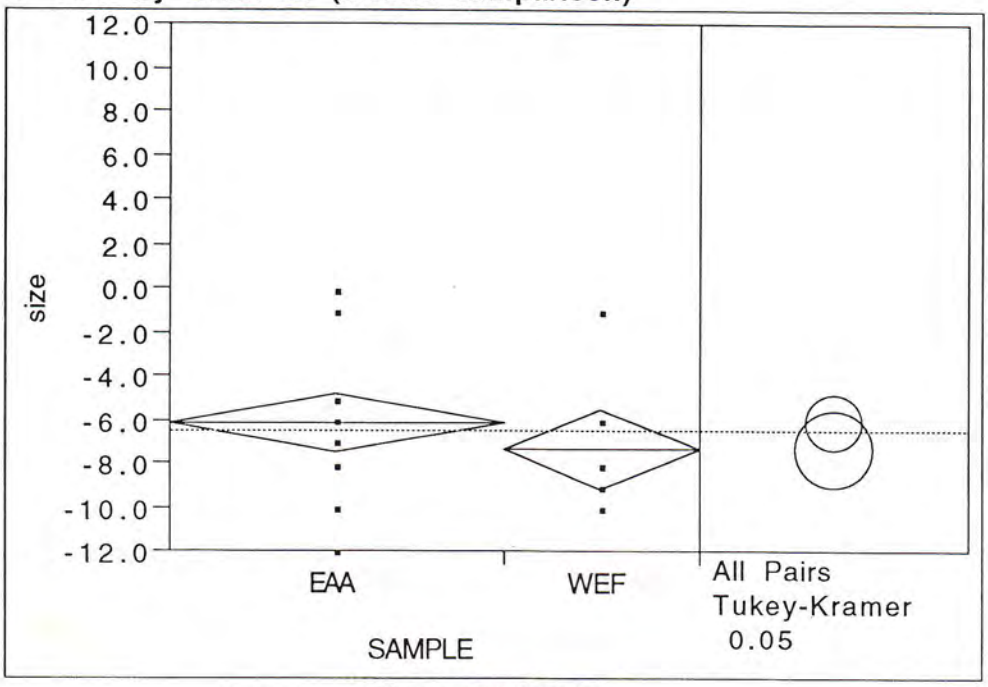
The answer to the second question is yes, and no. Based on their responses to the vehicles and accepting that each respondent has been correctly identified as an EV innovator or an environmentalist, the participants in this study are ambivalent with respect to choices of electric vehicles they rode and drove. Yes, there are some positive purchase intentions expressed. 15 of the 26 participants chose one of the vehicles they had tested in a hypothetical purchase decision. Three facts counter this positive response. First, 11 participants chose none of the vehicles. Second, 8 of the 15 who did choose a vehicle, chose the Solectria conversion. Third, the prices at which the prototype OEM vehicles were chosen represented the optimistic assumption that the prototypes would be priced similarly to gasoline vehicles of similar body styles (eg. Honda del Sol, Mazda MX3).

With regard to the last question, the vehicle attributes which determined choices were price, top speed, driving range, and styling. Price determined both whether any EV was considered and choices between vehicles. Top speed and driving range separated the smaller, slower City-El and Kewet from the freeway capable Solectria, Esoro and Horlachers. The two participants who identified that the non-freeway capable vehicles could access a large number of their activities chose these limited performance, limited range, low price vehicles. Within the group of freeway capable vehicles, respondents choices tended to maximize either top speed or driving range, and then to select for specific styling features.

Appendix A

This appendix contains statistical comparisons of the EAA and WEF samples. In most cases, comparisons of sample means and distributions are provided. Whether any of the differences are significant in either a statistical or substantive sense is discussed in the text of the report. In all distribution histograms, the EAA sample is shown by the darkest shading, the WEF sample by the lighter shading. Test statistics are shown only in those cases where the conditions for their statistical validity are met. For example, chi-square tests of independence are shown only for those tables in which the small sample size does not render the statistic unreliable.

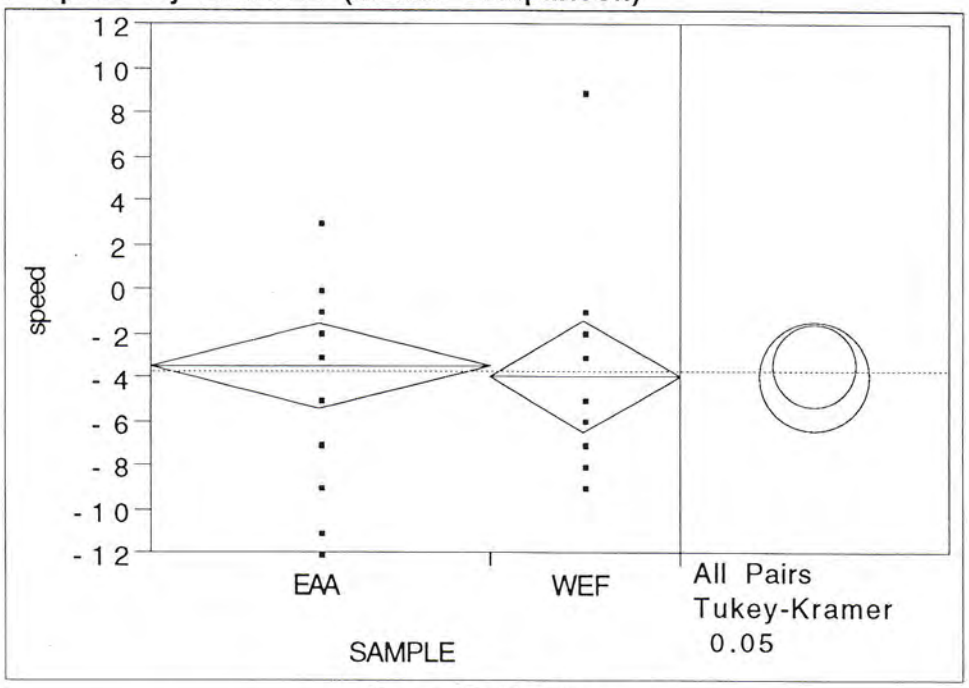
Figure A1: size By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	19	-6.05263	0.70377
WEF	11	-7.36364	0.92493

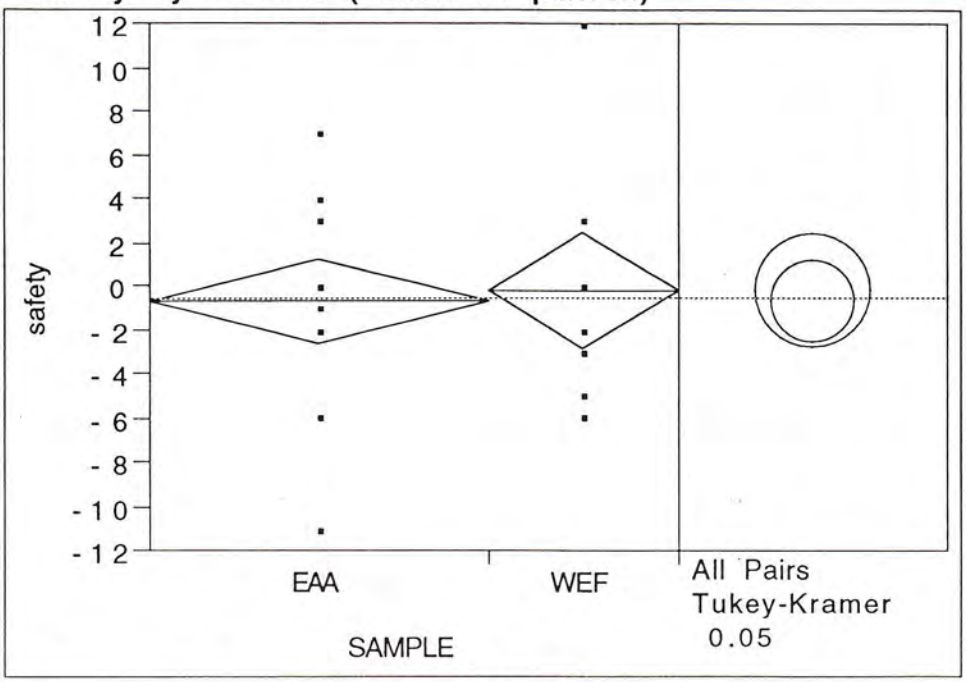
Figure A2: speed By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	20	-3.50000	0.9586
WEF	11	-4.00000	1.2926

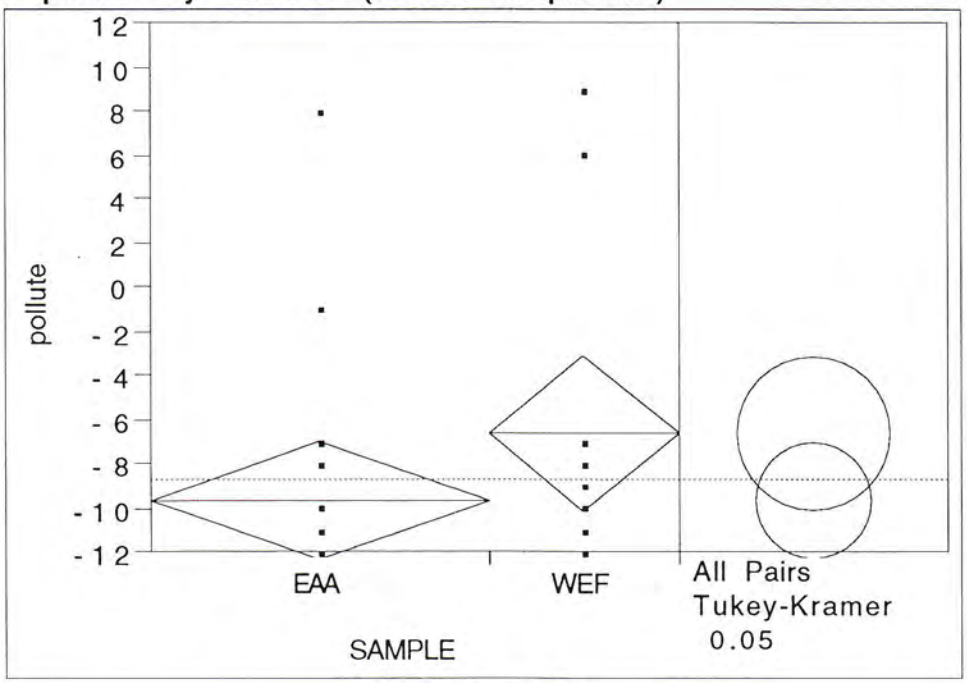
Figure A3: safety By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	20	-0.75	1.0034
WEF	11	-0.27273	1.3530

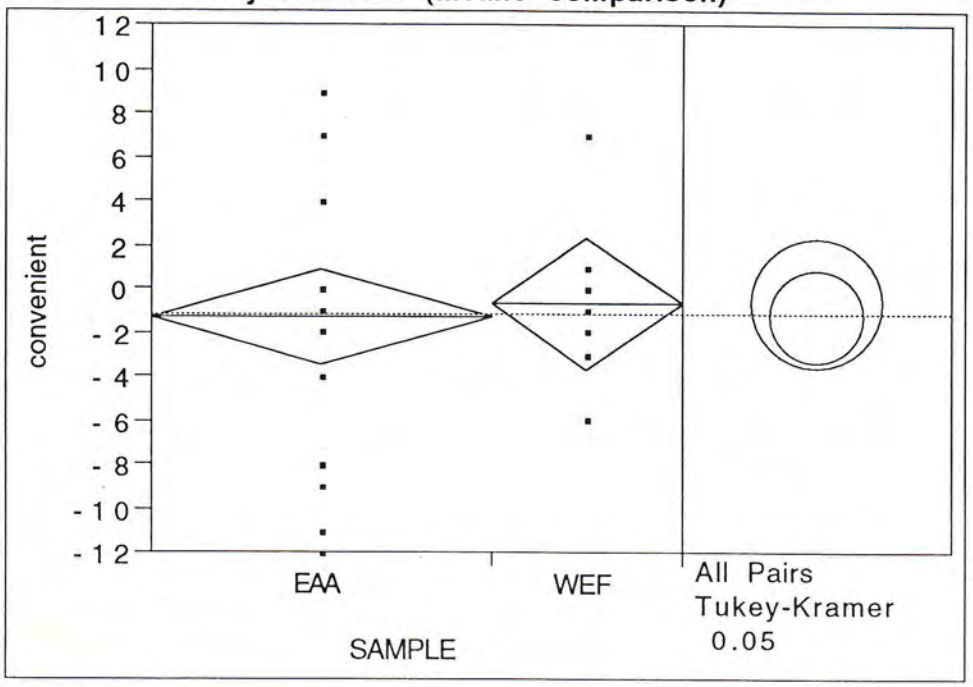
Figure A4: pollute By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	20	-9.70000	1.3094
WEF	11	-6.72727	1.7656

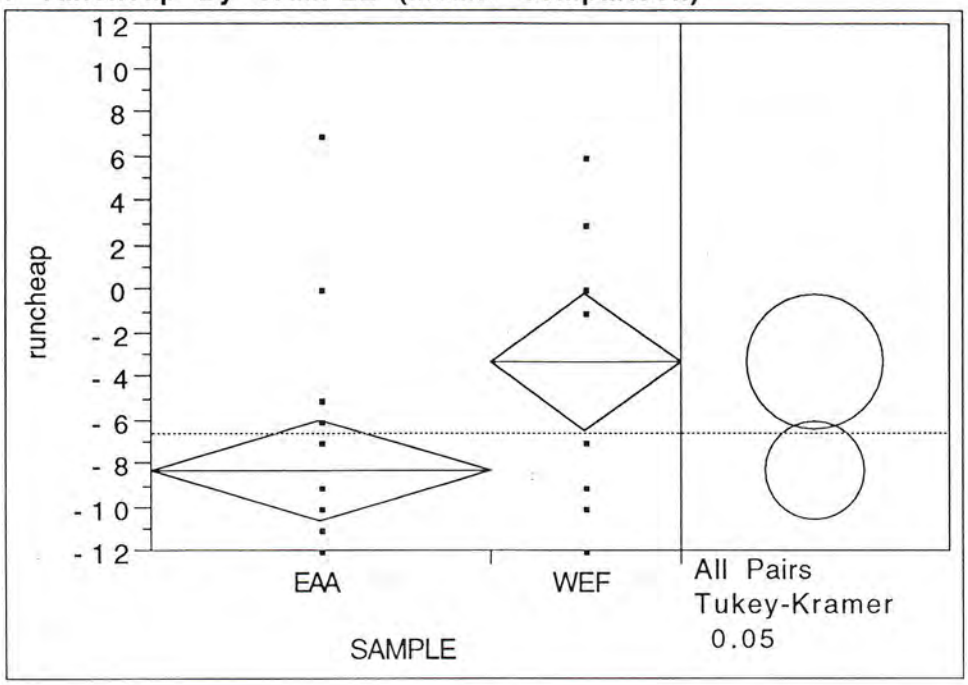
Figure A5: convenient By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	20	-1.35000	1.1054
WEF	11	-0.72727	1.4905

Figure A6: runcheap By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	20	-8.30000	1.1587
WEF	11	-3.36364	1.5624

t-Test	DF	Prob>|t|
2.53769179	29	0.0168

Means Comparisons

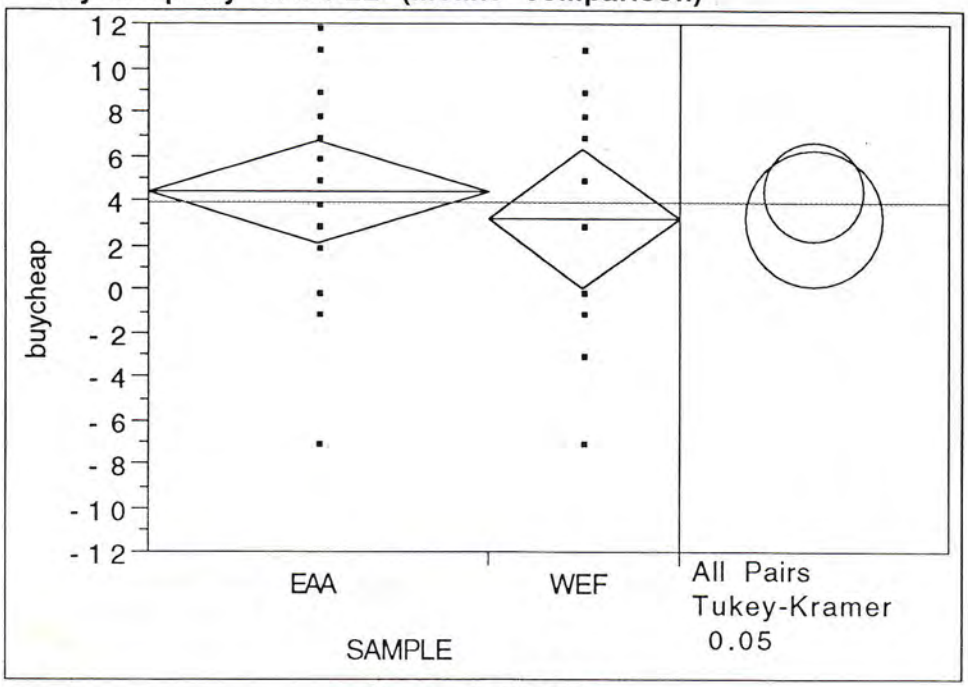
Comparisons for all pairs using Tukey-Kramer HSD q* 2.04524

Abs(Dif)-LSD

	WEF	EAA
WEF	-4.51920	0.95793
EAA	0.95793	-3.35153

Positive values show pairs of means that are significantly different.

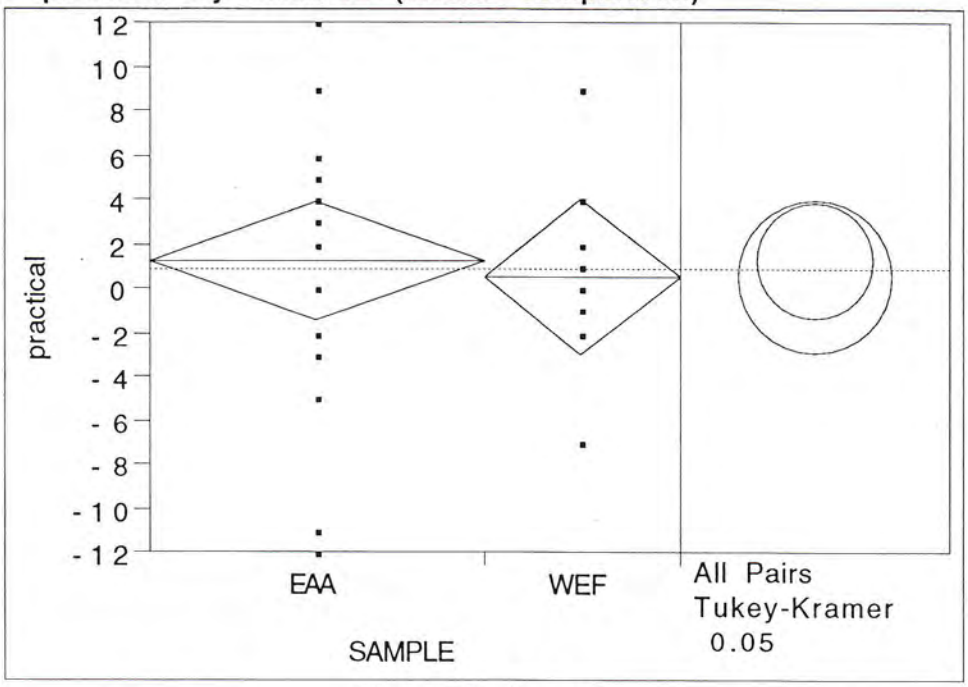
Figure A7: buycheap By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	20	4.40000	1.1570
WEF	11	3.18182	1.5601

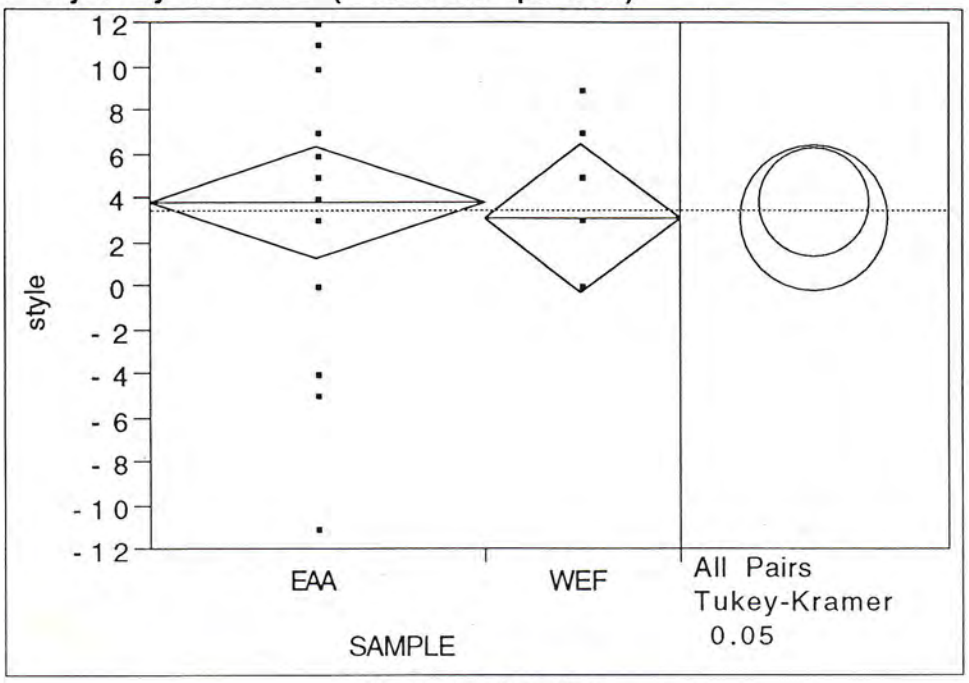
Figure A8: practical By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	19	1.26316	1.3422
WEF	11	0.45455	1.7640

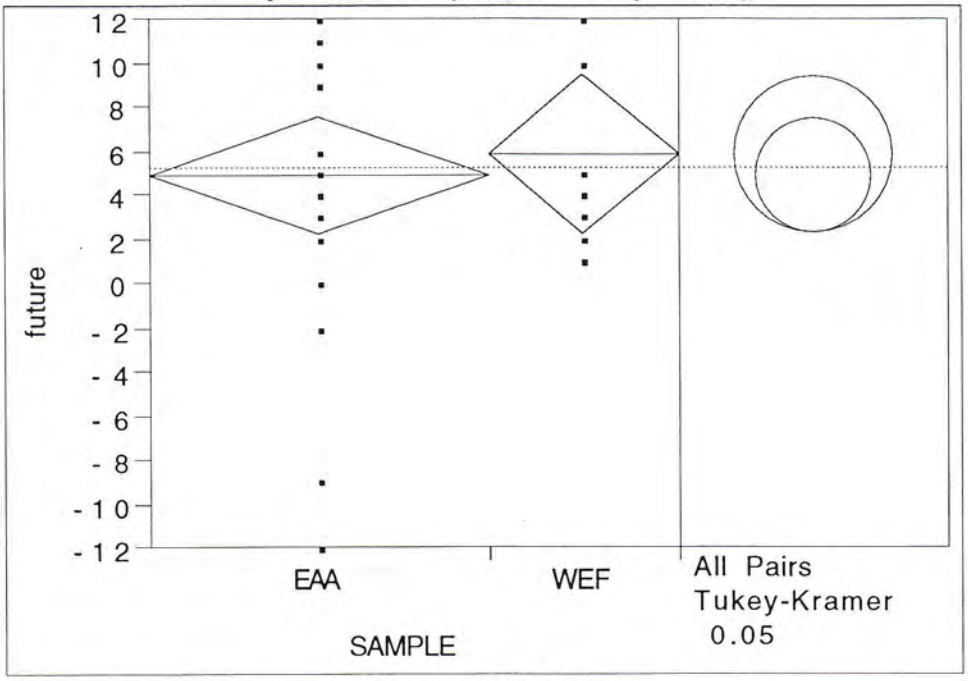
Figure A9: style By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	19	3.73684	1.2800
WEF	11	3.00000	1.6823

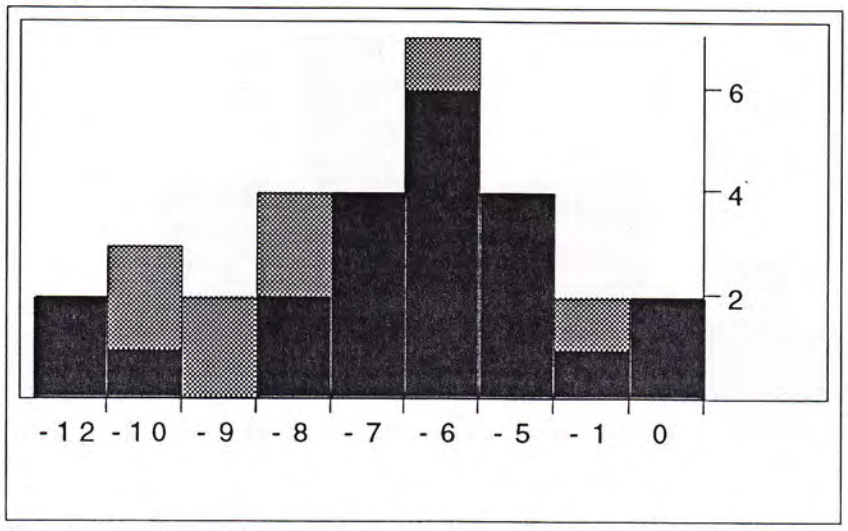
Figure A10: future By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	20	4.90000	1.3515
WEF	11	5.81818	1.8224

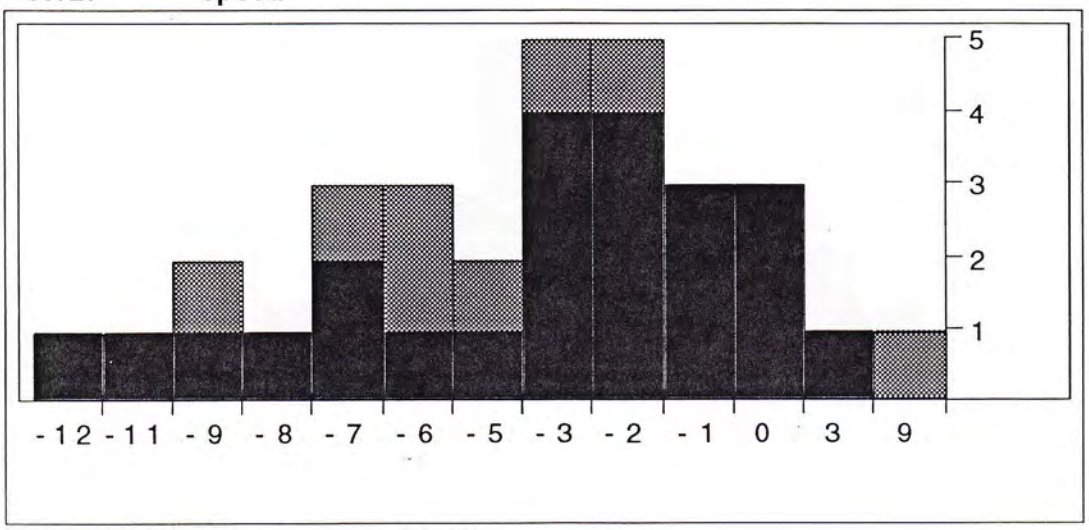
Figure A11: size



Note: The variables whose distributions are shown in Figures A11 through A20 were measured on 25 point scales, -12 to 12.

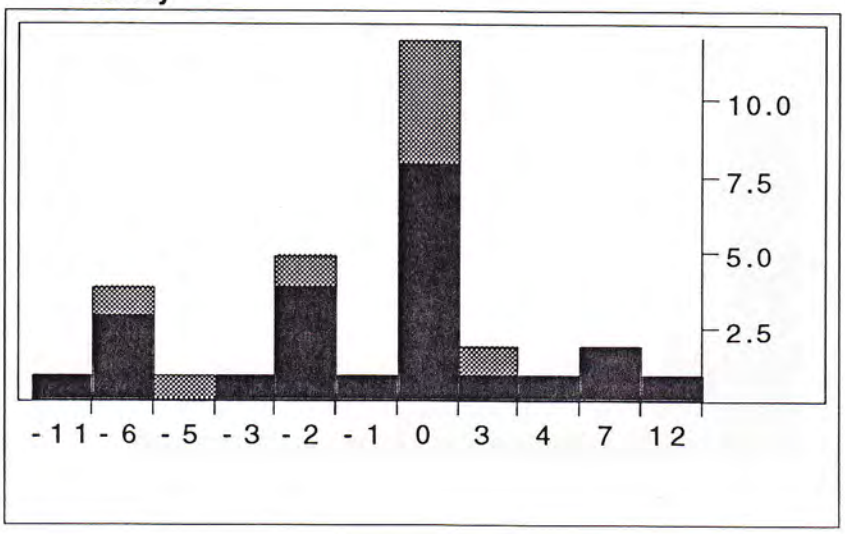
Level	Count
-12 (smaller)	2
-10	3
-9	2
-8	4
-7	4
-6	7
-5	4
-1	2
0 (no difference)	2

Figure A12: speed



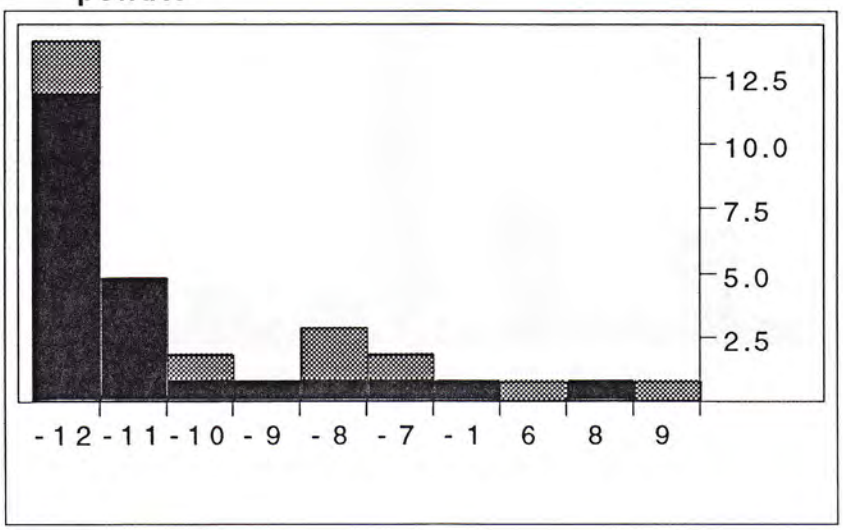
Level	Count
-12 (slower)	1
-11	1
-9	2
-8	1
-7	3
-6	3
-5	2
-3	5
-2	5
-1	3
0	3
3	1
9 (faster)	1

Figure A13: safety



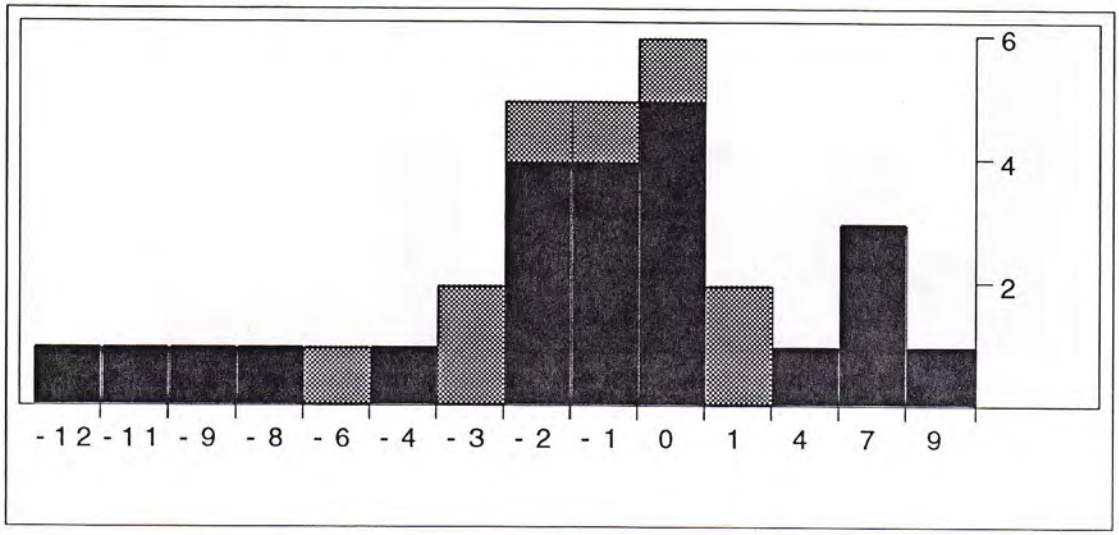
Level	Count
-11 (less safe)	1
- 6	4
- 5	1
- 3	1
- 2	5
- 1	1
0	12
3	2
4	1
7	2
12 (safer)	1

Figure A14: pollute



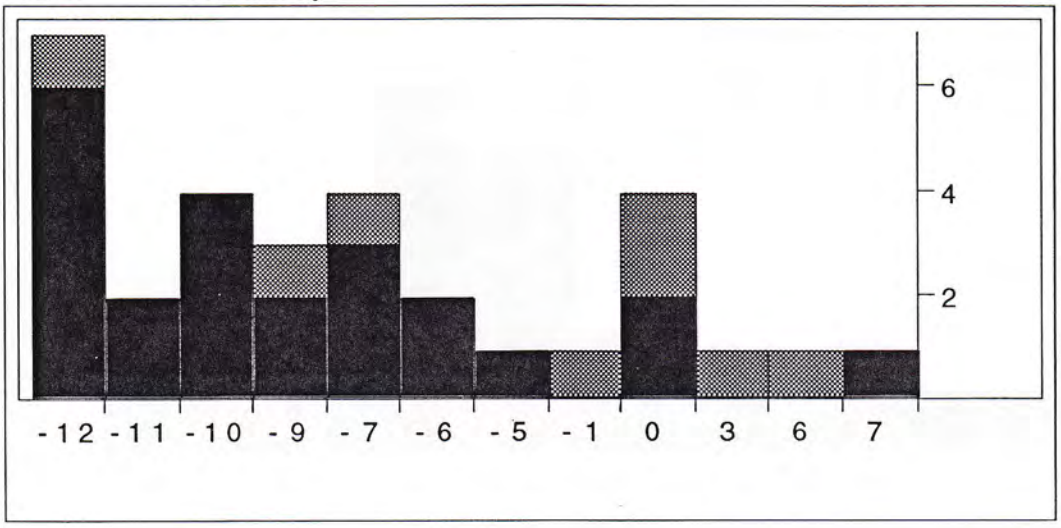
Level	Count
-12 (less polluting)	14
-11	5
-10	2
-9	1
-8	3
-7	2
-1	1
6	1
8	1
9 (more polluting)	1

Figure A15: convenient



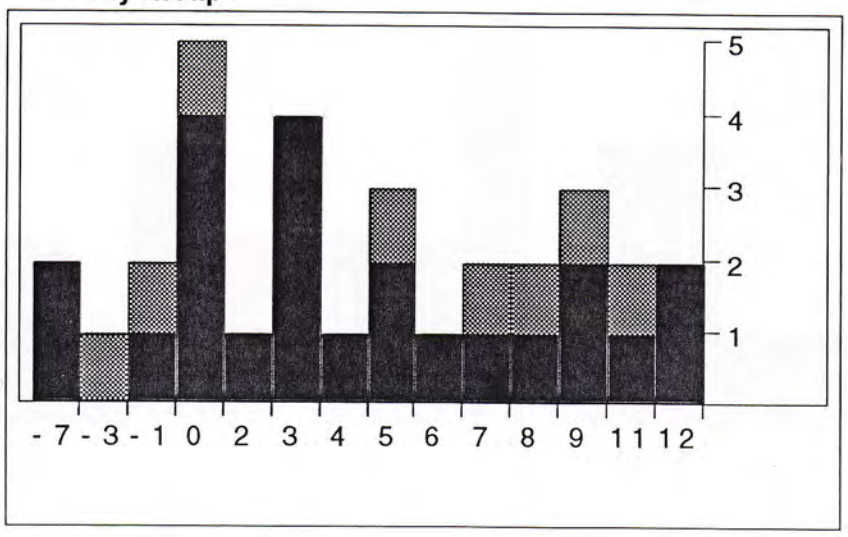
Level	Count
-12 (less convenient)	1
-11	1
-9	1
-8	1
-6	1
-4	1
-3	2
-2	5
-1	5
0	6
1	2
4	1
7	3
9 (more convenient)	1

Figure A16: runcheap



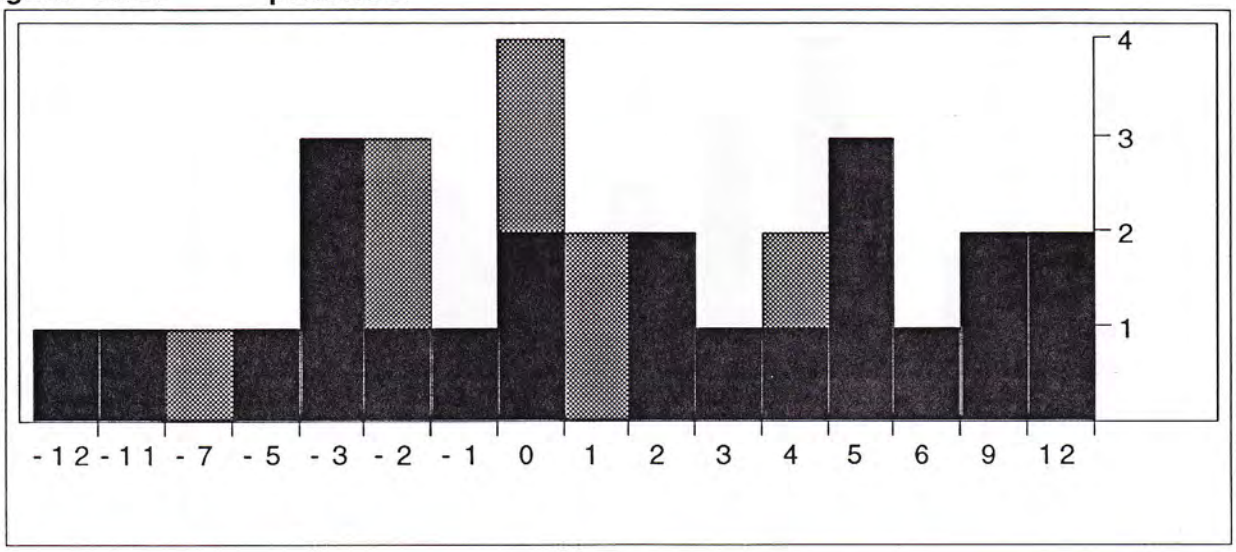
Level	Count
-12 (cheaper)	7
-11	2
-10	4
-9	3
-7	4
-6	2
-5	1
-1	1
0	4
3	1
6	1
7 (more expensive)	1

Figure A17: buycheap



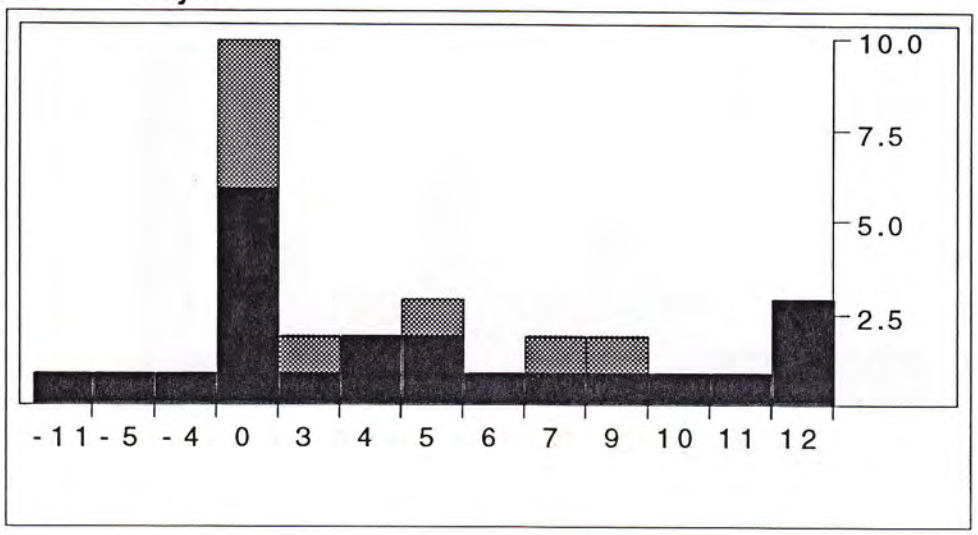
Level	Count
-7 (cheaper)	2
- 3	1
- 1	2
0	5
2	1
3	4
4	1
5	3
6	1
7	2
8	2
9	3
11	2
12 (more expensive)	2

Figure A18: practical



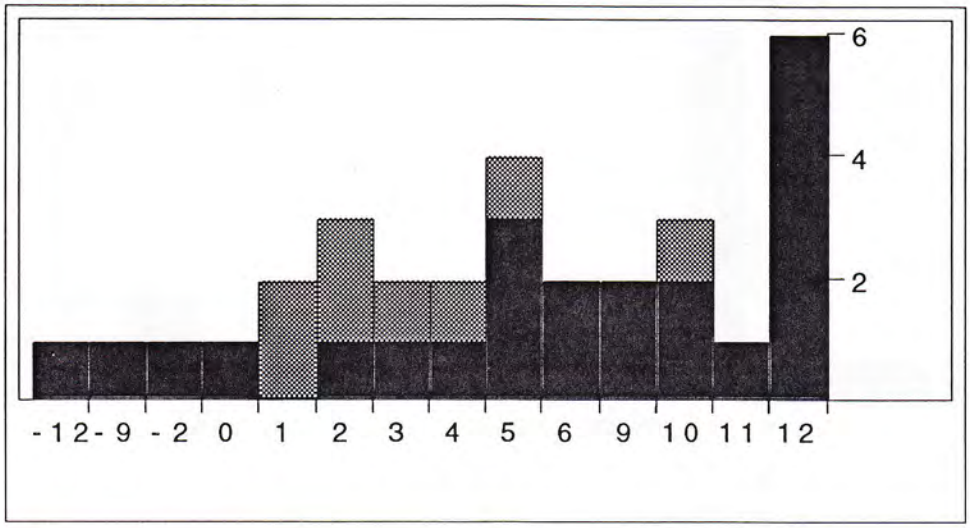
Level	Count
-12 (less practical)	1
-11	1
-7	1
-5	1
-3	3
-2	3
-1	1
0	4
1	2
2	2
3	1
4	2
5	3
6	1
9	2
12 (more practical)	2

Figure A19: style



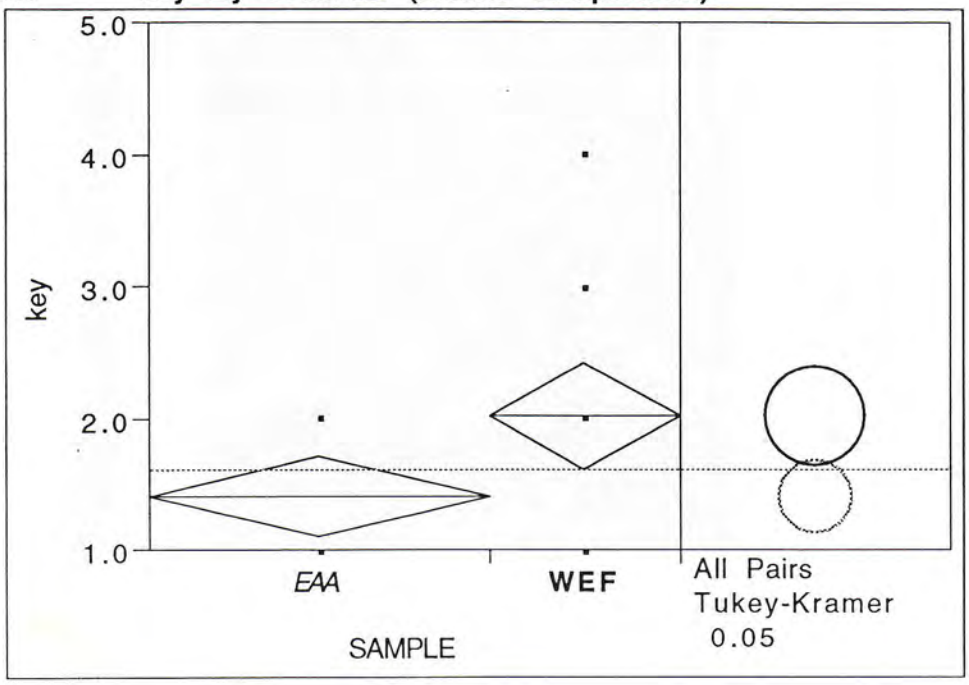
Level	Count
-11 (less stylish)	1
- 5	1
- 4	1
0	0
3	2
4	2
5	3
6	1
7	2
9	2
10	1
11	1
12 (more stylish)	3

Figure A20: future



Level	Count
-12 (less futursitic)	1
- 9	1
- 2	1
0	1
1	2
2	3
3	2
4	2
5	4
6	2
9	2
10	3
11	1
12 (more futuristic)	6

Figure A21: key By SAMPLE (means comparison)



Mean Estimates

Level	number	Mean	Std Error
EAA	20	1.40000	0.14856
WEF	11	2.00000	0.20031

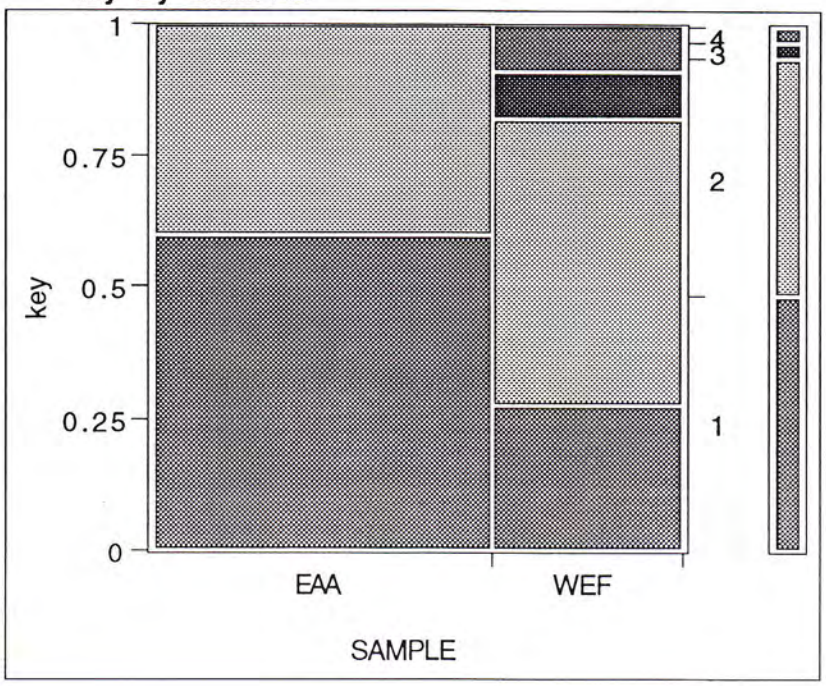
t-Test	DF	Prob>|t|
2.40588995	29	0.0227

Means Comparisons
Dif=Mean[i]-Mean[j]
Abs(Dif)-LSD

	WEF	EAA
WEF	-0.57939	0.089942
EAA	0.089942	-0.42968

Positive values show pairs of means that are significantly different.

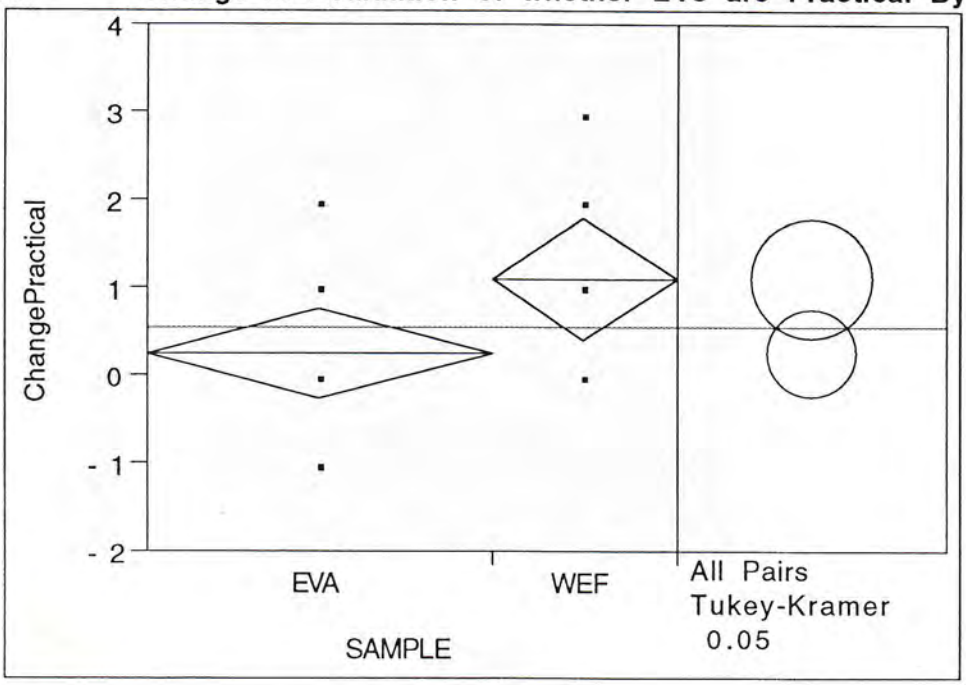
Figure A22: **key By SAMPLE**



Response Counts

	Sample		
key	EAA	WEF	**Total**
Strongly Agree	12	3	15
Agree	8	6	14
Indifferent	0	1	1
Disagree	0	1	1
Total	20	11	31

Figure A23: Change in Evaluation of whether EVs are Practical By SAMPLE



The variable "ChangePractical" is the difference between the respondents evaluation of whether EVs are practical to replace gasoline vehicles. This evaluation is measured immediately before and after they ride and drive the EVs. The variable can range from -4 (much less practical afterwards) to 4 (much more practical afterwards). In this sample, the actual range of scores is from -1 to 3.

Mean Estimates

Level	number	Mean	Std Error
EAA	19	0.26316	0.25203
WEF	10	1.10000	0.34739

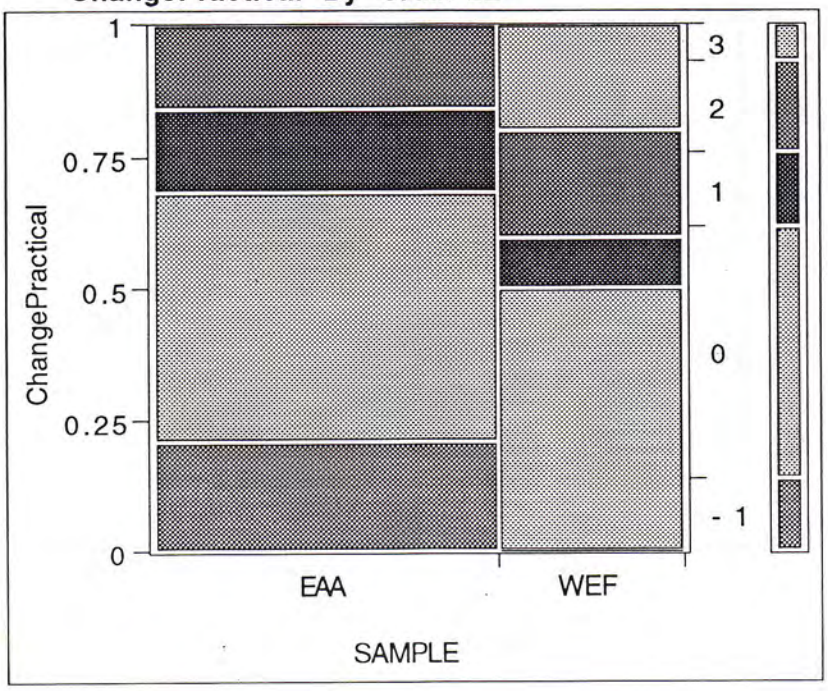
Means Comparisons
Dif=Mean[i]-Mean[j]

Comparisons for all pairs using Tukey-Kramer HSD q* = 2.05184
Abs(Dif)-LSD

	WEF	EAA
WEF	-1.00804	-0.04377
EAA	-0.04377	-0.73131

Positive values show pairs of means that are significantly different.

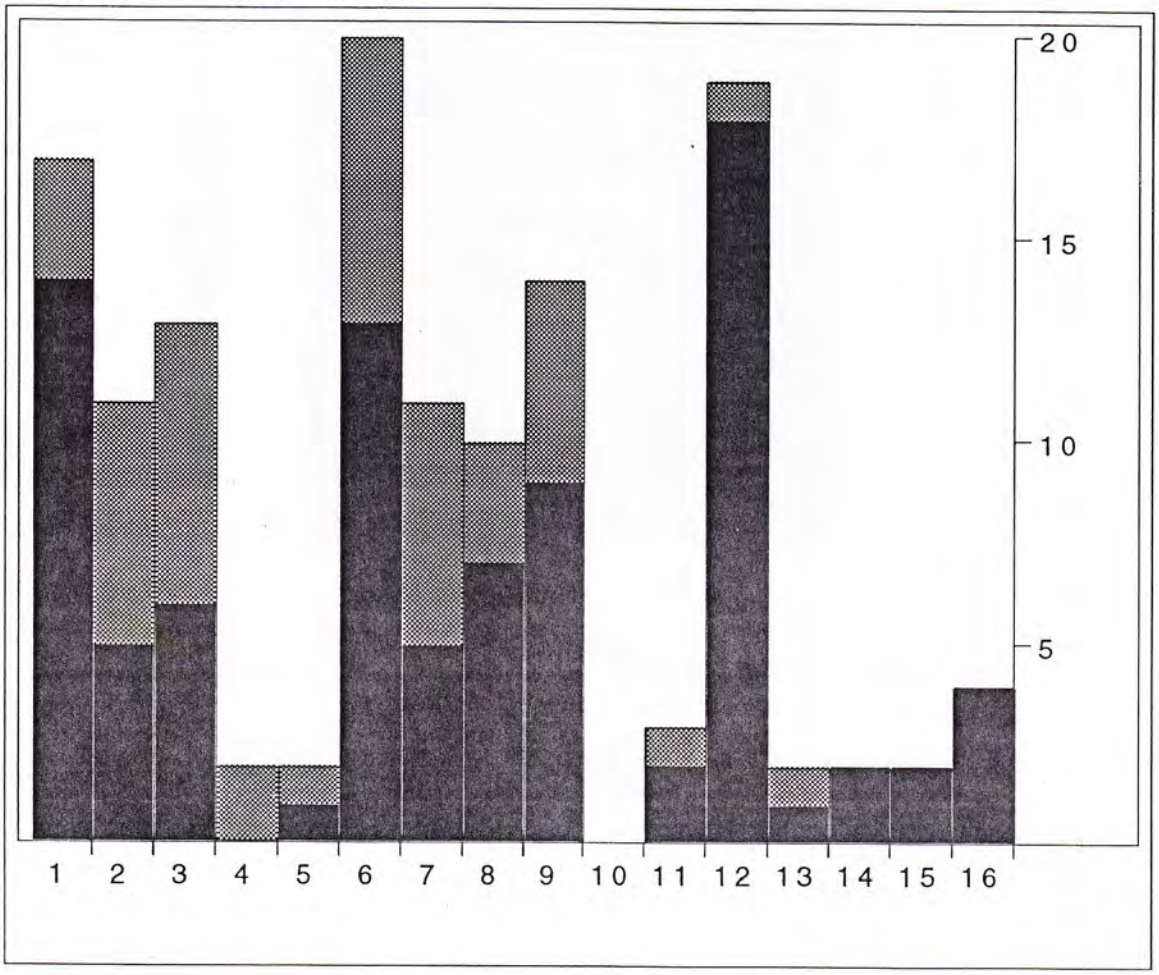
Figure A24: ChangePractical By SAMPLE



Response Counts

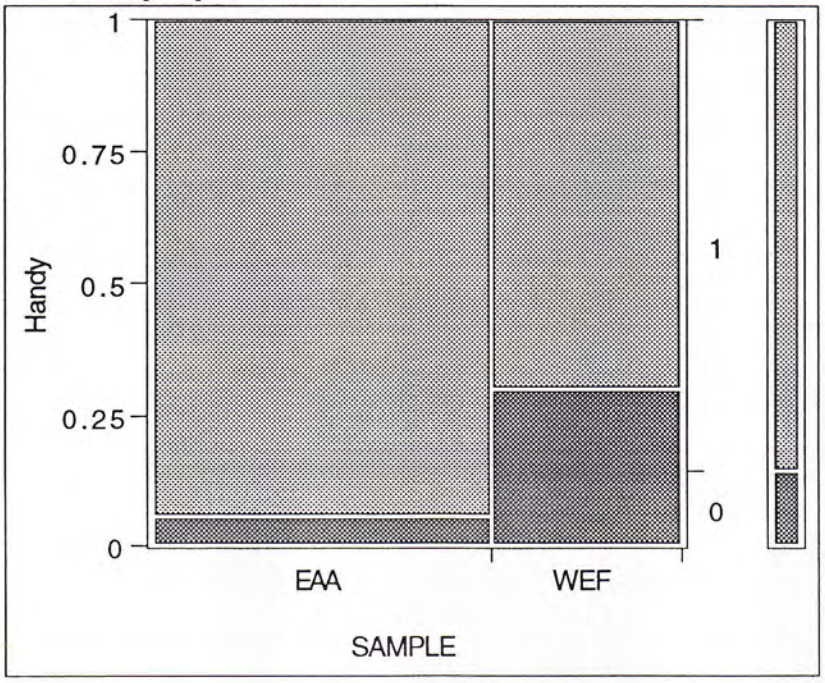
ChangePractical	1 = EAA	2 = WEF	Total
- 1	4	0	4
0	9	5	14
1	3	1	4
2	3	2	5
3	0	2	2
Total	19	10	29

Figure A25: Info Source



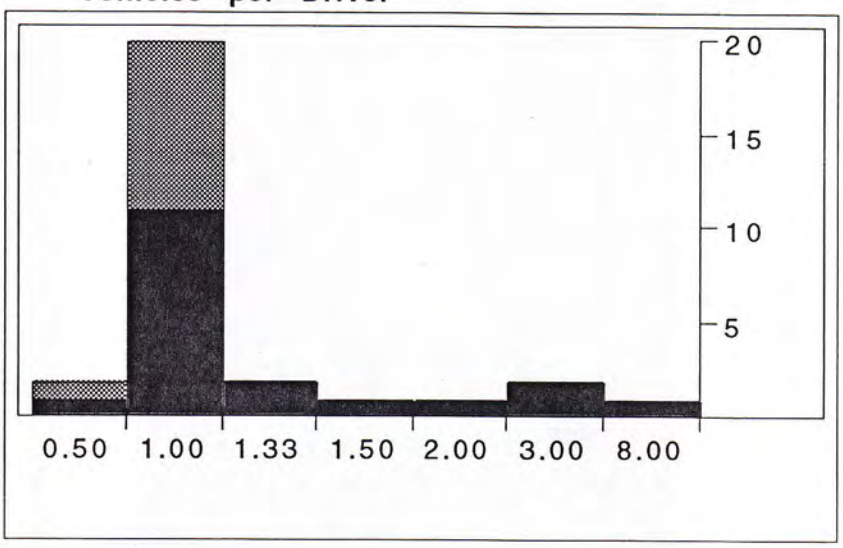
Source	Count
1 = Electric Utility	17
2 = TV or Radio News	11
3 = Newspapers	13
4 = TV Shows or Specials	2
5 = Automotive Magazines	2
6= Technology/Science Magazines	20
7 = Environmental Organizations	11
8 = Seeing EVs on the Road	10
9 = Word of Mouth	14
10 = Automobile Manufacturers	0
11 = Science Fiction	3
12 = Electric Vehicle Clubs	19
13 = Technical Papers and Journals	2
14 = EV Manufacturers	2
15 = Reading (unspecified)	2
16 = Owning an EV	4

Figure A26: Handy By SAMPLE



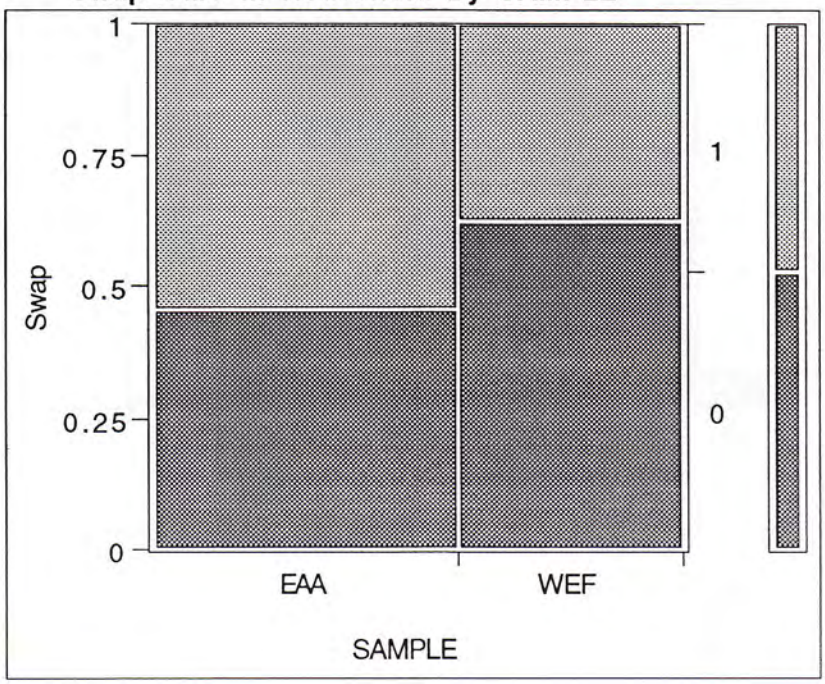
Handy	Sample EAA	WEF	Total
No	1	3	4
Yes	17	7	24
Total	18	10	28

Figure A27: Vehicles per Driver



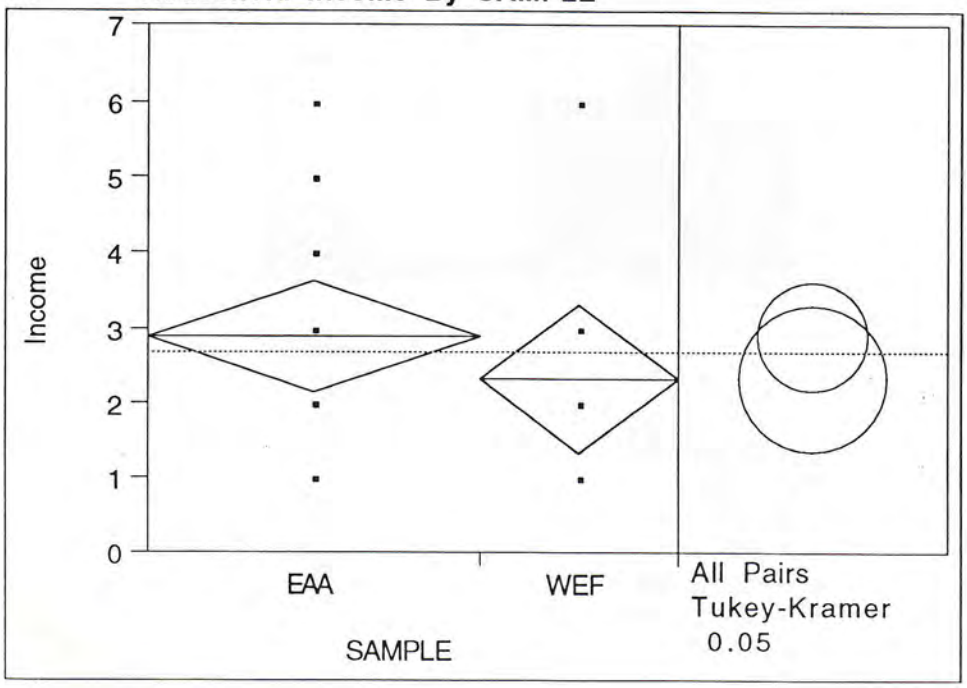
Level	Count
0.50	2
1.00	0
1.33	2
1.50	1
2.00	1
3.00	2
8.00	1

Figure A28: Swap Cars in Household By SAMPLE



	Sample		
Swap	EAA	WEF	**Total**
No	5	5	10
Yes	6	3	9
Total	11	8	19

Figure A29: Household Income By SAMPLE



Level	number	Mean	Std Error
EAA	17	2.88235	0.37531
WEF	10	2.30000	0.48935

Means Comparisons
Dif=Mean[i]-Mean[j]

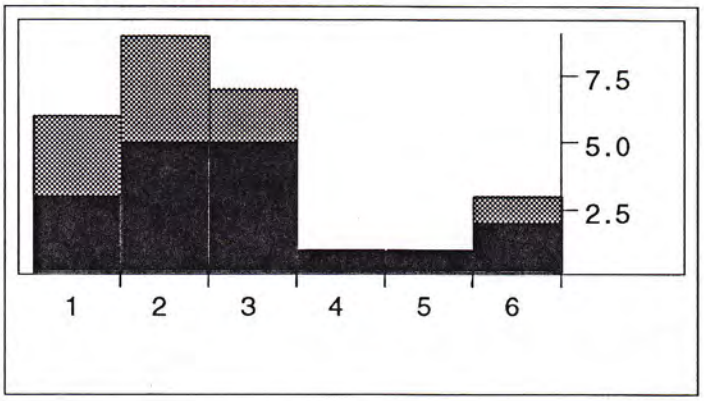
Comparisons for all pairs using Tukey-Kramer HSD q* = 2.05954

Abs(Dif)-LSD

	EAA	WEF
EAA	-1.09314	-0.68776
WEF	-0.68776	-1.42528

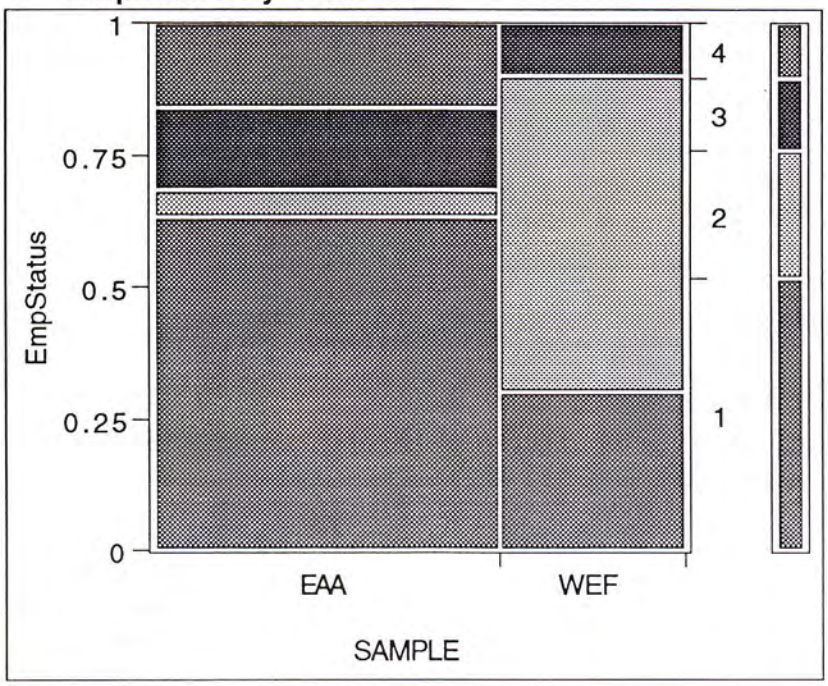
Positive values show pairs of means that are significantly different.

Figure A30: **Income Distribution**



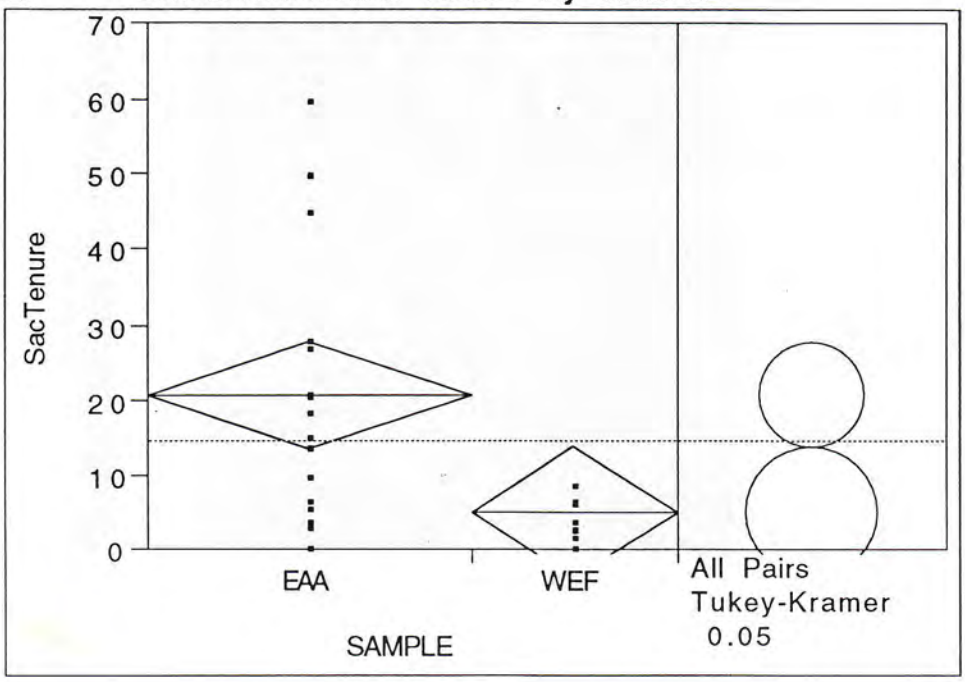
Level	Count
1 = < 25k	6
2 = 25k to 40k	9
3 = 40k to 60k	7
4 = 60k to 80k	1
5 = 80k to 100k	1
6 = > 100k	3

Figure A31: EmpStatus By SAMPLE



	Sample		
EmpStatus	EAA	WEF	**Total**
Employed outside the home	12	3	15
Student	1	6	7
Employed in the home	3	1	4
Retired	3	0	3
Unemployed	0	0	0
Total	19	10	29

Figure A32: Sacramento/Davis Tenure By SAMPLE



Mean Estimates

Level	number	Mean	Std Error
EAA	16	20.6562	3.5179
WEF	10	5.1260	4.4498

Means Comparisons
Dif=Mean[i]-Mean[j]

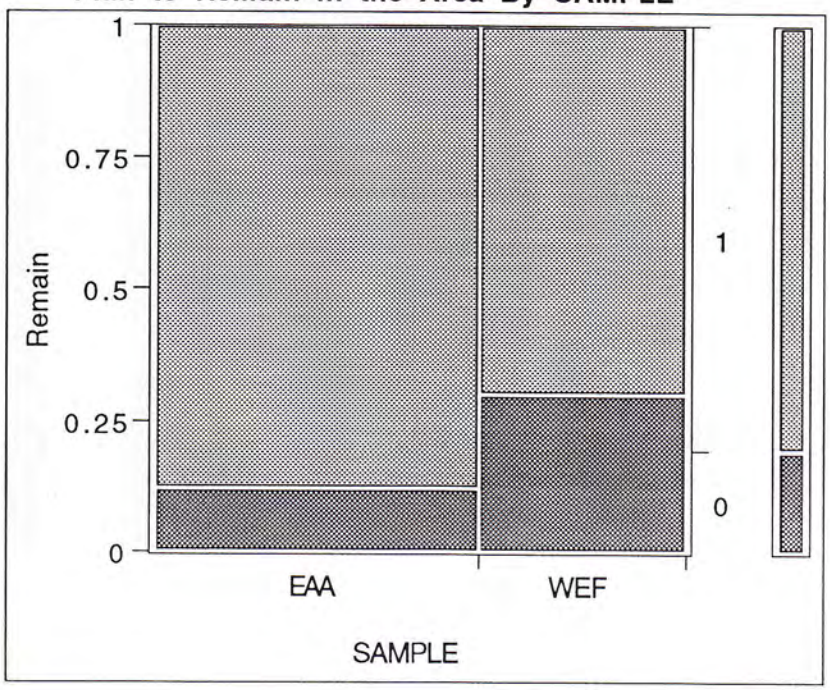
Comparisons for all pairs using Tukey-Kramer HSD q* = 2.06390

Abs(Dif)-LSD

	EAA	WEF
EAA	-10.2680	3.8229
WEF	3.8229	-12.9881

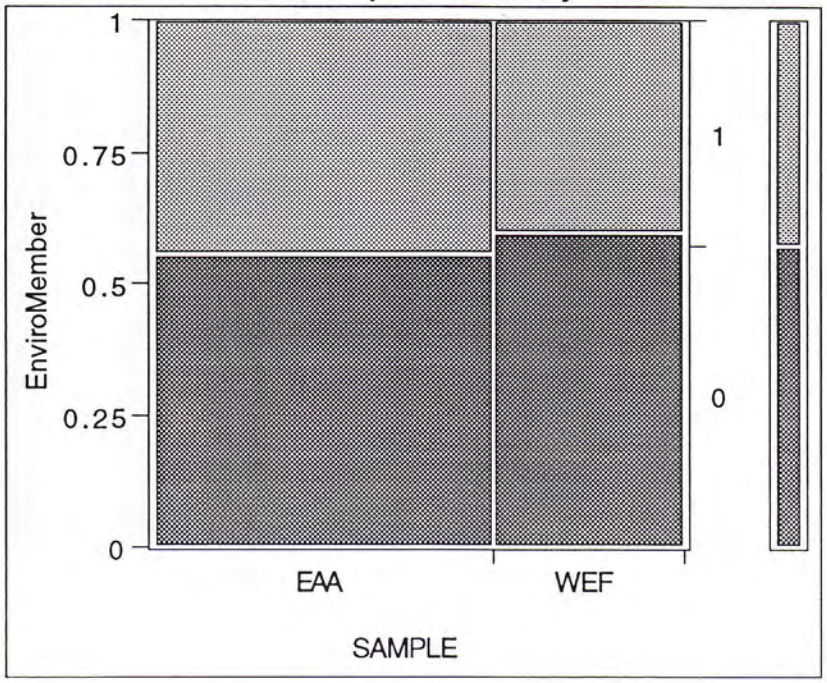
Positive values show pairs of means that are significantly different.

Figure A33: Plan to Remain in the Area By SAMPLE



Remain	Sample EAA	WEF	Total
No	2	3	5
Yes	14	7	21
Total	16	10	26

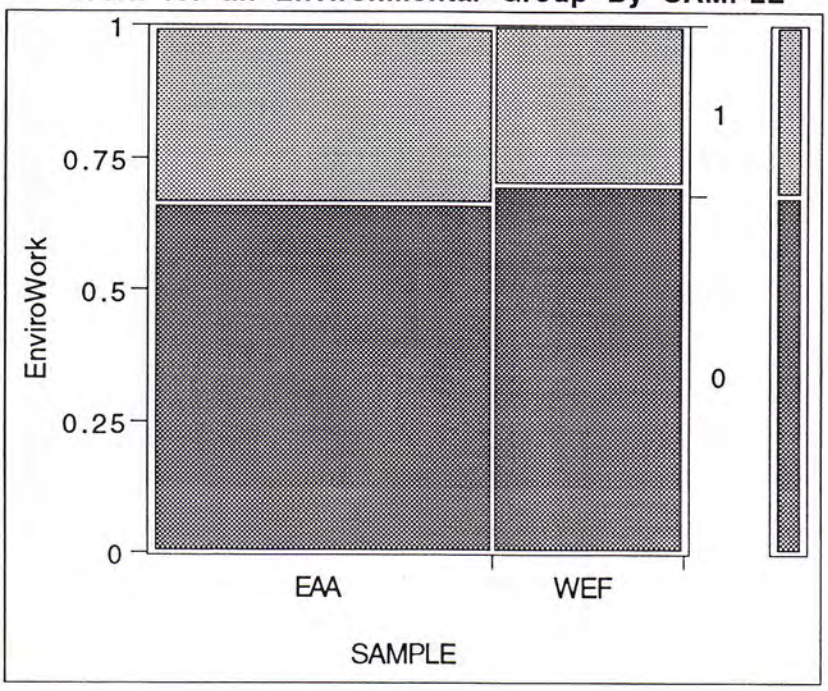
Figure A34: Environmental Group Member By SAMPLE



Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	0.052	0.8196
Pearson	0.052	0.8199

	Sample		
EnviroMember	EAA	WEF	Total
No	10	6	16
Yes	8	4	12
Total	18	10	28

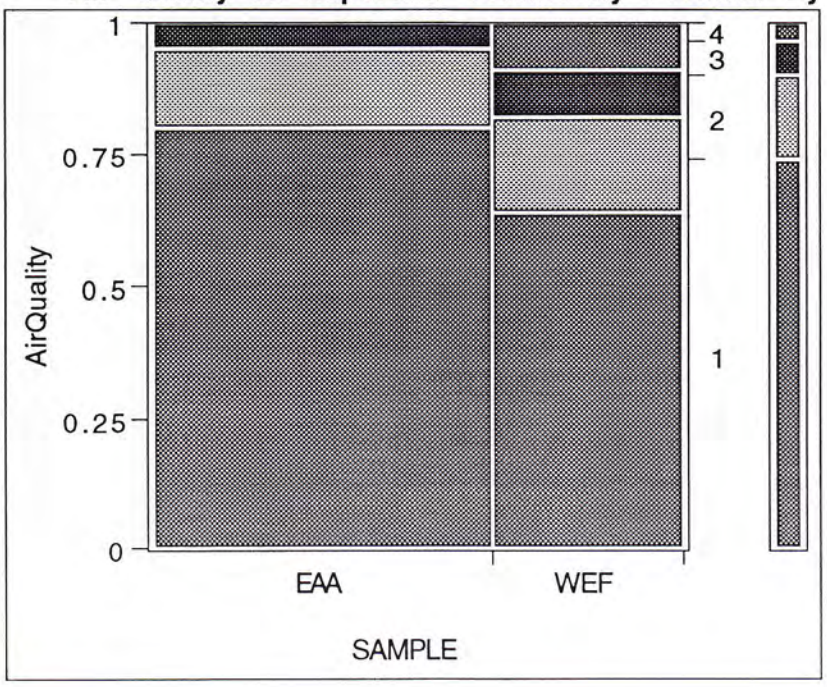
Figure A35: Work for an Environmental Group By SAMPLE



Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	0.033	0.8560
Pearson	0.033	0.8564

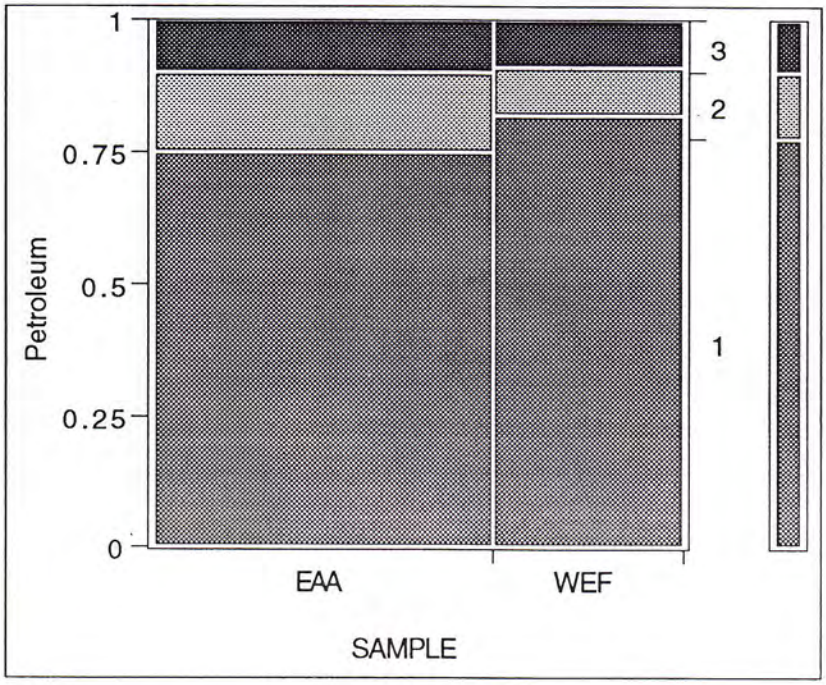
	Sample		
EnviroWork	EAA	WEF	Total
No	12	7	19
Yes	6	3	9
Total	18	10	28

Figure A36: Air Quality an Important Community Problem By SAMPLE



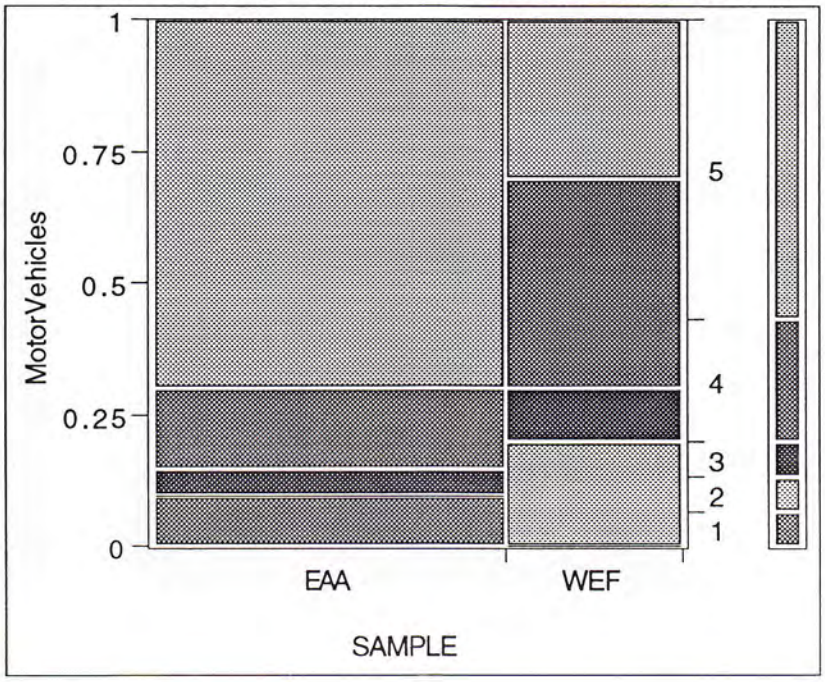
	Sample		
AirQuality	EAA	WEF	**Total**
Strongly Agree	16	7	23
Agree	3	2	5
Indifferent	1	1	2
Disagree	0	1	1
Stronly Disagree	0	0	0
Total	20	11	31

Figure A37: Reduced Petroleum Consumption Benefits Environment By SAMPLE



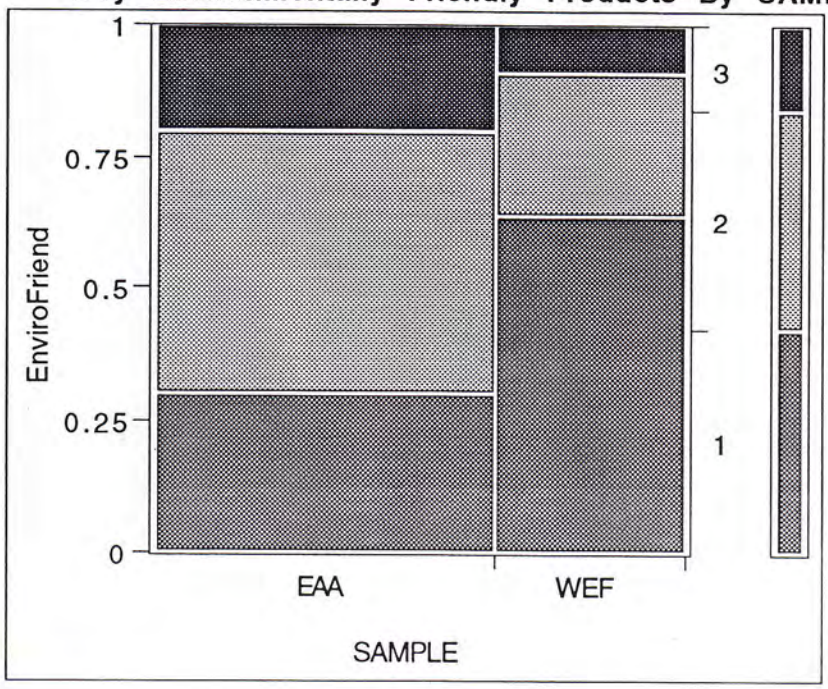
	Sample		
Petroleum	EAA	WEF	**Total**
Strongly Agree	15	9	24
Agree	3	1	4
Indifferent	2	1	3
Disagree	0	0	0
Strongly Disagree	0	0	0
Total	20	11	31

Figure A39: Motor Vehicles a Minor Source of Air Pollution By SAMPLE



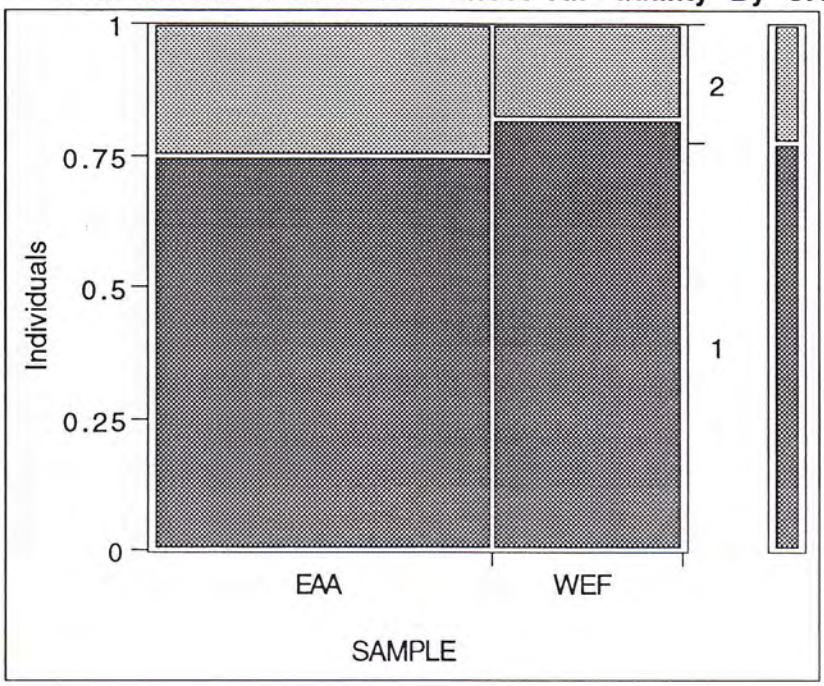
	Sample		
MotorVehicles	EAA	WEF	**Total**
Strongly Agree	2	0	2
Agree	0	2	2
Indifferent	1	1	2
Disagree	3	4	7
Strongly Disagree	14	3	17
Total	20	10	30

Figure A39: Buy Environmentally Friendly Products By SAMPLE



	Sample		
EnviroFriend	EAA	WEF	**Total**
Strongly Agree	6	7	13
Agree	10	3	13
Indifferent	4	1	5
Disagree	0	0	0
Strongly Disagree	0	0	0
Total	20	11	31

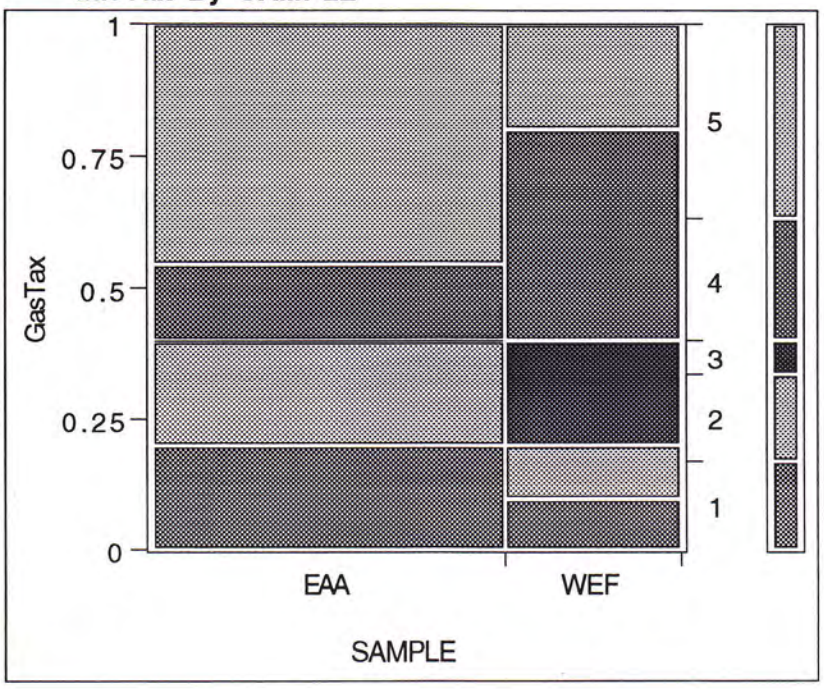
Figure A40: Individuals' Actions can affect Air Quality By SAMPLE



Test	ChiSquare	Prob>ChiSq
Likelihood Ratio	0.193	0.6601
Pearson	0.189	0.6640

	Sample		
Individuals	EAA	WEF	**Total**
Strongly Agree	15	9	24
Agree	5	2	7
Indifferent	0	0	0
Disagree	0	0	0
Strongly Disagree	0	0	0
Total	20	11	31

Figure A41: GasTax By SAMPLE



GasTax	Sample EAA	WEF	Total
Strongly Agree	4	1	5
Agree	4	1	5
Indifferent	0	2	2
Disagree	3	4	7
Strongly Disagree	9	2	11
Total	20	10	30