Two Experiments Investigating Problems With the Psychology Subject Pool

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Each year, thousands of human participants are needed for the research projects conducted by the psychology department. Most of these subjects are provided by the subject pool. The subject pool is a valuable resource because of its diversity and its accessibility; however, it is not without problems. The following experiments examine two of the problems that plague the subject pool. Why do subjects miss their appointments? Most of the researchers in the building tend to believe that subjects are lazy and inconsiderate. Frequently they suggest implementing a punishment system to increase the show rate. Thus the first goal was to determine if subjects really miss experiments because of apathy. A second and related problem is subjects becoming lost in the building and arriving late or failing to arrive for their experiments. Experiment 2 was conducted to determine the best routes in the building for which to design a wayfinding system.

Abstract

The present study attempted to identify the major reasons why subjects fail to show up for psychology experiments. Attempts were made to contact 98 students about participation in a one credit hour psychology experiment. Twenty-four of the 78 students who were successfully contacted were actually run. The subjects were hooked by electrodes to a physiogragh machine that served as a bogus pipeline. Subjects were then asked a series of questions about their and their classmates' participation in the subject pool. Analysis of responses yielded five categories of reasons for no-shows: memory, apathy, time conflict, illness, and wayfinding problems. Memory and apathy were the most frequent responses. Results for the self and classmate data reveal that the bogus pipeline may not have been successful in eliminating all socially desirable answering. Possible intervention strategies are discussed.

Reasons for subject no-shows

When subjects are late or fail to show up for experiments they create problems for both themselves and the experimenter. Late subjects interfere with the running of other subjects and subjects who never arrive waste valuable experiment time. In addition, subjects who fail to keep their appointments create a drain on the subject pool by taking sign-up times away from other students. These problems, when combined with the results from a recent study in which researchers were asked in an open-ended question to indicate their worst experience in research (43% responded subject no-shows) are reason for concern (Kirkhoff, 1990).

A review of the literature revealed that much of the attention paid to no-shows (in various settings) has dealt with either the characteristics that differentiate shows from no-shows, or intervention strategies to prevent no-shows (Wesch, Lutzker, Frisch & Dillon, 1987; Larson, Nguyon, Green & Attkinson, 1983; Turner & Vernon 1976; Kluger & Karras 1983). Many of the intervention strategies explored in other settings (phone call reminders, punishment) have been proposed to deal with our problem. However, these intervention programs all have underlying assumptions about the reasons for no-shows, either memory (reminders) or apathy (punishment or motivators). Because

it would be unwise to implement an intervention program before determining the cause of the problem, this study was designed to collect information from no-shows about why they missed their experiments.

Although subjects could simply be asked (either in an interview or questionnaire) why they missed their experiments, the validity of their self-reports were of concern. Subjects may feel that the experimenter is personally evaluating them, thereby making them more inclined to respond in a socially desirable manner. Nederhof (1985) defines social desirability as "a distortion of responses in a socially desirable direction which is a resultant of two factors: 'self-deception' and 'other-deception'." In our situation it was presumed that most subjects would remember if they had missed an experiment, so they would be more influenced by 'other-deception' in which answers are given to avoid negative evaluation.

In an attempt to reduce the likelihood of socially desirable answers, we employed a variation of the 'bogus pipeline' technique developed by Jones and Sigall (1971). The procedure involves convincing subjects that their self-reports can be objectively verified by a lie-detector-like machine. Such a procedure should induce in subjects a desire to tell the truth to avoid being

perceived as a liar. Millham and Kellogg (1980) have shown that the bogus pipeline reduces the other-deceptive component of social desirability. Therefore, the bogus pipeline was viewed as an ideal technique for our situation. In addition, both personal reasons and others' reasons for missing experiments were gathered because some psychologists have suggested that judgments about others may be more valid than personal judgments (e.g. Baird et al., 1976). This technique also provides a check on the validity enhancing qualities of the bogus pipeline.

Method

Subjects

During the sixth week of the spring semester, 98 students from seven different introductory psychology classes were selected from the Ball State University research participants pool. Students were chosen if they had been recorded as missing a psychology experiment during that semester. Students were contacted about participation in a one hour experiment via a note delivered by their teaching assistants during their introductory psychology classes. Attempts were made to contact each student on five consecutive class periods. Of the 98 students, 21 failed to respond to the five attempts (i.e. were not

attending class). Of the 78 students contacted, five refused to participate since they believed they had completed their course requirements and 32 made appointments with the experimenter. Of these 32, only 25 subjects showed up to be run.

Materials

Apparatus.-- Subjects were hooked by electrodes to a physiograph machine. This machine measured respiration, skin conductance, and heart rate. The hook up used a Bellowsneumograph for respiration, two finger electrodes (hooked to the two middle fingers of the dominant hand) for skin conductance, and three steel plated electrodes to measure heart rate. The heart rate electrodes were hooked to both the left and right arms and the right leg. The machine was on during the questioning.

Questionnaire.--A nine item questionnaire was constructed. Items concerned the students (and their classrocm acquaintances) participation in the psychology subject pool. The questionnaire is shown in Appendix A.

Procedure

Subjects met individually with the experimenter. They were then taken to a room that contained a chair and the physiograph machine. The subject was then informed that s/he would be hooked to a machine that had been used by previous researchers to detect truth-telling and asked a

series of questions about their participation in the psychology subject pool. The subject was then given the opportunity to withdraw without punishment from the experiment. No one chose to leave.

Each subject was hooked to the machine using the electrode configuration detailed in the apparatus section. The subject was given approximately ten minutes to habituate to the machine while it was being calibrated. The subject was then informed that s/he would be asked a test question to assure the experimenter that the machine was recording properly. The subject was instructed to respond with the truth to the following question, "What is your name?" The subject was then provided with a false response to make and asked the question again. At this time, the printout was removed from the machine and showed to the subject. The differences in the physiological recordings when they told the truth and when they were forced to lie were emphasized to increase their belief in the "lie-detecting" powers of the machine.

After demonstrating the reliability of the machine, the subject was asked the list of prepared questions about the subject pool. All verbal responses were recorded by the experimenter. The subject was then unhooked from the machine and any questions s/he had about her/his selection for the experiment or the machine were answered. No one

expressed serious doubts about the ability of the machine to detect truth-telling. Before being excused the subject was instructed not to discuss the experiment with anyone other than the experimenter. The subject was then thanked for their participation and dismissed.

Results

The 98 subjects were divided into 5 categories: shows, no-shows, subjects who refused to participate, subjects who never responded, and subjects who were never reached. Importantly, subjects who showed up to be run did not differ significantly from the other categories in either grade received in their introductory psychology class (X^2 [24] = 33.97, ns) (X^2 [6] = 5.107, ns) or gender (X^2 [4] = 2.261, ns). In fact, no variables were found to suggest that the group that showed up was different from those who did not.

Subjects verbal responses to the open ended questions about missed experiments (why they missed their experiment, why a classmate (real or hypothesized) missed an experiment, and what they thought was the most common reason subjects failed to show up for experiments) were analyzed by two judges. This analysis yielded five categories of responses: memory, apathy, time conflict,

Table 1

Judged reason for missing experiment

	Self	Classmate	Most Common
Memory	9	7	11
Apathy	3	9	12
Conflict	4	3	1
Illness	3	2	0
Wayfinding	2	1	0
N	21[a]	22[b]	24

[a] Number does not total 24 because of subjects who did not remember missing an experiment. [b] Two subjects responded "I don't know."

illness, and wayfinding problems. The results are summarized in Table 1.

Most subjects apparently told the truth. Not only did subjects state they were telling the truth, but comparison of frequencies for self and classmate were not significantly different ($X2$ [4] = 3.91, ns). Since subjects had no reason to lie about others, this result supports the hypothesis that they did not lie about their own reasons for missing.

As can be seen in Table 1, 43% of the subjects stated that they forgot. A chi square goodness of fit test on the self data does not indicate significant differences in frequencies for the 5 categories ($X2$ [4] = 7.33, $p < .12$). However, the N is very small and the test is not always robust with small frequencies in so many cells. An analysis of the classmate data does reveal differences in frequencies among the categories ($X2$ [4] = 10.73, $p < .05$). If self and classmate results are combined, then forgetting is the most common reason followed by apathy, time conflict, illness, and wayfinding problems. These frequencies do significantly differ ($X2$ [4] = 13.16, $p < .025$). Consistent with this analysis, subjects report that they believe memory and apathy are the major reasons that people miss experiments ($X2$ [4] = 31.42, $p < .01$).

Researchers who use the subject pool suggested that

one reason for the high rate of no-shows is that students are signed up by their friends who then forget to tell them of the appointment. Subjects self reports do not support this hypothesis. Of the 24 subjects, only 1 reported being signed up by someone else and that person was a member of his/her immediate family.

Discussion

The present investigation was successful in that it delineated five major categories of reasons for subject no-shows. The two most frequent reasons were memory and apathy. However, the three other categories, accounted for approximately 27 - 43% of the no-shows depending on the data used (self or classmate). These results indicate that the no-show problem is more complex than previously thought and that several factors need to be considered in designing an intervention program. Any intervention strategy would not only have to be efficient to implement, but would have to be fair to subjects in all five categories.

One suggested intervention strategy is some type of punisher (Wesch, Lutzker, Frisch, and Dillon, 1987). Two suggestions made by researchers in our department are increasing hours required proportional to hours missed or requiring an additional hour for every experiment missed

regardless of length. However, while a punisher might motivate subjects with apathy problems or time conflicts, it would not be fair to subjects who were ill or who got lost in the building. It is also not clear what impact a punishment system would have on those subjects that forgot. In addition, a punishment system might encourage subjects to call in and cancel their appointments to avoid being counted as a no-show. If this were to happen we would have succeeded in increasing the number of excused absences while not increasing the show rate.

The two categories for which it is hardest to design an intervention strategy are those subjects who are apathetic and those that have time conflicts. While reminders might be beneficial to the subjects with time conflicts by allowing them to reschedule, these subjects may also have been slightly apathetic in that they were not motivated to remember their commitment. As of yet, no good motivator has been proposed. Subjects are already provided with a slight motivator in that they will receive an incomplete in the class if they fail to complete the research requirement. However, this motivator does not appear to exert a strong influence on subjects. Another possible motivator would be to pay subjects for participation; however, this solution is only feasible for experiments requiring a small number of subjects or for

researchers with external funding.

A related solution would be to make the subject pool voluntary. This would solve the apathy problem by attracting only the most motivated students. The problem with this is that we currently get a very diverse group of students participating in research. By making the system voluntary we may end up with sampling biases.

Another frequently suggested intervention is to send reminders to subjects of their appointments (Kluger and Karras, 1983; Turner and Vernon,1976). On the surface this appears to be an ideal solution because it would benefit a significant portion of the no-shows and it is not unfair to any of the subjects. The problem with reminders is in designing a system that would be able to reach all subjects and still be efficient to run. Three possible systems are phone calls, postcards, or electronic mail.

Under the present circumstances, phone calls are not as efficient as they could be because many students fail to keep the university updated about residence changes. However, with one minor change in the system, phone calls could be successfully used. The change would involve having subjects fill out 3 x 5 cards on the first day of class that included their name, address and phone number. Subjects would be instructed that if any of the information on the card changed during the semester they should go the

psychology office and update it. This system would not create an unfair workload for any one person, and would increase the hit rate substantially. Phone calls are best used by experimenters running either single subjects or small groups. People running large groups however, may still find it to be inefficient.

The second suggestion of postcards would also be made more feasible by having students fill out the cards. However, a pilot study (Butler, 1989) revealed that only about 50% of introductory psychology students lived on-campus. This would make the financial investment in such a system quite high. Therefore, this system works best for researchers operating on external grants.

The final suggestion of using electronic mail bypasses the problems of cost and locating students because computing services are available to all students on campus. However, while this system is ideally good, in practice it is not reasonable at the present time. The computer competency of both the students and the faculty is not yet high enough to insure that everyone would be willing to use the system. Indeed, many students who are computer phobic might elect to do the optional project merely to avoid having to use computers.

Research is presently being conducted to help those subjects who become lost on their way to experiments.

Attempts are being made to find the best wayfinding aids to use, to determine what routes to use, and what the wayfinding aids should look like to maximize their efficiency. This type of intervention, while not increasing the show rate by a large amount, does benefit all subjects as well as experimenters by insuring that subjects arrive on time.

There is one group of no-shows for which the is no feasible intervention and that researchers must come to accept, those students who become ill. While it would be beneficial if these students would call to cancel their appointments, this is not always possible. When people become ill their schedule is often disrupted and many students may simply not remember to call and cancel.

A noteworthy issue regarding the present investigation is that the bogus pipeline may not have been as successful as asking about others in reducing socially desirable answers. Although the data for the self and classmate were not significantly different (possibly because of the small N) there was a slight difference. Results for the self question indicated that memory was the most frequent cause of missed experiments; however, when asked about classmates and for the most common reason, apathy became number one. These results are interesting in light of subjects' responses to a forced choice question in which they were

asked which they would consider worse, someone who forgot an experiment or someone who was unconcerned and decided not to show up. Only two of the subjects reported that they would consider someone who forgot worse. While it is possible that the people subjects used for the classmate question really were apathetic, these results tend to indicate that some subjects may have made socially desirable answers. However, because the difference was not statistically significant, more research needs to be done to see if in certain circumstances asking about others produces equivalent or better results than the bogus pipeline.

Based upon our findings, it appears that there are ways to reduce the severity of the no-show problem. The most important contribution of the study was that it revealed five categories of no-shows, four of which can be helped by the implementation of some type of intervention. The research suggest that the two things that would be most beneficial in increasing the show rate are a card system that would permit the collection of current information about students, and the development of a wayfinding system for the building. In addition, the research raises questions about the validity of the bogus pipeline for some types of questions.

Appendix A

Questions:

1) Have you missed one or more psychology experiments this semester?

2) How many experiments have you missed?

If necessary: For the questions that follow please consider only the most recent experiment missed.

3) Why did you miss the experiment?

4 categories: Memory; Apathy; Other; Undecided

4) Do you know any other people who have missed experiments?

If not, please imagine that some people you know missed an experiment.

5) Why do you think they missed their experiments?

6) What do you think is the most common reason people fail to show up for experiments?

7) Which would you consider worse, someone who missed an experiment because they forgot or someone who was unconcerned and decided not to show up?

8) Do you sign yourself up for experiments or are you signed up by friends?

9) On a scale of 1-10 please rate how busy you are compared to other students in your class with 1 being everybody is busier than I am to 10 being nobody is busier than me.

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Abstract

Previous research on wayfinding has generally tended to neglect what characteristics comprise a best route. This study was done to provide an initial investigation into best routes, and to find the best routes along which to guide subjects through a complex building. Twenty-five undergraduates were shown a video tape and maps of seven routes from a designated starting area to a goal room. Subjects were given a table that provided a summary of route variables. The subjects were asked to rate the routes for desirability four times on a scale of 0 to 10. The four conditions were; 1) an initial rating made after viewing the tape and maps, and studying the table; 2) a rating made while imagining they were confined to a wheelchair; 3) a rating made while imagining they were visually impaired; and 4) an overall rating taking into account their previous three ratings. Subjects' judgments of desirability varied across routes, and according to instruction condition. Short routes and routes with elevators were judged best. This provides support for the efficiency hypothesis.

Characteristics of a Best Route

The term wayfinding has been linked to cognitive maps in the literature. However, it should be made clear, that they are not the same. Cognitive maps are long term memory representations of environments. Wayfinding is the process of getting from one place to another. It could involve the use of well-developed cognitive maps (e.g. getting around a house you have lived in for years) or a partially developed cognitive map (e.g. getting around in an unfamiliar building).

There is a particularly troublesome wayfinding problem in the building in which we work. Each year, thousands of people participate in numerous research projects run in the building. According to the criteria proposed by Garling, Book, and Lindberg (1986) the building has "very high" wayfinding problems. This, combined with the fact that most of the research participants are newcomers to the building results in many subjects getting lost and arriving late, or failing to arrive at all, for experiments. According to Best (1970), there are two logical solutions to wayfinding problems: move locations so that they are easier to find, or provide wayfinding aids. In our case, moving destinations was impractical so it was necessary to turn to wayfinding aids.

In an initial study (Butler, 1989), you-are-here maps

were compared to signs as wayfinding aids. The study found that subjects not only expressed a preference for signs, but they arrived in less time and made fewer errors than did students following maps. However, these results presented a new problem. The building, like many public buildings, provides numerous routes to the same destination. If a sign system were to be developed, which route should be used?

While the literature has not concerned itself with the characteristics of a best route per se, Best (1970) has suggested that a good indicator of whether people will become lost is the number of choice points in a route. This would suggest that the best route would then be the one with the fewest decision or choice points. However, because we would be designing a sign system that would theoretically eliminate incorrect decisions, this definition was suspect.

Following the logic of Gestalt psychologists, best routes may be the simplest. Unfortunately, it is not clear how simplest should be defined. Is it simply the one with the fewest direction changes or is it the one with the lowest information load (Leeuwenburg, 1967)?

An alternative hypothesis, that people would prefer the most efficient route, was derived from subjects' frequent comparisons of our building with a rat maze. The

principle of least effort states that organisms will respond "in such a manner as to expend the least amount of physical energy in the achievement of a goal" (Brener and Mitchell, 1989). Based on this, the efficiency hypothesis predicts that the best routes would be those requiring the least amount of physical expenditure.

There were two purposes to this investigation. First we wanted to identify the best routes for guiding subjects to experiments. Second, we wanted to provide a preliminary study of the variables that determine good or poor routes. Wayfinding difficulties can be especially severe for people in wheelchairs and the visually impaired. Passini and Proulx (1988) have shown that congenitally blind individuals can be successful wayfinders. However, lack of sensitivity on the part of architects and others can create architectual barriers for the visually impaired, that while less visible then those affecting people in wheelchairs, are no less real. In our effort to find the routes that would be best for all students in the subject pool, subjects were asked to make ratings from several points of view in addition to their own: that of a visually impaired student, a student confined to a wheelchair, and a composite viewpoint that included their own and these other points of view.

Method

Subjects

The subjects were 25 undergraduates participating in the Ball State University research participants pool. All students enrolled in introductory psychology are required to engage in three and a half hours of extra classroom activities. One of the activities in which they can participate is the research participants pool.

Materials

Seven of the most practical routes from the experiment sign-up board to a particular set of psychology laboratories located in the basement of the psychology building were selected. These routes were chosen on the basis of the likelihood that subjects would actually use them in trying to locate the labs. These routes differed on several variables; overall distance (yds.), number of stairwells, total number of stairs, turns, whether the route used an elevator, whether the route went outside, and the number of decision points. A decision point was defined as any location at which a person had the choice of going more than one direction. A stairwell was defined as any continuous set of stairs regardless of number of landings. Each route was given a color code, and all of

this information was presented to subjects three ways. It was presented via a table (see Table 1).

Insert Table 1 about here

Also each route was videotaped as it was walked by the experimenters. The videotape was about 15 minutes in length. Simplified floor plans of both the first and ground floors of the psychology building were created. There was a set of floor plans (first and ground floors) for each route, with the route drawn out in its color code. In addition, there was a set of floor plans that displayed all of the routes in their color codes.

Procedure

Subjects were informed that they would be shown a video of several routes through the psychology building, and that they would be required to rate their preference for these routes. Prior to the viewing of the video, subjects were given the information sheet which provided a summary of the information about each route. The variables on the information sheet were described and any questions about the information were answered at that time. Then subjects were shown the video tape. Subjects were encouraged to ask questions and make their own notes while watching the video. During the video presentation,

Table 1

Summary of route variables provided to subjects

	RED	ORANGE	GREEN	BLUE	BROWN	PURPLE	BLACK
Overall Distance (yd)	107	57	131	81	106	84	184
No. (#) of Stairwells	3 (1)	0	2 (1)	1	2 (1)	3	1 (1)
Total # of Stairs	27	0	12	7	15	29	4
Turns	8	5	4	7	6	9	8
Use Elevator	NO	YES	NO	YES	NO	NO	NO
Does Route Go Outside	NO	NO	YES	NO	YES	NO	YES
No. (#) of Decision Points	11 (10,1T)	8	9	13 (12,1T)	7	9 (8,1T)	8

transparencies of the floor plans for both the first and the ground floors of the psychology building were displayed on an adjacent projection screen. In addition, the route was verbally described by the experimenter and the location of the video was shown on the floor plan.

After viewing the videos of all routes, subjects were given a rating sheet that listed the routes by color code. They were asked to rate the routes on a scale of 0-10 with 10 being a "best" or optimal route, and 0 being a terrible route that they would not use. Subjects were encouraged to use fractions, if necessary, to differentiate among routes. Subjects were then asked to list those factors that were important to them in making the ratings and to rank order the factors in order of importance. Segments of the video were played a second time while these ratings were made and subjects were encouraged to request reviewing segments they could not remember. However, no subject requested to view all the segments.

Prior to the experiment, several students, who were either confined to wheelchairs or were visually impaired, travelled the routes with the experimenter and commented about various building features and mobility problems. This information was provided to subjects who were then asked to rate the routes again. For the second rating, subjects were to imagine they confined to a wheelchair, and

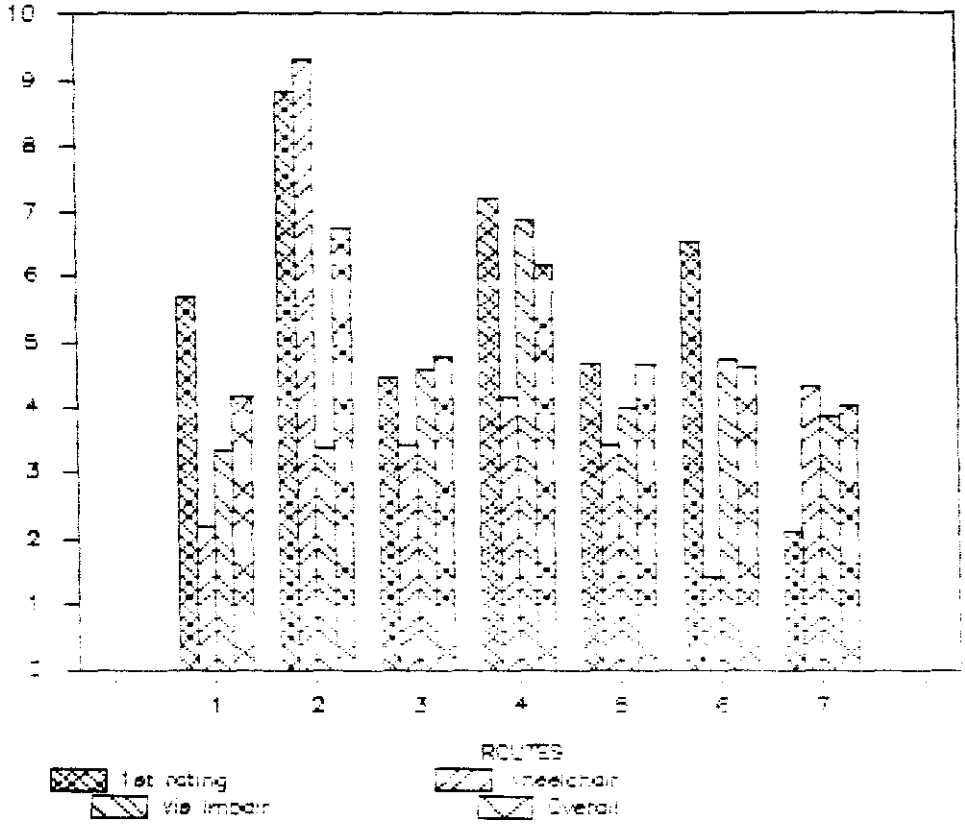
MEAN RATING
10
9
8
7
6
5
4
3
2
1
1
2
3
4
5
6
7
ROUTES
Tot rating
Wc impair
Wheelchair
Overall

Figure Caption

Figure 1. Mean ratings for the seven routes by instruction condition.

in the third rating they were to imagine they were visually impaired (totally blind). Subjects were then instructed to make a final set of ratings taking into account their three previous ratings and all of the information they had been given.

Results

As expected, ratings of the seven routes were affected by both route and instruction condition. The mean ratings for the routes are shown in Figure 1. The ratings were analyzed using an ANOVA with two within subjects variables: instruction condition (4 levels) and route (7 levels). All effects in the ANOVA were significant. Instructions had a significant effect on ratings (F [3,72] = 11.95, p < .0001, eta2 = 4%), ratings varied across routes (F [6,144] = 20.69, p < .0001, eta2 = 16%), and there was a significant interaction between instructions and routes (F [18,432] = 16.29, p < .0001, eta2 = 17%).

Insert Figure 1 about here

Instructions affected subjects ratings of the routes in reasonable ways. As can be seen in Figure 1, on the first rating, subjects rated route 2 as best, then routes 4

and 6. On the second rating (wheelchair condition) means for the routes with stairs generally decreased and means for routes 2 and 7, which do not have stairs, increased relative to first ratings. On the third rating (visually impaired condition), ratings for routes 2 and 7, which have features that were pointed out as problems for the visually impaired, decreased relative to the wheelchair condition. All other routes in the visually impaired condition increased with respect to the wheelchair condition. On the fourth ratings, in which subjects were asked to make an overall judgment, subjects rated route 2 the best followed by route 4. All other routes fell to within one point of each other.

Insert Table 2 about here

Contrary to expectations, complexity of route as defined by the number of turns and decision points did not strongly influence subjects' personal ratings of the routes. Table 1 shows Pearson r correlations for the variables on the information sheet and subjects' first and fourth ratings. First ratings were significantly higher for shorter distances, for routes that had an elevator, and for routes that did not go outside. Distance was a significantly better predictor of first ratings than either

Table 2

Pearson r correlations for route variables and first and fourth ratings

	FIRST	DIST	STRWELLS	STAIRS	TURNS	ELEVTR	OUTSIDE	DEC PTS
DIST	-.97**							
STRWELLS	-.24	.09						
STAIRS	-.04	-.11	.97					
TURNS	-.15	.13	.45	.54				
ELEVTR	.75**	-.63	-.75	-.61	-.27			
OUTSIDE	-.82**	.75	-.04	-.25	-.37	-.55		
DEC PTS	.32	-.23	.11	.15	.25	.40	-.58	
FOURTH	.82**	-.74**	-.71**	-.58**	-.46*	.95**	-.48*	.22

* $p < .05$. ** $p < .01$.

elevator (z = 3.58, p < .01) or whether the route went outside (z = 2.97, p < .01). The correlations between ratings and whether the route used an elevator did not differ significantly from the correlations between ratings and whether the route went outside (z = .61, ns). Fourth ratings were significantly correlated with seven of the eight variables. Surprisingly, the one variable that was not significantly related was the number of decision points. Whether the route had an elevator was a significantly better predictor of final ratings than distance (z = 2.96, p < .01), stairwells (z = 3.15, p < .01), turns (z = 4.00, p < .01), or whether the route went outside (z = 4.35, p < .01). The other correlations did not significantly differ from each other as predictors of fourth ratings.

Discussion

Preference judgments for the seven routes tend to support the efficiency hypothesis over complexity. In condition 1, in which subjects' rated the routes from their own point of view, the variable which exerted the strongest influence on ratings was distance. Neither the number of turns nor decision points, which comprise complexity, significantly affected subjects' ratings. In the fourth

condition (overall rating), number of turns did become a significant influence; however, number of decision points still failed to strongly influence judgments. Additional support for the efficiency hypothesis can also be derived from subjects' ratings in condition 1, in which routes with elevators were clearly preferred over routes with stairs. Apparently subjects were concerned more with the amount of physical energy expenditure than with the cognitive load imposed by the route.

One potential problem with this study is that because actual routes through an existing building were used, the characteristics of the routes were not evenly distributed. Future research will need to exert more control over the route variables. One possible solution is to create fake floor plans in which the routes could be specifically constructed to compare variables. The increase in control would allow a more accurate assessment of the weights given to each factor in determining a best route. A pilot study was conducted in which subjects were provided with both the information table and the floor plans, but not shown the video. The results obtained were virtually identical to those obtained with the video. These results suggest that studying a table and examining floor plans are adequate for subjects to make reliable judgments of route desirability.

Instruction condition had a strong effect on judgments

of best routes because of the architectual barriers to both students in wheelchairs and the visually impaired. In addition, subjects appeared to do a reasonably well job of imagining they were either confined to a wheelchair or visually impaired. Ratings for routes with stairs decreased in condition 2 (wheelchair), and ratings for the routes that had problems for the visually impaired decreased in condition 3. In addition, seven of the eight route variables were significantly correlated with fourth ratings. These results indicate that subjects did follow instructions and base their overall judgements on their previous three ratings. However, it is not certain that the results obtained are identical to those that would have been obtained had members of these special populations been tested directly. A discussion with the visually impaired students who had helped the experimenters prior to the study, indicated that a route with an elevator would probably not have been chosen as the best route in condition 3. One possible reason for this discrepancy is that because our world is very visually oriented, subjects were not very successful in imaging what a loss of vision is like. Another possible reason that elevators were chosen as best for the visually impaired is that subjects had already made ratings for both themselves and students in wheelchairs (both groups for which elevators were rated

highly). It is possible that some order effects were operating by the time subjects made their ratings for the visually impaired. Ratings for the wheelchair condition were what could be expected, indicating that subjects were better able to imagine a loss of physical mobility.

The study was successful in finding what are the best routes for our situation. Routes 2 and 4, were judged clearly better then the other five. Both of these routes use elevators and are accessible to all members of the subject pool. The decision must now be made whether to design sign systems for both routes or to try and guide all subjects along the same path. Research is currently underway as to the nature of the signs to be used.

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Vitae

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Memberships:
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Professional Activities:
Undergraduate curriculum committee, Psi Chi representative, 1989-1990

Fellowships and Grants:
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Papers Presented:
Acquino, A.L. (April 1990). Characteristics of a best route: An application to wayfinding systems. Paper presented at the 9th annual Mid-American Undergraduate Research Conference, Franklin, Indiana.

Research Experience:
Undergraduate fellowship (88-89) This project investigated the territorial effects of vaginal secretions taken from Syrian hamsters.

My honors thesis, which is currently in progress, investigates wayfinding and directional

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Teaching Experience:

I have worked as a private introductory statistics tutor at the request of Dr. Hill.

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I have worked three years as a desk staff in the residence hall. My duties include making change and dispensing equipment and information to the residents.