PERSONAL CONTROL OVER WORKPLACE LIGHTING:
Performance and Mood Effects

by

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ABSTRACT

Lighting research has produced a wealth of knowledge concerning the visual effects of workplace lighting, but little understanding of other behavioural consequences. One trend in current lighting practice is toward providing users with the opportunity to control their own workstation lighting, often through the use of supplementary task lighting. The general assumption is that personal control over lighting will lead to better performance and improved mood. The personal control literature in psychology is abundant and tends to support this belief. Environmental psychologists in particular have embraced the idea that the provision of choices in the physical environment will lead to desirable outcomes, such as feelings of self-efficacy or competence.

The present study tested the notion that personal control over lighting has beneficial effects, using a modified 2 x 2 Control X Preference factorial design with an additional control group to test for the possibility of subject reactivity biases. The Preference variable was included to test the hypothesis that working under favoured conditions, regardless of one's ability to control them, beneficially affects performance and mood. The design incorporated measures of motivation and attention to attempt to distinguish between two competing mechanisms that might underlie the effects. Male and female undergraduate students were randomly assigned to one of the five conditions in this laboratory experiment for a 2-hr session during which they completed a mood questionnaire and intellectual tasks including brain-teaser puzzles, a creativity task, an arithmetic task, and a grammar worksheet.

The manipulation of Control as well as the manipulation of Preference (for the lighting at which one worked) affected ratings of perceived control. Subjects in the Control condition reported higher feelings of control than those in the No Control Condition; similarly, Preference Given subjects rated their perceptions of control more highly than Preference Denied subjects.

Contrary to the conventional wisdom among environmental psychologists and designers, the results showed that choices in the physical environment are not always beneficial, at least where lighting is concerned. Control subjects performed more poorly on the intellectual tasks and more slowly on the creativity task than No Control subjects. The outcomes are discussed as differential effects of decisional versus cognitive control. Design applications of the personal control construct await further research.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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Introduction

From its infancy, environmental psychology has straddled the boundary between basic and applied research. Environmental psychologists attempt to understand basic psychological processes from a particular perspective (cf. Russell & Ward, 1982) while concurrently working to build a body of knowledge that can improve the design of environments for people (cf. Kaye, 1975). Although there is general acceptance that the field has "come of age" (Stokols, 1982; Stokols & Altman, 1987), there remain substantial gaps in our knowledge and few powerful theoretical frameworks. One topic that is poorly developed in this respect is the study of the behavioural effects of lighting (Boyce, 1987).

The scientific study of lighting began with the understanding of the role of lighting in making tasks more visible. Early studies focused on the limits of visual performance (e.g., Blackwell, 1946), and this work led to the establishment of illuminance recommendations and to improvements in industrial hygiene (Boyce, 1981). Visual performance, however, is only one possible process that lighting might affect: Nonvisual effects of lighting -- that is, effects that occur despite the adequacy of the lighting given the contrast and size of the task elements and the age of the viewer -- have received negligible research attention despite repeated calls for further investigation (e.g., Boyce, 1981; Sundstrom, 1986).

Current lighting design practice emphasizes installations that permit individual adjustment of workstation illumination. Designers (e.g., Wotton, 1989) believe that providing personal control in this manner will improve workers' performance and mood. This experiment, therefore, examined the effects of personal control over workplace lighting on intellectual task performance and mood. The research literature generally supported the hypothesis that personal control over lighting is beneficial, and suggested two psychological mechanisms (attention and motivation) for its action. The design of the present study was an attempt to test these mechanisms. Improving our understanding of this type of relationship can have implications for design practitioners as well as for theorists. Thus, this investigation was representative of the dual traditions of environmental psychology.

The role of this study within the discipline can best be understood in the context of its empirical and theoretical foundations, which are reviewed in the next few sections. We begin with the lighting literature.

Lighting

Review of Research

As Boyce (1981) has pointed out, there have been two approaches to lighting research: the practical, or field study, approach, and the laboratory approach. The latter has had by far the greater effect on lighting practice because of its greater role in the establishment of lighting standards and codes. Field studies generally lack controls to allow confident conclusions to be made concerning the causal relations between illumination and task performance.

The classic case that demonstrates the difficulty in conducting field studies involving illumination is the Hawthorne studies (Roethlisberger & Dickson, 1939). These well-known experiments conducted at an electrical assembly plant systematically varied illumination levels (illuminance). In some experiments, the light level was increased, while in others, it was decreased. Paradoxically, productivity increased regardless of the direction of the lighting increment. Even in the control group, which experienced no change in lighting, production improved steadily. In further informal investigations productivity increased even when existing lamps were replaced with identical lamps instead of brighter ones.

Gifford (1987) suggested that the Hawthorne studies might have delayed the development of environmental psychology by thirty years. Certainly one conclusion drawn from these studies was that the physical environment has no direct effect on human behaviour. This naive deterministic assumption, however, ignored the apparent effect that employee perceptions of the lighting had on their work output. The Hawthorne studies were confounded, in any case, by the special characteristics of the test rooms that differentiated the experimental subjects from the normal work environment so that not only the lighting varied (Steele, 1973). In addition, the room layout permitted more social interaction than the regular workroom; these special conditions might also have improved productivity.

Field studies are of limited use in developing lighting standards because each one uses a unique task having unspecified visual demands. It would be impractical to expect a field study to identify the optimal range of lighting conditions for every possible occupation, and yet the visual demands of the task are critical to the quantity and quality of light that are required for its performance. The identification of the most important of these task dimensions and their relationship to illumination has been the approach taken by the laboratory studies in what Boyce (1981) called the analytic model.

The analytic model. This model of lighting research uses simulations of real world tasks under strict control in a laboratory setting. Various aspects of the task and the lighting can be manipulated; ultimately, researchers in this tradition hope to produce results that can be extended to real workplaces.

It is important to recognize that the focus of the early lighting researchers was the optimization of visual performance. Their investigations concerned the characteristics of lighting and tasks that made details easy to see and that would enable prolonged work sessions without excessive fatigue. Nonvisual aspects of the environment-behaviour relationship, such as motivation, subjective impressions of the illumination, and lighting preferences, although not ignored, were clearly of secondary interest (e.g., Simonson & Brozek, 1948).

Some of the most successful research in the analytic model is Weston's (1962) series of investigations of task size (i.e., the size of the visual detail) and contrast over a broad range of illuminances. Weston used a simple task that is primarily visual and that allows easy manipulation of size, contrast, and colour. This is the Landolt ring chart, a page of closely spaced circular rings with gaps oriented in one of the eight cardinal directions. Subjects are asked to mark all of the rings on the chart having gaps oriented in a specified direction. Performance scores for this task consist of the time taken per correctly cancelled ring, corrected for the manual time needed to cancel a ring.

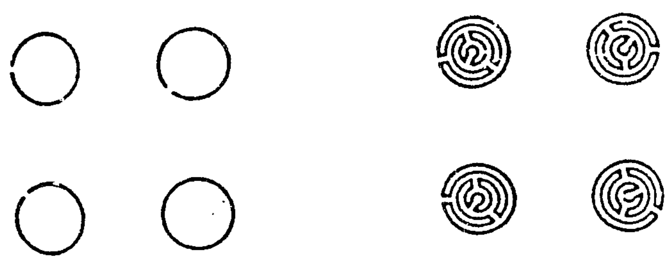
Weston used gaps of a broad range of sizes (visual angles of 1.5 to 4.5 min arc) and charts having contrasts [the ratio of background to task brightness (luminance)] of 0.28 to 0.97. The illuminances (the density of light energy incident on the task) ranged from almost 0 lux (lx) to nearly 10,000 lx (typical offices range from 500 - 1000 lx). His results show that for any task, increasing the illuminance causes an increase in performance that follows a law of diminishing returns. For each contrast and size combination, eventually there is no further performance increase associated with increases in illuminance.

Additional conclusions can be drawn from Weston's data. The precise illuminance at which performance levels off depends on the task size and contrast, and is lower for larger gap sizes and darker (i.e., larger) contrasts. Over illuminance ranges of practical interest, one can improve performance more by increasing task size or by increasing the contrast than one can by increasing the illuminance. Furthermore, a visually difficult task (i.e., small gap size with poor contrast) will always show poorer performance than a visually easy task, regardless of the illuminance.

Another type of Landolt ring has been used to study the effects of task complexity on visual performance. These are shown in Figure 1. The visual demands of this task can be made identical to the *simple* Landolt ring, but the complex rings are more difficult to search because gaps in the line must be distinguished from invaginations in the circles. Boyce (1974) compared the two types of Landolt rings at a number of illuminances. He found that the basic form of the relationship between illuminance and visual performance depends on visual difficulty (contrast and size), but is modified by task complexity as a multiplying factor at each level of illumination. At all levels of illumination, performance was slower for complex rings than for simple rings.

Background luminance, as well as task contrast and size, was the focus of an investigation by Boynton and Boss (1971) into visual search performance. The task required the use of both foveal and peripheral vision, whereas the typical Landolt ring chart uses foveal vision alone and therefore simulates different visual processes. At maximum contrast (background:task ratio = 1.00), performance varied little over a broad range of background brightnesses (360 - 1370 cd/m^2); there was no drop in performance until contrasts were reduced below 0.10. Relationships between luminance and contrast at 50% target detection threshold differed for small and large targets. Some conditions of luminance and contrast give easy performance, so that large changes in one dimension (luminance, contrast, and task difficulty) have little effect on target detection, the authors concluded; combining changes in various dimensions, however, can make target detection impossible.

Figure 1
Simple and complex Landolt rings



Size and contrast have been the most extensively studied variables in the illuminance-work relationship, but Boyce (1981) pointed out that other factors of potential importance await further investigation. Among these are task movement, off-axis work, blurred target edges, and colour contrast at low background luminance.

One non-task variable that is known to have an effect is the age of the viewer. Boyce (1973) found that older subjects performed consistently more poorly on the Landolt ring chart than young subjects, at least at low illuminances (220 lx), although the performance of both groups was the same at high illuminance (1600 lx). Results such as these should lead to a cautious approach to illumination standards based on performance data from a limited population.

The dependent measures considered important by analytic model researchers are not only performance data. Physiological indices of visual fatigue have long been sought, although no single measure has proven to be a reliable or a valid measure of the state of the visual system. As Boyce (1981) said, "at best, the literature on ocular fatigue can be said to show that some lighting conditions can produce ocular fatigue for some tasks sometimes" (p. 218).

Two prominent researchers in the North American lighting debates of the mid-century were Ernest Simonson and Josef Brozek. They questioned the light levels recommended by Luckiesh and Moss (1938), which were considerably higher than other recommendations. Tinker (1939), for example, found 31 lx was adequate for reading, but recommended 100-150 lx be provided to give a "margin of safety". Luckiesh and Moss recommended 200 - 500 lx for "ordinary reading" (p. 350). Simonson and Brozek (1948) sought to clarify this difference using a simulated task performed over an extended period; they used a variety of outcome measures that included performance, fatigue, and subjective impressions.

The task resembled a conveyor inspection job: Subjects copied letters appearing in a narrow slit. The letters were on a band of paper driven at a constant rate by a motor. The work period lasted 2 hr; each of the six subjects participated in all conditions of illuminance and lamp type, but were not informed of the purpose of the study. Before-and-after measures were made of a variety of visual functions including critical flicker fusion (CFF, the frequency at which a flickering light is seen as a continuous light) and a complete ophthalmic battery of tests. During the work period, performance was evaluated at three times (after 5, 60, and 110 min of work) and blink rate was also measured three times. Subjective assessments of the various illumination conditions were obtained separately, after the work data had been collected.

The researchers were careful to use statistical procedures that they believed were appropriate to their data and to base their conclusions on significance test results instead of graphical trends. They erred on the conservative side, however, by analyzing their within-subjects data as though it were between-subjects data. Re-analysis is impossible because they did not publish standard deviations. It is possible, but unknown, that statistically significant effects were overlooked.

The results in Simonson and Brozek (1948) show a performance optimum above 500 lx but below 3000 lx; it might be in the vicinity of 1000 lx (they tested 20, 50, 150, 1000, and 3000 lx). Performance and subjective well-being were optimal in the 500-3000 range, and certain fatigue measures (blink rate and recognition time for objects of threshold size) showed significant drops in this range. Regardless of lamp type, 1000 lx was the preferred illuminance. Interestingly, Simonson and Brozek found no effect of illuminance on visual fatigue measured with the standard ophthalmological tests; fatigue was demonstrated after the work session by the CFF (lower values indicate greater fatigue), maximum rate of eye movements, and subjective complaints. The authors noted that the optimum level they obtained would equal the minimum recommended level of the then-current standards of the Illuminating Engineering Society of North America (IESNA).

The same authors later reviewed the situation in the work-illumination field (Simonson & Brozek, 1952) and noted several difficulties with the research; they disagreed with the illumination standards of the day because of these problems. In theory, they said, illumination levels should be set to minimize visual fatigue, which is a physiological problem; however, the research did not show a systematic relationship between fatigue trends in visual functions and illuminance. The work performance studies reviewed were discredited because of poor controls and inadequate procedures. Simonson and Brozek favoured laboratory study of carefully designed work tasks for the study of illumination and visual performance. This work, they said, demonstrated the existence of an optimum illuminance, although not its value. The optimum should be the value given in illumination tables, but further research integrating performance, visual functions, and subjective reactions was recommended as the best route to improvements in illumination standards.

Some contemporary researchers have continued this line of work, including Boyce (e.g., 1970), who found a performance optimum between 1888 and 4196 lx for a meter-reading task. Others dispute the existence of optimal illuminances for task performance (e.g., Smith, 1978): In North America, the dominant model during the past 35 years has been the visibility model of lighting research based on the work of H. R. Blackwell.

The visibility model. Blackwell began his research during the war years, when he conducted an intensive investigation of the limits of human vision (Blackwell, 1946). This research established the contrast thresholds for stimuli of various sizes, contrasts, and exposure times as a function of adaptation luminance. As adaptation luminance increased, contrast thresholds consistently decreased; that is, observers became more sensitive to low contrasts as they adapted to brighter light. This result makes intuitive sense: We know from experience that brighter light makes things easier to see.

The ability to detect details is the key performance variable in the visibility model. The model has reached a highly defined state after decades of research by H. R. Blackwell and others. The first detailed report was published in 1959. It described the operation of the Visual Task Evaluator, a device now known as a visibility meter. This device makes it possible to compare the contrast of actual tasks to the threshold contrast of a reference task at a particular adaptation luminance. The two contrasts are used in the calculation of a ratio known as the visibility level. The detailed procedure is as follows.

The reference task is the detection of a luminous disc subtending 4 min of arc, viewed for 1/5 sec. By exposing subjects to a broad range of background (adaptation) luminances, it was possible to obtain a standard visual performance curve relating threshold contrast to background luminance (Blackwell, 1959). The threshold standard is 99.9% accuracy, rather than the more common 50% detection accuracy, because it was felt that, for practical purposes, near-perfect visual performance is required. The standard curve used in the visibility model was constructed from a population of 20-30-year-olds with normal or corrected-to-normal vision, and the reference illumination is diffuse white light with colour temperature of 2850 K. Thus, for a given background luminance, the curve establishes the contrast at which the luminous disc is just barely visible; this contrast is called $C(L_T)$.

In calculating visibility level (VL), the researcher places the target (reading material or other task material) into the visibility meter and sets the background luminance for the level under which the task is normally performed (L_T). The observer then adjusts a knob that controls a mechanism to cast a veiling luminance (L_V) over the task, like a cloud of light, until it is just barely visible. The mechanism is such that the total adaptation luminance is constant, because the background luminance decreases exactly in step with the increasing veiling luminance.

The target is then removed from the visibility meter and the 4-min disc presented. The veiling luminance previously set is maintained, while the background luminance against which the disc is viewed is adjusted to the visual task (L_T). The observer manipulates the contrast of the disc until it is just visible to give the equivalent contrast (C(eq)) of the target task in terms of the standard reference task. Visibility level is calculated using the formula:

$$VL = \frac{C(eq)}{C(L_T)}$$

The VL thus calculated represents visibility under very special conditions that never exist outside a visibility meter. The light is unpolarized, diffuse, of a particular colour temperature, and produced with uniform luminance at all parts of the task. The visibility model attempts to correct for these special conditions by the use of multiplying factors [Commission International de l'Eclairage (CIE), 1972].

The contrast rendering factor (CRF) is an index of the effects of the polarization, spectral composition, and spatial pattern of the actual lighting installation on task visibility, in comparison to the reference lighting conditions. The pattern of luminances in the task environment can either enhance or reduce visual performance potential in comparison with the reference lighting; this quality of the lighting installation is captured in the disability glare factor (DGF). In some installations, a third factor becomes important, the transient adaptation factor (TAF). This factor measures the loss in contrast sensitivity that occurs when the luminous environment is markedly nonuniform, so that the eye must frequently adapt to different levels of brightness as the gaze shifts. These values, calculated from photometric data from the actual lighting installation or from a visibility meter, are used to calculate the effective visibility level (VL_{EFF}):

$$VL_{EFF} = VL \times CRF \times DGF \times TAF$$

The goal of the visibility model researchers is the creation of a model that will allow the prediction of visual performance from information about the lighting installation, the task, and the observer. The model is not yet at that stage of development (Boyce, 1981); however, H. R. Blackwell and O. M. Blackwell (1968) reported analyses comparing H. R. Blackwell's 1959 standard visual performance curve with visual acuity data obtained at various luminances. The visual acuity data were obtained from studies that had used Landolt rings and letter recognition. Agreement between Blackwell's data and the visual acuity data was good.

The CIE has reported that a comparison of four studies of visual work performance as a function of VL_{EFF} show a consistent negatively-accelerating increase in performance with increasing VL_{EFF} (CIE, 1972). The value of VL_{EFF} beyond which the increase was very small is approximately 8, and this is the visibility level set as the design standard by the IESNA (1987).

One difficulty with the initial model was its static nature. It was possible to retroactively fit experimental performance data to VL_{EFF}, but predicting actual performance proved more difficult. Most tasks do not involve on-axis, brief viewing, which is the basis of the model; they demand constant scanning. Later versions of the model have included a factor that attempts to correct (as yet imperfectly) for the degree to which the target task demands off-axis viewing (Boyce, 1981). Population data on off-axis sensitivity were obtained by the Blackwells (H. R. Blackwell & O. M. Blackwell, 1980).

The original visibility model was constructed from a particular age group, and therefore there were difficulties in applying it to other viewers. Wide differences in the standard visual performance curve -- the basis for the entire model -- have been reported for different age groups (O. M. Blackwell & H. R. Blackwell, 1971). Older adults have poorer contrast sensitivity than the young adults of the reference population. Thus, the refined model also incorporates a factor to adjust for the age of the viewer. Work continues on the determination of the precise adjustments needed to account for these differences from the reference visual performance function (Boyce, 1981).

Relative visual performance (RVP) model. The National Research Council of Canada was the source of the most recent attempt at modelling visual performance. Rea (1986a, 1986b) used the philosophical foundations laid out by Weston and a mathematical model from electrophysiology to model visual performance on a numerical verification task. The philosophical roots of the model lie in the use of psychophysics to relate stimulus dimensions to quantifiable response dimensions (Rea, 1986a). Suprathreshold research in electrophysiology provided a mathematical formula demonstrating that increasing stimulation becomes progressively less effective in eliciting greater sensation (Rea, 1986b); the data used to develop the model provided the specific estimates for the parameters relevant to the numerical verification task.

The RVP model thus described predicts visual performance (response time corrected for mechanical response time) on an alphanumeric reading task from the task contrast and background luminance. Data are for suprathreshold performance; thus, the RVP model avoids the difficulty of the analytic model in assuming a linear relationship from threshold to suprathreshold performance (see below concerning this difficulty with IESNA standards). Based as it is on a task that can occur in everyday life, the model enjoys better external validity than the analytic model; however, we do not yet know the extent to which its predictions might apply to reading-based visual tasks other than numerical verification.

Rea (1986b) has made no claims that the RVP model is complete. Other factors that need to be incorporated into the model include size of critical details, viewer age, and the luminance distribution. The model does represent an advance in that it allows the prediction of visual performance from task and lighting characteristics, and it predicts how performance might alter if either is changed. This knowledge might improve design decisions; for instance, reducing illuminance from 650 lx to 150 lx will reduce visual performance by only 2% in young adults (Rea, 1986a). Such a loss might be acceptable in view of the potential energy savings of the lower illuminance. Rea advocated the use of the RVP model in specifying lighting needs in cases where visual performance is particularly important because it allows this kind of specificity about the effects of stimulus characteristics on visual performance.

The psychologist might note, however, that the RVP model systematically excludes nonvisual aspects of performance. The corrections applied to the performance measure and the research design itself were created with precisely this goal in mind. Rea (1987) has criticized much of the earlier lighting research for having confounded visual and nonvisual performance in a variety of ways. He considered between-subjects designs to have confounded subject differences with experimental variables, ignoring the effects of randomization; in his advocacy of within-subjects designs he appeared to dismiss considerations such as hypothesis-guessing and Hawthorne-type effects. Rea strongly advocated the unambiguous relating of visual responses and stimulus conditions as the only means to refining lighting recommendations. This approach, however, seems unlikely to lead to more accurate recommendations, because it excludes many variables that are likely to affect lighting requirements, including individual differences and preferences.

Despite the uncertainties and gaps in our knowledge of the relationship between light and work, illumination standards and codes are needed. A variety of recommendations for illumination levels have been made, each depending on the theoretical model used. Having discussed the principal models in current use, we turn now to their applications.

Standards and codes. Most countries subscribe to some form of lighting recommendations for various installations. Certain of these regulations -- for instance, safety lighting in stairwells -- have the force of law, but most exist in the form of codes written by one or another professional organization. The specific illumination levels that have been recommended for various tasks vary widely from country to country; European standards are lower than North American ones, and individual expectations for appropriate lighting vary accordingly (Belcher, 1985). The theoretical orientation that underlies the recommendations provides a clue to the reason for this difference.

The IES(UK) Code for Interior Lighting is the British lighting standards guide. Some samples of its recommendations are given in Table 1 alongside the parallel recommendations from the IESNA Lighting Handbook (IESNA, 1987), the North American guide. The British recommendations, it can be seen, are uniformly lower than the North American recommendations (table adapted from Boyce, 1981, p. 395).

The British code, first published in 1936, is based in part on Weston's Landolt ring studies (Simonson & Brozek, 1952), although each successive edition has incorporated changes that reflect new information and new lighting technology. The IESNA recommendations are explicitly based upon Blackwell's visibility model; they set the goal $VL_{EFF} = 8$ for all lighting installations. Although the choice of this VL_{EFF} was based partly on research evidence, it is primarily an arbitrary level that is believed to be a sufficient "safety margin" to guarantee adequate illumination.

These two approaches are in good agreement, according to an analysis of visual acuity data (from the analytic model studies) compared to the standard visual performance curve (Blackwell & Blackwell, 1978). This means that Weston's data, the basis of the British code, follow a similar function for performance at various adaptation luminances as Blackwell's threshold visibility for $VL_{EFF} = 1$. The North American standards reach for a higher VL_{EFF} than exists in the research that is the basis for the U.K. code, so it is not surprising that they should be higher.

The North American standards, although comprehensive [Boyce (1981) wrote that "the IES Lighting Handbook contains all there is to know about lighting and a bit more" (p. 394)], are open to criticism. The recommendations attempt to ensure illuminances equivalent to $VL_{EFF} = 8$ as established using reference lighting conditions; however, no data exist to demonstrate that any actual lighting conditions provide the same visual performance curve as the reference conditions.

Furthermore, the lighting calculations that a designer would perform in order to convert from VL_{EFF} to a task luminance to be supplied by the lighting system are based on a simple linear extrapolation of the original standard visual performance curve to the higher visibility level goal. Ross (1978) suggested that the relationship between visibility level and performance is not the same for suprathreshold performance; if this is true, it throws the entire framework of the

Table 1

Illuminance Recommendations of North America and Great Britain for Similar Applications (lx)

Application	IESNA	IES(UK)
Clothing factories --		
sewing	5400	1000
Glass works --		
furnace rooms	320	150
Engineering --		
medium machining	1100	500
General office	750	500
Drawing office	2200	750
Corridors	220	150

IESNA recommendations into doubt. Other data discussed by Ross show that, for equal visibility levels, the same task presented in different printing to subjects of various ages can have very different visual performance. This is contrary to the model assumption that visual performance should be identical for all tasks of equivalent VL_{EFF}.

The IESNA recommendations cover an enormous variety of tasks and settings, and include adjustments for glare, task importance, age of viewer, and surface reflectances. It is certain that the equivalent task contrast curves [C(eq)] have not been obtained for every possible task; indeed, for many tasks it would be impossible to determine. One serious drawback to the recommendations is the lack of any explanation of the way threshold visibility was related to most tasks in the absence of data. The Lighting Handbook is a tremendous achievement, but its credibility as a scientifically derived specification system suffers because of these problems.

The reader of lighting standards, Boyce (1981) pointed out, quickly realizes the difficulty in writing such a document. Ideally, standards should rest on sound empirical data; however, we do not yet have all the answers. In the meantime, the people who design workplaces and homes and schools want guidance for their lighting specifications, and they cannot wait for scientists to formulate the perfect predictive model. As a result of this tension, we do have sets of recommendations, however imperfect, that can assist the lighting designer. It remains for other researchers to investigate the practical effects of lighting installations on behaviour; this is one means of filling in the gaps left by the visual performance approach to lighting research.

Illuminance and office work. A long tradition of belief exists that equates more light with better productivity, a belief reflected in the steady increase in the IESNA recommendations from 1942 to 1981 (Pansky, 1985). It is true that brighter light improves the resolution of task details, as we have seen; however, research evidence for an illuminance effect on paper-and-pencil office tasks is equivocal. The question is not whether it is possible to make the workplace sufficiently dark to destroy performance, but whether extra illumination (over and above that necessary to resolve critical details) can improve performance.

A recent attempt to integrate the literature concerning this issue was a meta-analysis conducted by Gifford, Hine, and Veitch (in press). This quantitative integration of the results of eleven articles found that, indeed, higher illuminances lead to greater performance; this small-to-medium-sized effect could translate into a 19% improvement in performance if illuminance were increased from 450 to 2000 lx. However, the meta-analysis also suggested that this effect diminishes when people are given time to adapt to the conditions, although further research will be needed to resolve this question.

One strength of meta-analysis is its ability to provide information of the strength of a relationship, as well as detecting its existence. The combination of many experimental results has the added benefit of providing a more stable estimate of the effect size. However, conclusions about causal relations remain limited by the quality of the studies included in the meta-analysis. Regardless of the effect size estimated in a meta-analysis, it is impossible to attribute that correlation to a causal relation between the variables if uncontrolled extraneous factors confounded the primary research. The discussion below describes some of the research on the illuminance/office work issue and the reasons for the equivocality of the evidence.

Clerical work has been a popular choice for experimental tasks in illumination levels studies because speed and accuracy are easily quantified for number verification and paired-comparison tasks. Hughes and McNelis (1978) used number verification performance to compare the effects of three levels of illuminance, 538, 1076, and 1614 lx. Groups of young and old female clerical workers were hired to participate in the study, which used a within-subjects design. In the first study, the participants adapted to one of the light levels, completed a sheet of numbers to be verified, and then responded to a number of questions about the appearance and difficulty of the task in that light condition. The illuminance then was changed, and the procedure was repeated. Two levels of illuminance constituted one session. All possible sequences of pairs of the three illuminance levels were used; these were assigned randomly to the 9 sessions completed by each subject.

The data indicate that processing time per sheet decreased significantly as illuminance increased. Older workers were consistently slower than younger workers, regardless of illuminance. Accuracy in a second task, a variation of the number verification task involving comparisons between columns of numbers, showed steady improvement with increasing illuminance.

The authors reported, in addition to speed and accuracy effects, significant differences in subjects' ratings of the visibility, ease, and comfort of the task, and of the brightness of the lighting levels. Higher illuminances were rated as more comfortable and more satisfactory; ratings of the effort required, stimulation, and distinctness of the task increased with higher illuminances as well (Hughes & McNelis, 1978). These effects weaken the strength of their conclusions: The procedure of alternating the subjective ratings with the number verification task leaves open the possibility that the participants became aware of the manipulation and the hypotheses and adjusted their work accordingly. The design is reminiscent of the original Hawthorne studies (Roethlisberger & Dickson, 1939), in which a similar process probably occurred.

Barnaby (1980) reported similar findings, using them as the basis for a cost-benefit analysis of the effects of increasing illuminance in insurance offices. He attempted to demonstrate that the cost of the added luminaires and electricity would be more than offset by improved productivity. His conclusions might not be true today because electricity rates have increased substantially in the past decade and are very variable across North America; in any case, financial costs are not the only result of increasing workplace lighting. The environmental cost of the increased energy production has led other writers to recommend that excessively high illuminances be avoided, particularly when the evidence to support their performance benefits is weak (e.g., Boyce, 1981).

Smith and Rea (1978) studied proofreading accuracy as a function of age and illuminance. Performance did improve monotonically with illuminance, although the increase was less marked for young than old subjects. In the 500-1600 lx range studied by Hughes and McNelis (1978), the increase in performance was negligible in comparison with the standard error. These results cast doubt on the notion that raising illuminance levels will improve office productivity.

Concerning intellectual tasks of the sort done in most offices, the evidence for illuminance level effects on performance is lacking. Null results have been observed with a number of tasks, each simulating a different aspect of office work, as the following discussion will demonstrate.

One important dimension of nearly all office jobs is reading comprehension. Smith and Rea (1982) compared performance on the Davis Reading Test under illuminances of 9.9, 125.9, 1022.2, and 4885 lx, but found no significant effect of illuminance on comprehension or reading speed. The design was a within-subjects comparison with the illuminance conditions assigned to sessions using a Latin square. Although the use of this procedure controlled for practice and fatigue effects, it did not compensate for demand characteristics associated with full knowledge of the purpose of the study. A postexperimental debriefing did occur, but the authors (Smith & Rea, 1982) did not report whether the subjects had beliefs that might have altered their performance.

Earlier research (Tinker, 1959) had found that on a test with maximum performance accuracy, reading speed increases with increasing illuminance, to a maximum around 1000 lx even for poor contrast materials. Therefore, Smith and Rea (1982) were surprised by the results they obtained and suggested that a procedural difference between the studies might explain the discrepancy. Tinker's subjects had been tested using an apparatus that controlled their posture and maintained a constant viewing distance. The participants in the experiment by Smith and Rea were permitted to sit in any posture they chose The latter strategy was used to improve the external validity of the findings; however, they observed that in dim light subjects chose to incline their heads closer to the test booklet. They suggested that this might have compensated for what otherwise would have been performance deficits in poorer lighting (9.9 lx).

The nature of reading itself is also a plausible reason for the null findings of Smith and Rea (1982). They pointed out that reading does not generally demand the discrimination of fine details, but rather the recognition of whole words. Performance in general would not, therefore, be expected to decline until words could not be identified.

Veitch (1990) replicated the null results of Smith and Rea (1982) within the 200-600 lx range. The study used a between-subjects design so that subject expectations would be minimized. The results, however, might have been obscured by the low internal reliability of the reading test. Posture was unrestricted in this study, leaving open the possibility that subjects compensated for the lighting condition in their selection of a comfortable seating position, as had been observed by Smith and Rea (1982).

Creativity is considered another important aspect of office work because it demands complex intellectual processing. Nelson, Nilsson, and Johnson (1984) compared illuminances of 100 and 300 lx in a between-subjects experiment of illuminance and temperature effects on the number of words and the number of stories written in a creative writing task. No significant main effects were found on the performance measures. Mood questionnaires showed that low illuminance led to less boredom than high illuminance.

Nelson, Nilsson, and Johnson (1984) also found a curious interaction between illumination and temperature on mood: Low temperature (13°C) and high illuminance (300 lx) produced "bad mood" and "sadness" ratings that were worse than the low temperature/low illuminance condition. The trend was the reverse in the high temperature (30°C) conditions.

Creative writing was also the task in a recent study by Gifford (1988). The study used a between-subjects design to compare the effects of 60 versus 900 lx on the quantity of written communication between friends. There was no statistically significant difference between illuminance levels in communication (Gifford called the $p = .06$ for the lighting effect "marginally significant"). There was, however, an interaction effect of Illumination X Time, in which participants in low light decreased communication over time, while those in bright light maintained the same level.

In sum, although one review (Gifford, Hine, and Veitch, in press) suggests that the relationship may be real, design problems in some of this research create doubt about the accuracy of the statement that more light means more work. The volume of equivocal results suggests that future lighting research ought not to seek simple illuminance effects, but should strike out in new directions. Changes have occurred in recent years in the practice of interior lighting, and these can point the way for interesting research programmes. We turn now to the history and practice of lighting design and its relation to lighting research.

Lighting the Office

In the first offices designed for administrative or clerical work, illumination was entirely provided by natural daylight (Sundstrom, 1986). The offices of the mid-19th century were contained in narrow buildings with large windows to take advantage of all available light. Illuminance levels varied throughout the course of the day and with changing weather conditions and seasons. The need to have light penetrate to the centre of the building imposed width limits of 12-18 m because light could penetrate only 7-10 m from the windows. A common design feature was an interior courtyard that allowed light to reach the centre of the building. Interior partitions were usually made of glass to allow light to reach the clerical and reception areas from the private offices along the exterior walls.

It was not until the 1930s that artificial light became common in offices in North America (Sundstrom, 1986). As the advances in technology made brighter interiors feasible, standards for interior light levels rose sharply (Pansky, 1985; Sundstrom, 1986). The introduction of fluorescent lamps in the 1940s removed the practical difficulty of overcoming the heat production of incandescent lamps and provided greater intensity of light along with improved energy efficiency. Soon, cool white fluorescent lamps became the standard for office lighting, and the illuminance level goal for office lighting was set at 1000 lx.

Conventional office lighting consisted until recently of uniformly bright overhead fluorescent lighting provided by evenly spaced luminaires throughout the office. However, poorly designed systems can create glare, and monotonous designs are not aesthetically pleasing (Ellis, 1986). The problem of glare attracted increased attention following the introduction of video display terminals (VDTs) in many office in the late 1970s and early 1980s (e.g., Shahnavaz & Hedman, 1984). Veiling reflections (direct reflections of light sources) and glare on VDT screens were frequently associated with complaints of eyestrain and headache (e.g., Isensee & Bennett, 1983).

The response from lighting designers was to develop new luminaires and to change the design convention (e.g., Florence, 1989). Typically, offices with VDTs today have a lower overall ambient illuminance supplemented by personal mobile task lighting that allows individuals to direct the light where it is most needed. This design represents a fundamental shift from the assumption that visual comfort is maximized by uniform luminance across the space to the belief that variable luminance is preferable because it creates visual interest (cf. Vischer, 1989).

Concurrent with the change in design assumptions, there has been continuing concern on the part of lighting researchers that there is poor understanding of the effects of lighting quality on people. Ellis (1986) in particular emphasized the need to extend our understanding of lighting from the functional (requirements for seeing) to the aesthetic and symbolic realms. Wineman (1982) pointed out that little is known about the psychological effects of the various colour rendition capabilities of light sources, although some of the newer lamp types (e.g., high intensity discharge lamps) trade poor colour rendition for remarkable energy efficiency and are therefore being used more frequently as energy costs escalate.

The lighting literature has yet to catch up with the recommendations for research of writers such as Ellis (1986) and Wineman (1982). One study, however, has suggested that nonuniform lighting installations that reduce overall illuminance levels can be favourably rated by office workers (McKennan & Parry, 1984). The experiment was a within-subjects design that simulated normal office work performed under a variety of lighting installations. Subjects were aware that they were participating in a lighting study, but it is not clear from the report whether this knowledge might have influenced their assessments of the 10 installations. The authors did, however, report that a further field trial of some 18 months' duration had demonstrated both high satisfaction and substantial energy savings with a nonuniform lighting installation.

The basis for the early practices in artificial lighting design for offices was the belief that more light allows more sight and therefore more work (Sundstrom, 1986); it gave us recommended illuminances that were not justified by research data (see above; also, cf. Vischer, 1989). Current design practice is no less bound by assumptions. One common belief is that supplementary task lighting is preferable to other designs because it provides control to the user (Wotton, 1989). Personal control is frequently assumed to be beneficial; for example, Standley (1989) reported that allowing patient control over local lighting levels was one determinant of the overall lighting design in a renal dialysis clinic. The concern was clearly to provide an environment free of unnecessary irritants so that the painful medical procedure would be less traumatic.

Among office workers, some degree of control over office lighting is believed to be very important. Fifty-four per cent of the office workers in the 1979 Louis Harris poll for Steelcase, Inc. reported that it is very important to have a say in determining the type of lighting that is best for their work ("Office lighting", 1980). Marans and Yan (1989) reported that for workers in enclosed offices, the correlation between the rated ability to control lighting and total workspace satisfaction was 0.36, a moderately strong relationship. For workers in totally open offices, the correlation dropped to 0.18.

The centrality of the personal control construct to the changes under way in office lighting design makes it an obvious direction for lighting research to explore. Personal control has an extensive history in psychology and obvious applications to environmental psychology, as we shall see. The present study tested the notion that personal control over workplace lighting leads to beneficial effects on worker performance and mood, as designers (e.g., Wotton, 1989) and surveys (e.g., "Office lighting", 1980) have suggested.

Personal Control

Types of Control

Although there are innumerable studies in the psychological literature that have sought to understand the effects of personal control, the literature is not unified. The construct has been an important explanatory variable in the fields of abnormal psychology, applied social psychology, industrial/organizational psychology, and health psychology as well as being important to environmental psychologists. One reason for this disunity has been the variability in the operational definitions used for personal control, which invalidates broad generalizations.

The definitions of personal control fall into three broad categories that correspond to the three types of control identified by Averill (1973). These are behavioural control, cognitive control, and decisional control. Each will be discussed in turn.

Behavioural control. Behavioural control, as Averill (1973) defined it, exists when a response is available to the organism that might influence, either directly or by modifying its characteristics, a threatening event. This aspect of control was manipulated in Seligman's classic experiments that established the concept of learned helplessness (e.g., Seligman & Maier, 1967).

The initial studies (Seligman & Maier, 1967) compared the ability of two groups of dogs to learn an escape response when the grid floor of their enclosure was electrified with a mild current. The response was to jump over a low barrier. One group of dogs had previously been exposed to inescapable electric shock; the other had not. The inescapably shocked dogs could not learn the response; they lay curled in a corner, passively enduring the shocks. They had learned that their behaviour had no effect on the environment, and behaved in a helpless manner. The other dogs had no difficulty learning to escape.

Seligman extended the concept of learned helplessness from animal learning to human depression. He observed that the learned helplessness paradigm when applied to people produced behavioural, cognitive, and affective deficits that paralleled the characteristics of clinically depressed individuals (Seligman, 1974). Depression, according to the since reformulated model, is the result of global, stable, and internal attributions of failure or other aversive events; whatever happens to an individual that is unpleasant is attributed to causes within themselves that are enduring and that apply to most situations (Abramson, Seligman, & Teasdale, 1978). These attributions develop out of experience with repeated uncontrollable events. Although the theory remains a matter of debate (e.g., Ellis, 1987; Kofta & Sedek, 1989), the belief that a lack of control leads to feelings of powerlessness and unhappiness is widespread (cf. Averill, 1973; Burger, 1989).

Cognitive control. Averill (1973) defined this type of control as existing in the way in which an aversive event is interpreted, appraised, and incorporated into a cognitive plan. The clearest example of this concept is embodied in Glass and Singer's (1972) noise research.

Glass and Singer studied the effects of aversive bursts of noise, both predictable and unpredictable, on physiological and performance measures and on performance measures after noise exposure. Repeated stimulation produced adaptation of the physiological responses; vasoconstriction and skin conductance scores returned to baseline regardless of the predictability or controllability of the noise. Simple task performance was similarly unaffected by noise exposure (Glass & Singer, 1972); however, unpredictable noise did produce deficits in complex task performance during noise exposure (Finkelman & Glass, 1970).

Predictable noise did not cause the performance decline observed with unpredictable noise.

The knowledge gain in the predictable noise condition is said to provide cognitive control over responding because the individual knows when to expect the aversive stimulus, even if powerless to prevent it (Glass & Singer, 1972).

Perceived control was manipulated in the Glass and Singer studies by telling the subjects that, if they wished, they could terminate the noise bursts by pressing a switch. None, in fact, chose to do so; thus, both control and no-control subjects were identically exposed to noise; the only measure that showed significant effects were behavioural aftereffects. Perceived control increased subjects' postnoise frustration tolerance and improved their proofreading performance in comparison to subjects who lacked perceived control. These postnoise differences were the same as those found for the predictability/unpredictability manipulation.

Glass and Singer considered Seligman's learned helplessness model, which is based on reinforcement contingencies (aversive events that occur regardless of the organism's behaviour), to be a special case of a more general phenomenon underlying the effects of aversive stimuli. The perception of control, even if not exercised, allows one the possibility of escape; predictability allows preparation for the aversive event, even if escape is not possible. Without predictability or control, the organism "is at the mercy of his environment, in which case we may describe his psychological state as one of helplessness" (Glass & Singer, 1972, p. 86).

Decisional control. Decisional control offers the opportunity to choose between courses of action (Averill, 1973). In this sense are we all familiar with the concept of control. We are in control when it is our option whether to see one film, or another; it is an infringement on our liberty to be told what we shall do.

Perlmuter and Monty (1977) suggested that successful choices lead to improved motivation, whereas frustrated choices lead to reactance (Brehm, 1966), in which individuals attempt to re-establish the threatened freedom. Perlmuter and Monty found that the perception of control over what would be learned -- even when it did not, in fact, exist -- led to better performance on a paired associate learning task. Continuing research has also supported the hypothesis that perceived control leads to increased motivation; this motivation generalizes to tasks over which no choice is allowed (Perlmuter, Scharff, Karsh, & Monty, 1980).

Barnes (1981) clearly favoured the provision of choice in built environments as a means of preventing the detrimental effects seen in situations where perceived control was lacking, such as Seligman's learned helplessness research and Glass and Singer's noise aftereffects. However, where other writers equated perceived freedom with perceived control (e.g., Perlmuter & Monty, 1977), Barnes distinguished between them. Perceived freedom, he said, is associated with a desire for variety in options and with uncertainty, whereas perceived control is associated with a desire for certainty and predictability. Perceived control might emerge from repeated experience with freedom, as the product of many congruences and incongruences between behavioural goals and the structure of the available alternatives in the built environment. Thus, when one has learned by experience the proper configuration of window blind orientation, task and overhead lighting direction, and VDT location, to prevent glare on the VDT screen, one comes to feel in control of the environment and the situation.

Barnes' (1981) suggestion received support from the more recent findings of Chan, Karbowski, Monty, and Perlmuter (1986). These investigators found that the exercise of choice influences the development of perceived control. Slower decisions led to greater perceived control, and the perception of control generalized to a different task from the one in which the decision was involved. Chan et al. suggested that people monitor their behaviour -- they assess the effectiveness of their behaviour with respect to control -- and use the outcome information to form the perception of control.

In the built environment, Barnes (1981) advocated making the available choices explicit. The manoeuvrability of task lighting should be clear to the user; the various positions available for the window blinds must be apparent. Furthermore, the most important choices need to be identified so that designers can present the options that will maximize users' perceived freedom and, ultimately, their perceived control and satisfaction with the built environment.

As the preceding discussion suggests, decisional control is the most easily provided form of control for built environments. A belief that such choices lead to beneficial effects is the foundation of Barnes' (1981) recommendations; other theorists have suggested that control over the environment is not always desirable.

The connection is Steele's (1973, 1980) concept of environmental competence. Environmental competence is displayed in "people's ability to deal with their immediate surroundings in an effective and stimulating manner" (Steele, 1980, p. 225). Frequently, these dealings with the environment will involve making choices.

The role of personal control in the development of environmental competence is more clear in the definition offered by Jutras and Cullen (1983): Environmental competence is a reciprocal process, at once characterized by a motivation to control one's environment and the result of exercising that control. It is accompanied by a sense of mastery to the extent that the outcome is positive and a feeling of weakness or inability when failure occurs. Jutras and Cullen likened this weakness to the sense of powerlessness accompanying learned helplessness, when one learns that no behaviour of his or her own will alter an unpleasant situation.

Although this definition makes a clear connection between environmental competence and decisional control, it also makes clear that there is a cost associated with actions that do not achieve the desired result; having this control might not result in a favourable outcome. A number of means have been developed to avert the problems of failed decisions, mostly by Steele. He has advocated user participation, through consultation with managers and designers, in the design process (Steele, 1973). This call has been taken up in the design professions (e.g., Kleeman, 1981). More recently, Steele (1980) outlined a variety of ways to enhance environmental competence, including programs for formal education systems and mass media attention to the choices available in the physical environment.

Recent research by Paciuk (1989) points to the complexity of the relationships between actual control, perceived control, and the physical environment. She found that perceived control over the thermal environment enhanced satisfaction with the thermal environment; perceived control also mediated the effects of environmental and behavioural variables on office workers' thermal comfort and satisfaction. However, actual control over the thermal environment seemed to cause dissatisfaction; it appeared that the nuisance value of having to set the temperature outweighed its benefits in terms of thermal comfort and increased perception of control. Paciuk suggested that in designing environments that allow user control, a balance should be struck between enhancing perceptions of control and minimizing the possibility of causing annoyance in individuals forced to make too many choices.

The preceding outline of the typology of personal control included only a limited consideration of the effects of personal control. We know much more about the outcomes of, and the limitations to, personal control. The review that follows is not exhaustive, but it serves to demonstrate the diversity of research dealing with this topic. It also provides another perspective on the logic behind the present study and the rationale for testing the belief that personal control over workplace lighting benefits task performance and mood.

Consequences of Personal Control

Learned helplessness. Recall that Seligman's original research into learned helplessness involved exposing a group of dogs to a punishing stimulus (electric shock) that was unrelated to any behaviour they emitted (Seligman & Maier, 1967). The consequences of noncontingent reinforcement have been examined closely, but the generality of the effects remains in doubt. Winefield and Fay (1982) suggested that inconsistent findings in earlier research might have been caused by methodological flaws or, alternatively, that learned helplessness in humans might be moderated either by individual differences or transitory situational variables.

The test of this hypothesis involved comparing anagram solving ability in two groups of high school students following a training task that was contingently or noncontingently rewarded, or not rewarded at all (Winefield & Fay, 1982). The students attended either a traditional or an open-plan high school. The latter school emphasized individual initiative and active involvement to a greater extent than the former. It was anticipated that these students would display a weaker learned helplessness effect than the conventional school students. The data showed that prior exposure to noncontingent reward led to subsequent performance deficits on an anagram-solving task (a learned helplessness effect) in the conventional school students only. It appears, then, that the adverse effects of uncontrollability can be reduced by situational factors that affect individuals' perceptions of control.

Perceived control and locus of control. One individual difference variable that might affect the consequences of perceived control is locus of control, which refers to an individual's generalized belief that events are consequent on one's own behaviour (Internal locus of control), or on chance or powerful others (External locus of control) (Rotter, 1966).

It might be reasonable to believe that when perceived control in a given situation and generalized locus of control are congruent, adverse reactions to stress would be minimized. That is, when Internals perceive that they have control, or when Externals perceive that they lack control over a stressor, they will show reduced reactions during and after exposure to that stressor. Despite the face validity of this hypothesis, it has not found support in empirical tests (Stevens, Kirsch, & Graybill, 1987); of course, it is possible that more powerful methodologies might detect subtle effects that have not yet been observed.

Control over environmental stressors. The Glass and Singer (1972) research has been extended using a different stressor: crowding (Sherrod, 1974). High density did not produce performance deficits during exposure; however, subjects who had been given the option of leaving the crowded room, but who had elected to remain, showed greater post-exposure frustration tolerance than subjects who had not been offered that choice. These findings parallel the Glass and Singer findings except that Sherrod failed to find a postexposure effect on proofreading performance.

In the 1970s, there was a marked increase in concern for the ethical treatment of experimental participants. Informed consent procedures became commonplace, and are now required by most ethical review committees. Gardner (1978) observed that the change in regulations had a serious effect on his research program. Studies conducted under the old guidelines replicated Glass and Singer (1972), whereas the experiments that were conducted under the informed consent guidelines showed a complete lack of behavioural aftereffects following noise exposure.

Gardner (1978) suggested that perceived control is the mediating factor. All subjects, under the new rules, know that they may leave the experiment at any time without penalty. Thus, even participants in the no-control condition have, in fact, control over whether or not they choose to be exposed to the stressor. Bell and Doyle (1983) also suggested this possibility when faced with null results in their study of noise and heat effects on helping behaviour.

Intrinsic motivation for control. Thus far, we have considered the detrimental effects of a lack of control. In the experimental literature cited thus far, control -- either actual or perceived -- has led to one of two outcomes: (a) to more favourable outcomes than its absence (e.g., Glass & Singer, 1972); or, (b) to outcomes that are not significantly different from those where no control exists or is perceived [e.g., Winefield & Fay (1982) found no overall effect of training condition on anagram solutions]. These results accord with the popular notion that perceived control is intrinsically motivated, desired for its own sake (cf. Averill, 1973; Burger, 1989; Rodin, Rennert, & Solomon, 1980). Does the research literature support this notion?

Some evidence does support this idea. Schorr and Rodin (1984) examined whether control is intrinsically motivated, or whether it is desired because it increases the chances of a favourable outcome. They manipulated a task such that performance on it determined whether or not the subject gained or yielded control over a subsequent outcome. Subjects' motivation was inferred from the effort they expended on the task when the subsequent control was or was not contingent on performance.

Schorr and Rodin's (1984) results suggested that people are motivated for personal control: that is, subjects expended more effort when good performance would give them control over the later event. This was not accounted for by feelings of self-efficacy (the expectancy of gaining a good outcome through having personal control). In this study, no conditions were found in which subjects preferred to yield control rather than to obtain it.

Other evidence, however, points to situations where there is motivation to avoid control, not to obtain it. An important difference exists between these studies (discussed below) and Schorr and Rodin (1984): the importance of the outcome. Schorr and Rodin's subjects were in an artificial situation in which their control (or lack thereof) concerned whether a bitter or a sweet flavour would be tasted in a subsequent part of the experiment. Other studies have involved choices that probably held greater importance to the participants, such as their scores on various personality inventories. When the consequences of a poor choice are considerable and the choice is important to the outcome, the desire to control is low. People will give up decisional control in order to prevent the appearance of having caused failures (Rodin, Rennert,

& Solomon, 1980); contrary to popular wisdom, in certain situations greater perceived control can lead to poorer, not better, self-esteem.

The conditions under which personal control is undesirable were clarified by Burger (1989). Although control has been defined in many ways, he used a simple, general definition to unify his literature review: Control is "the perceived ability to significantly alter events" (p. 246, emphasis in original). Note that what is crucial is the perception of control whether or not it actually exists.

Burger (1989) identified three conditions that lead to undesirable outcomes following perceived control. Perceived control is not favoured when:

1. It leads to uncomfortable concern with self-presentation (i.e., it gives one too great a risk of failing, or of feeling foolish).
2. It decreases the likelihood of achieving desirable outcomes (e.g., when one believes that a good outcome is more likely when someone else, better qualified, makes the decision).
3. It increases the predictability of, and therefore draws attention to, aversive aspects of the situation.

In each of these situations, increases in perceived control can lead to negative affect (including lower self-esteem, as mentioned above), poorer subsequent task performance, and a tendency to relinquish personal control. Thus, although perceived control is a powerful variable, it is not universally desired or desirable. Burger therefore cautioned the designers of cognitive interventions to consider carefully both the situational and personal variables involved before deciding that increasing personal control is the desired intervention.

Control interventions. One frequently cited project is the nursing home intervention research conducted by Ellen Langer and Judith Rodin (Langer & Rodin, 1976; Rodin & Langer, 1977). The control intervention was an instruction set, delivered to residents on one floor of a nursing home, that emphasized the responsibility that residents had for making their own choices about their daily lives. Residents on another floor were told that the staff were committed to meeting their needs for them. For example, Responsibility-Induced subjects were given the choice of a plant and the responsibility to care for it; Comparison subjects were presented with a plant and told that the nurses would water it for them.

Three weeks after the intervention, Langer and Rodin (1976) found that the control intervention had led to improvements in residents' general sense of well-being, their alertness, and their active participation (e.g., visiting outside the institution, visiting other residents, talking with staff). At a follow-up eighteen months later, Rodin and Langer (1977) reported, the effects had persisted. Residents who had been part of the control intervention had better health and were more active than the Comparison subjects. Sociability and mood ratings showed less decline for the control intervention residents than for Comparison residents and, surprisingly, their mortality rate was significantly lower. These studies are cited as classic examples of the importance of perceived control for health and well-being.

Recall, however, Burger's (1989) caution against overzealous implementation of control-relevant interventions. One situation in which control is likely to be relinquished occurs when desirable outcomes become less likely as a result of personal control being given the individual. In the case of institutionalized people, this might occur when the exercise of control by patients makes life more difficult for the staff.

Langer and Rodin (1976) acknowledged that the implementation in their study involved some awareness on the part of the staff, and that this might have altered the quality of staff-resident relations. Furthermore, selection bias might have operated because conditions were assigned to entire floors of residents.

Hutchison et al. (1983) attempted to address these difficulties in the design of their study, which implemented control for individuals using a multiple-baseline design and kept the staff blind to the implementation. They found that the control intervention -- encouragement and support given in personal interviews for individuals' specific activity choices and their suggestions for institutional changes -- did have an effect on the specific behaviours involved. Participation in preferred activities did increase, as shown by graphical analysis of the observations in this small-N study.

However, the intervention did not affect self-reported activities, moods or beliefs, staff ratings, interviewer ratings, nor behavioural observations; this suggested that the Langer and Rodin (1976) results could not be accounted for by personal control alone. Hutchison et al. observed that positive outcomes were assured only when control led to behaviour that was mutually beneficial to both staff and residents, thereby taking advantage of the reinforcers present in the situat : staff responses to patient demands. Control in and of itself, as Burger (1989) suggested, is no panacea.

Control in the workplace. Industrial/organizational psychologists have shown great interest in the effects of personal control on job satisfaction and performance. Spector (1986) conducted a meta-analysis of 101 samples in 88 studies published since 1980 to summarize knowledge in this area. He found that employees with comparatively high perceived control on the job have greater job satisfaction, motivation, commitment, and job involvement. These employees, it seems, also perform better work and have fewer symptoms of emotional distress. Although these findings conformed to Spector's expectations, he cautioned that the heterogeneity in the mean correlation sizes suggests that perceived control is not universally favourable and that further research is necessary in order to identify its limits. Evidence that individuals do not always desire control supports his suggestion (e.g., Rodin, Rennert, & Solomon, 1980).

One intriguing suggestion is that job satisfaction and job performance depend on the discrepancy between the amount of control possessed and the amount of control desired. Greenberger, Strasser, Cummings, and Dunham (1989) conducted the same two-phase longitudinal study in two different field settings, and controlled in both cases for locus of control [recall that Stevens, Kirsch, & Graybill (1987) failed to find support for the situational/dispositional control congruency hypothesis]. The results replicated in samples that differed in terms of education, professionalism, and responsibility.

Most subjects desired more control than they possessed, which suggested to the authors that cautions about the negative effects of too much control are unnecessary (Greenberger et al., 1989). Personal control was positively related to both performance and satisfaction, within phases and over time. Time 1 personal control predicted Time 2 job performance (supervisor rating) and job satisfaction (self-report). Unfortunately, high intercorrelation between the ratings of

Control Possessed and Control Desired made a direct test of the discrepancy hypothesis impossible.

Findings of the sort analyzed by Spector (1986) and reported by Greenberger et al. (1989) underlie the quality of worklife movement. These are programmes involving job redesign to increase employee control, job variety and complexity, and task identity; their goal is more satisfied, productive, and healthy employees and effective organizations (Becker, 1986). One aspect of job quality not to be overlooked is the physical environment, and to this end, Becker defined quality of work environment (QWE).

QWE is not an absolute; what constitutes a quality work environment will depend on characteristics of the workers, their tasks, their expectations, and their values (Becker, 1986). High quality will exist when there is agreement between what exists in the office environment and what is needed. Becker contended that worker health and well-being are positively related to QWE.

One consistent feature of the elements in the definition of QWE is control. QWE is maximized when individuals have maximal control over adjustments to their physical environment, including office lighting. The 54% of office workers in the 1979 Louis Harris poll for Steelcase, Inc. ("Office lighting", 1980) who rated control over office lighting as important would agree; however, the notion has yet to receive an empirical test. This, therefore, was one purpose for the present study.

The Research Question

This study examined the issues raised by the trend to greater individual control over lighting in the workplace. Specifically, it tested the notion that user control over lighting benefits both performance and mood. Complex intellectual performance was assessed using brain-teaser puzzles, arithmetic, a grammar worksheet, and questions requiring creative thought. Performance speed was also measured. A mood questionnaire measured feelings on three subscales: Dominance, Pleasure, and Arousal.

Environmental psychology has typically equated control with the presentation of choices, implicitly defining control as decisional control. However, this approach confounds control with preference. When one makes a choice, one chooses the option one prefers. This experiment attempted to disentangle Control and Preference.

The literature suggested two mechanisms (discussed below) that might underlie the relationships between personal control, performance, and mood. Specific hypotheses were generated about the effects of Preference and Control in each model. These also are discussed below.

Explanatory Models

One model placed attention as a mediator between control and performance, and might be considered specific to the role that lighting plays in making task details visible. It presumed that individuals learn by experience the lighting configurations that work best for them, and that they choose these when control is available. The other mechanism placed motivation as a mediator of the effects of personal control on performance.

Attention. Many researchers have concerned themselves with the motivating or arousing effect of light levels (e.g., Gifford, 1988), but lighting can also assist in focusing attention. LaGuisa and Perney (1973) used spotlighting of visual aids to assist attention focusing in elementary school classrooms, and reported that the special lighting caused better attention as well as improved performance on a short-term memory test for the highlighted material.

Butler and Biner (1987) studied preferred light levels and found considerable differences in subjective ratings of preferred illumination levels for different tasks and different settings. They suggested that illumination levels are chosen to facilitate appropriate focusing of attention for the task. To the extent, then, that individuals know which lighting choice optimizes their attention to the task (presumably through their experience in different settings and performing different tasks with a variety of light levels and types), having control over the lighting should have a beneficial effect on task performance. However, performing a task under one's preferred lighting should be equally beneficial; most people, given a choice between options, will choose what they prefer. According to this model, any beneficial effect of having control is an artifact of having obtained one's preference.

In the present experiment, attention was operationalized as the ability to screen irrelevant stimuli. Scores on a test of incidental learning constituted the attention measure. The incidental learning methodology used in the present study was modelled after Craik and Tulving (1975). To the extent that attention is focused on the task demands, subjects should be less able to remember extraneous details of the task materials, such as their colour, typefaces, and irrelevant information about their sources. They should be unable to correctly answer questions concerning these characteristics. If their attention is not devoted to the task, memory for the superficial features of the task should be greater. The learning that occurs during the session but that is incidental to the task is called incidental learning.

One flaw in this approach is the requirement that the subjects pay a minimal degree of attention to the task material. A subject who ignores it altogether, staring into space for the duration, will not have been exposed to the task materials and will do poorly on a recognition test. The present study examined this possibility with a manipulation check on self-reported attention to task.

Motivation. Having personal control over any environmental condition, lighting included, might benefit performance and mood through a motivational mechanism that is more general than the attention model. The perception of control has been associated with increased motivation (e.g., Chan et al., 1986; Perlmuter, Scharff, Karsh, & Monty, 1980), particularly when the control is over situational variables that highlight feelings of mastery and competence (cf. Burger, 1989). In the physical environment, having personal control and successfully exercising it is associated with the development of environmental competence (Jutras & Cullen, 1983), which is believed to be beneficial to employee performance and satisfaction (Steele, 1973).

Bandura (1982) wrote that self-efficacy is "concerned with judgements of how well one can execute courses of action required to deal with prospective situations" (p. 122). To the extent that one has successfully met such challenges in the past, one will perceive oneself to be self-efficacious. This judgement will affect how long one persists and how much effort one expends to carry out the task at hand. Perceptions of self-efficacy have a motivating effect, leading to more prolonged persistence in the face of obstacles.

The motivational model for the present study, therefore, predicted a chain of events:

Personal control leads to perceptions of self-efficacy, which improves motivation, which in turn influences task performance. Consistent with Becker's (1986) QWE concept, the model suggests that control over workplace lighting leads to a general feeling of competence or self-efficacy that improves one's motivation to perform the task at hand.

Research Design

The research design was intended to serve two data analysis strategies. The study used a true experimental design, a 2 x 2 between-subjects factorial design crossing Control with Preference.

The first data analytic strategy was an analysis of variance approach. Planned comparisons were used to test specific hypotheses (discussed below); it was expected that the pattern of results would support one or the other of the two models.

The independent variables in the experimental design were manipulated using the instructional set given to the participants at the start of the study. Those subjects assigned to one of the four conditions formed by the 2 x 2 cells of the design performed the cognitive tasks after having been given the option of working under a lighting configuration other than the experimenter's suggestion (Control), or having been offered no choice (No Control). The experimenter suggested a lighting configuration for each subject, either the one they preferred or that they did not prefer, established by prior ratings of the lighting choices (Preference Given versus Preference Denied).

A fifth group of subjects (labelled the Naive group) performed the same tasks under the same lighting as the other four, but were given no prior indication that control over or preference for lighting were involved in the study. This condition was a comparison group to test for subject expectancy effects such as those reported in the Hawthorne experiments (Roethlisberger & Dickson, 1939). In particular, the group controlled for the possibility of hypothesis-guessing or other subject biases introduced by the preference pretest procedure. The subjects in this group were randomly assigned to the three lighting configurations. The design is depicted in Figure 2.

The second data analytic approach planned for this study was correlational. At the same time as control over and preference for workplace lighting were manipulated to test their effects

Figure 2
Experimental design

Workplace Lighting:	No Control	Control
Preference Given	n = 36	n = 36
Preference Denied	n = 36	n = 36
Naive (preference posttest)	n = 36	N = 180

on cognitive performance and mood, attention, self-efficacy, and motivation were measured. In addition to their role in the ANOVA model, the intent was to use these variables in a path analysis of the data from the factorial portion of the design to determine whether the pattern of correlations supported one or another of the models described above.

The models tested in this study are depicted in Figures 3 and 4. In the Attention model, Control is expected to directly affect Dominance scores, which are a measure of the extent to which one feels in control of the situation. Other effects that have been attributed to control are, in this model, the result of having obtained one's preference. The effect of Preference on performance is mediated by attention.

In the Motivation model, Control affects Dominance directly; however, the effects on performance, arousal, and pleasure are mediated by self-efficacy and motivation. Preference and Control X Preference interaction effects also indirectly influence the outcome measures.

Hypotheses

Four planned comparisons were made. One contrasted the Naive group against the weighted mean of the No Control groups in a test for Expectancy effects. These groups were treated identically except for the timing of the preference rating. If the preference pretest caused subject biases, the No Control groups would differ from the Naive group. If there were no biasing effects of the preference pretest procedure, no Expectancy effects would be detected. Although this contrast is not orthogonal to the Control main effect, it is the only meaningful contrast to test for subject biases caused by the preference pretest procedure. Meaningfulness of a comparison is the critical criterion in the analysis of experiments (Keppel, 1982).

The contrasts of primary interest were tests for a Preference main effect, a Control main effect, and a Preference X Control interaction. Different patterns of results were expected depending on the mechanism, but the same pattern was expected for the cognitive tasks and the mood reports. The patterns of results that each mechanism was expected to produce are compared in Table 2. Note that in either case, one would expect a main effect of Control on the Dominance subscale of the mood measure.

Attention. An attentional mechanism would be suggested by the presence of a Preference

Figure 3
Attention model of the personal control-performance/mood relationship

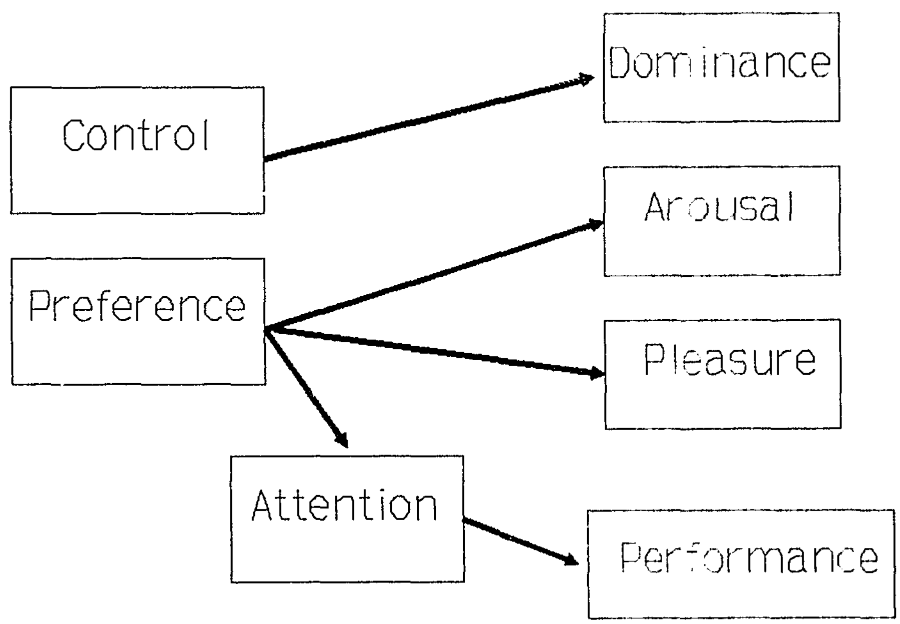
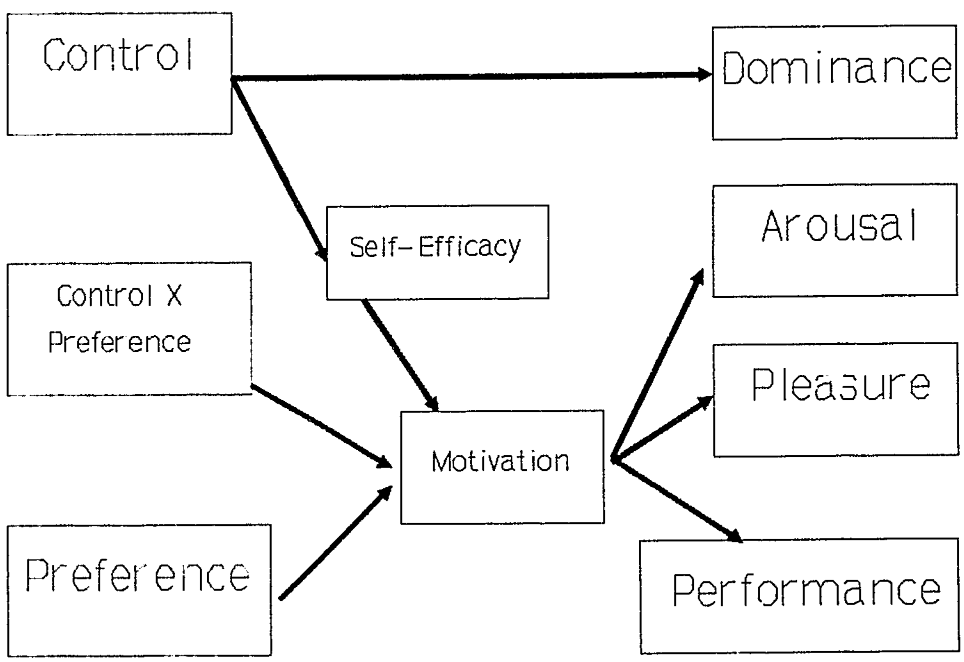


Figure 4
Motivation model of the personal control-performance/mood relationship



main effect in the absence of either a Control effect or an interaction between the two. Under this model, it would be the case that simply working under the lighting that offers the best focusing of attention on the task benefits performance.

Motivation. Preference and Control main effects and a Preference X Control interaction would imply a motivational mechanism. Preferring one's lighting or feeling that one had control over it would both improve one's feelings of efficacy and mastery, and these would increase the motivation to perform the task at hand. The motivational effect of lacking control would differ, however, depending on whether one was allowed to work in one's preferred lighting configuration or not: The No Control - Preference Denied condition should have decreased motivation more than the No Control - Preference Given condition. Hence, the predicted interaction effect, depicted in Figure 5.

To offset the possibility that differences in the desire for control over environmental features would obscure the effects of the control manipulation, perceived personal influence was measured. Thus, if necessary, these scores were available for use in an analysis of covariance.

Existing research evidence supported the motivational mechanism more strongly than it did the attentional mechanism. There is a long tradition of support for the motivation. ' effects of perceived control on performance (e.g., Perlmuter & Monty, 1977) and the social learning literature supports Bandura's self-efficacy construct and its effects on performance (Bandura, 1982). The attentional mechanism rested on the assumption that individuals choose the lighting that is best for them, rather than the lighting that is most familiar or that is preferred on emotional grounds; this is a tenuous assumption. However, the attention mechanism was included in the present study because the hypothesis casually suggested by Butler and Biner (1987) had yet to receive an empirical test. The present study was intended to provide such a test.

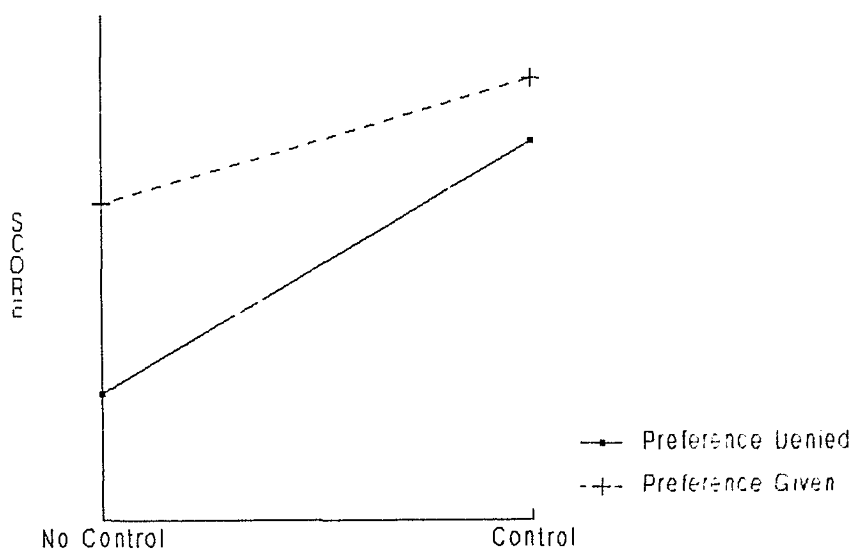
Table 2

Comparison of Hypotheses under Attention and Motivation Models

Effect	Model: Attention	Model: Motivation
Control	higher score: Dom	higher scores: TP, Sp, Dom, Pl, Ar, SE, Motiv
Preference	higher scores: TP, Sp, Pl, Ar, Att	higher scores: TP, Sp, Pl, Ar, Motiv
Control X Preference		On TP, Sp, Pl, Ar, Motiv, as in Fig 5.

Note. TP = task performance measures; Sp = performance speed (higher = faster); Dom = Dominance score on mood measure; Ar = Arousal score on mood measure; Pl = Pleasure score on mood measure; Att = attention measure; SE = self-efficacy measure; Motiv = motivation measure.

Figure 5
Hypothesized Control X Preference interaction, assuming that a motivational mechanism operates



Method

Subjects

The subjects were 192 undergraduates from the University of Victoria, 96 men and 96 women between the ages of 17 and 36. They represented all the undergraduate faculties of the university. More than half were in their second to fifth year of university; 42% were first-year students. All had normal or corrected-to-normal hearing and vision. Each participant received an honorarium of $8.

Apparatus and Variables

Setting

The study was conducted in a 5.18 x 5.18 m windowless room set up to appear like a shared office. Three workstations were placed in such a way as to maintain visual privacy for each participant and to allow different lighting configurations to exist at each one (see Figure 6). The illuminance levels at the three desks were equal at 750 lx mean horizontal illuminance. This level was chosen for consistency with IES recommended illuminance for office work with medium-contrast printed materials (IESNA, 1987). Different combinations of ambient light and supplemental task lighting were used to achieve the target illuminance.

The ambient lighting in the room consisted of cool white fluorescent lamps (GE F40CW/RS/WM) in recessed troffers with K-12 acrylic lenses. Roscolux gel #97, a neutral grey, was used to reduce the brightness of certain luminaires. Each layer of this gel reduces transmission by 50%. The lighting layout is shown in Figure 7.

One of the three workstations was lit using direct and indirect ambient lighting only; that is, the existing overhead fluorescent luminaires provided all the light for this workstation. Another was lit using a combination of ambient lighting and supplemental incandescent task lighting with a 60- watt lamp. The third workstation was lit by ambient lighting and supplemental task lighting with an 11-watt Osram Dulux EL compact fluorescent lamp. The equivalent illuminances were achieved by reducing the brightness of the ambient light (by using two layers of gel in the luminaires directly overhead) for the workstations having supplemental task lighting.

In order to maintain the equivalence of the illuminances during the entire session, the

Figure 6
Floor plan of room

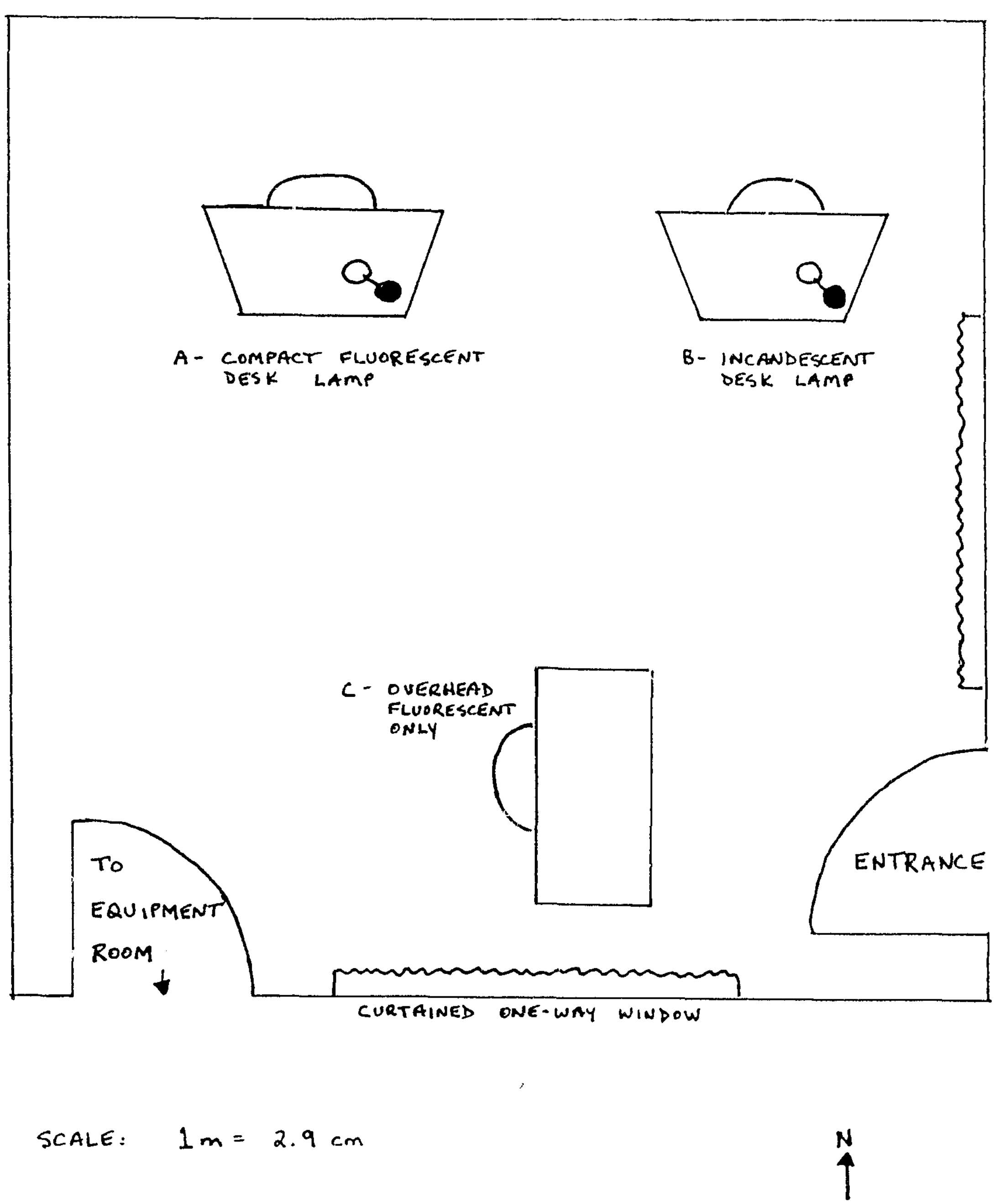
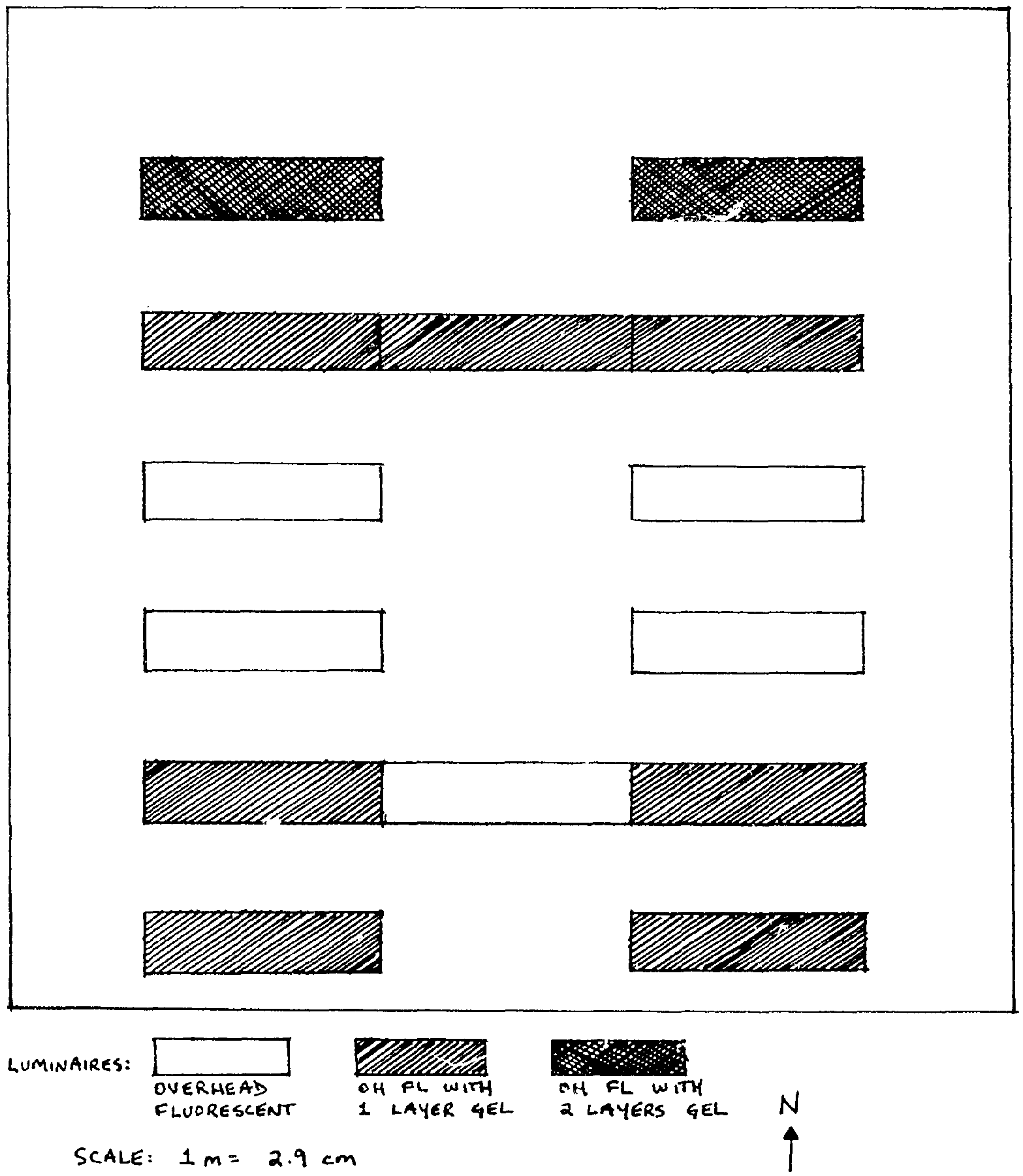


Figure 7
Lighting design in experimental room



configurations themselves were fixed; control over workplace lighting was manipulated using the instructional set (see below).

The laboratory room is light beige. To create visual interest, the walls were decorated with lithographs of abstract scenes. The room has one-way mirrors on two walls; these were covered by curtains. The photographs in Figure 8 were taken during data collection.

Independent Variables

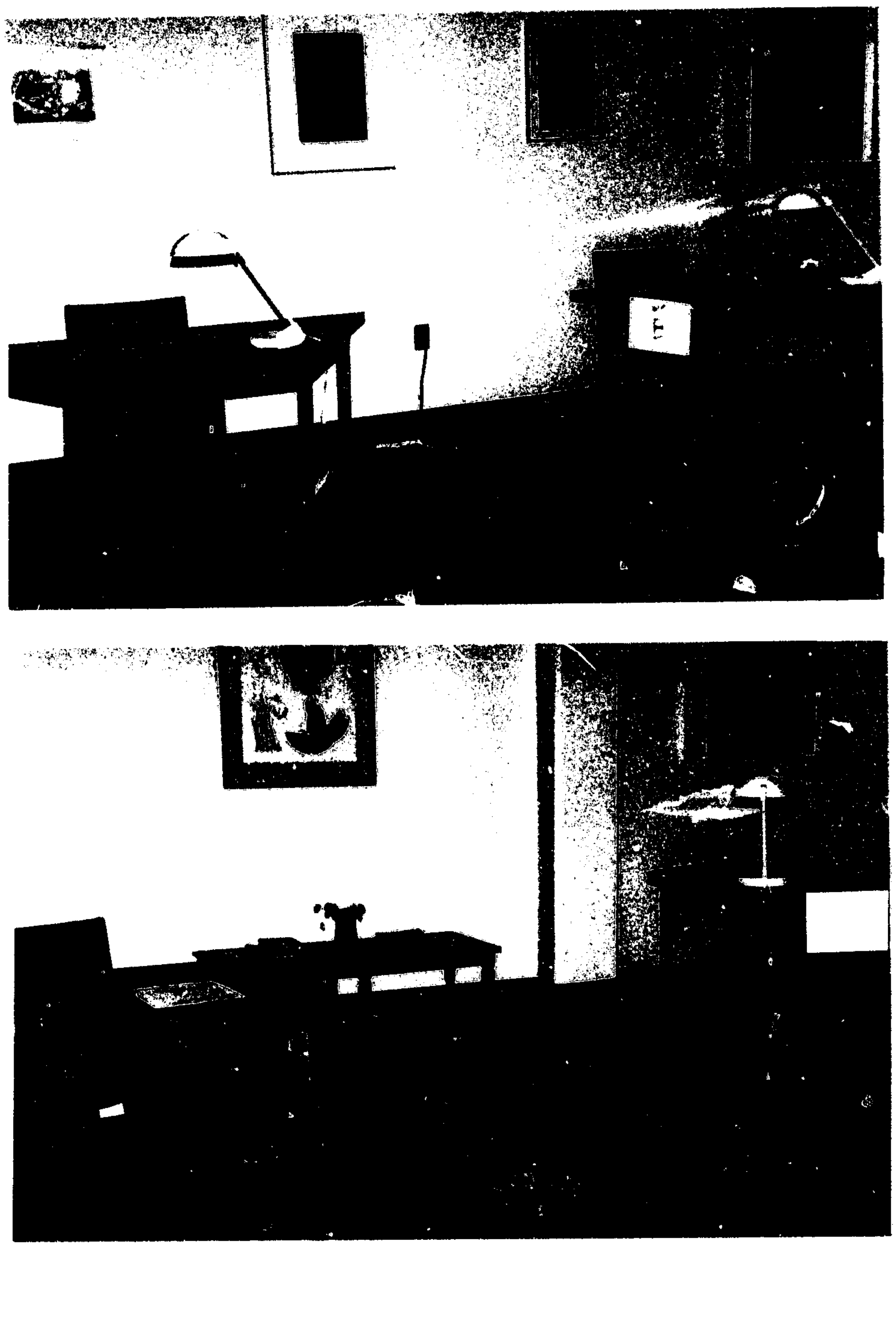
The two manipulated independent variables each had two levels. Control over workstation lighting was given or denied, and subjects performed the tasks at a workstation with lighting that was either their preferred configuration of the three choices, or was their least preferred configuration. The manipulations of these variables was as follows.

The subjects in the 2 x 2 Control X Preference conditions began the experimental session by completing a questionnaire in three parts (see Appendix A), one section at each of the three workstations. The assignment of questionnaire sections to workstations and of subjects to starting points were both random. One section of the questionnaire requested demographic information. The remaining two parts were created by dividing in half the 28 items of the Academic Locus of Control scale (Trice, 1985) a forced-choice scale measuring the extent to which students attribute their academic situation to their own behaviour. In the present study, this was a dummy questionnaire, and the responses were later discarded.

After completing the three parts of the initial questionnaire, the subjects rated their relative preference for each of the three workstation lighting configurations. Relative preference for each configuration was measured by having the preference ratings take the form of allocating 10 "preference units" between the three options. The forms for this rating differed for the Control and No Control groups in that the subjects in the Control group were explicitly told that their ratings would influence the lighting they worked under for the rest of the session (see Appendix B).

The preference rating information was used to assign subjects to workstations for the remainder of the experimental session. Preference Given subjects were assigned to their top-ranked workstation; Preference Denied subjects were assigned to their lowest-ranked workstation.

Figure 8
Photographs of experimental setting



In order to perform the assignment, the experimenter left the room under the guise of having to add scores on the initial questionnaire before the session continued. When she returned, she asked the subjects to take a particular seat for the remainder of the session. This instruction constituted the manipulation of Control.

The instruction set was a modification of the original Glass and Singer (1972) instructions for their studies of perceived control over noise. In the present study, the experimenter said to the Control subjects:

> "I'm going to ask each of you to sit in a particular seat for the rest of the session. If you really want to work under a different lighting setup, you have the choice of sitting elsewhere. All you need to do is tell me. The choice is yours, but I would prefer that you sit at desk __, and that you sit at desk __."

No Control subjects were politely asked to move to the appropriate seat, and no explanation was given. No Control subjects already seated at the appropriate seat were told that they would not need to move.

The desk assignment was either their preferred (Preference Given) or least-preferred (Preference Denied) workstation. Where the initial random assignment to conditions would have resulted in two people sitting at the same workstation, one was randomly assigned to the complementary condition (i.e., Preference Given instead of Preference Denied) to resolve the conflict. This procedure, which the experimenter carried out without the subjects' knowledge, was necessary in 40 of the 143 sessions having two participants.

The five subjects who chose to exercise their option in the Control-Preference Denied condition were allowed to move to another desk; however, their data were later excluded from the analyses. Replacement subjects were recruited for that condition.

A fifth group of subjects did not perform the preference rating task at the start of the session, although they did perform the three-part questionnaire at the three workstations. When the experimenter returned to the room, they were asked to return to the workstation to which they had originally been assigned. No explanation was given for why the seating was assigned. At the end of the session, these subjects rated their liking for each of the workstations in the same manner as the No Control subjects. This condition was a control for the possibility that the initial preference test might have had a biasing effect on the outcome.

Materials and Measures

All the task materials were high-contrast black-on-white photocopies of typed material that was 10 pt or greater. The computer answer sheets were green ink on white. The subjects used dark ink or HB pencils.

Self-efficacy. Self-efficacy refers to the belief that one has the ability to perform competently. It was measured using the Self-Efficacy Scale (Sherer et al., 1982). This is a 23-item scale that measures general beliefs in one's own competence separately from general beliefs or behaviours (see Appendix C). It has subscales for general self-efficacy and social self-efficacy, although only the full scale score was used here.

Cognitive task performance. The dependent measures of task performance were four cognitive, intellectual, and creative tasks chosen for their similarity to the kinds of tasks that office workers perform. The tasks included a timed arithmetic test (Appendix D), in which subjects had 2 min to successively subtract the same amount from a starting value, and a grammar task (Appendix E) that was also performed under time pressure. In the latter task, the subjects underlined the nouns or verbs in a sentence.

Another dependent measure was the number of complex logic problems correctly solved. The problems were of the type given to potential members of Mensa (e.g., Fixx, 1972). Correct solutions require the application of logic, basic mathematics, and world knowledge. The problems were from the public domain. Pilot testing with undergraduates (who did not then participate in the study) established the difficulty level and appropriate number of problems for the time period allotted.

Creative problem-solving was assessed using the responses to questions that ask for novel uses for familiar objects. The measure was the number of plausible suggestions; the questions were of the form: "Name as many possible uses as you can for a wire coat hanger." Both the logic and creative problems are in Appendix F.

The subjects were allotted a fixed period of time to work on the 13 problems in the task booklet. They were asked to note the time at which they started and finished each problem, using a small digital clock on the desk. This provided a measure of the time required to solve each problem.

Attention. The measure of attention was an index of the extent to which subjects attended to irrelevant details of the task booklet. Incidental learning is a commonly used paradigm in the study of selective attention (e.g., Beiser, 1974; Lane & Pearson, 1982; Stava & Jaffa, 1988). Those subjects whose attention was focused on the solution of the puzzles were expected to score lower on a test of memory for the colour of the paper or the typeface in which particular questions were printed. The test was administered without warning immediately following the intellectual task booklets. The test itself is in Appendix G; the material to which it refers is in Appendix F.

Motivation. In the present study, motivation is conceived as the extent to which an individual is willing to persist when faced with a difficult or impossible task. The more motivated one is to perform the task, the longer one will persist. To measure this variable, the present study included the Feather persistence task (Feather, 1961), a perceptual reasoning task that requires the subject to trace an outline without lifting the pen from the page and without tracing any line twice (see Appendix H). Four items make up the task, of which two are unsolvable.

Copies of each of the four items were stacked in a pile and the four piles placed face down in front of the subject, with the piles labelled 1-4. For each item, the subject's task was to trace over all the lines of the diagram. The subject could take as many trials as desired on each item; each trial lasted 40 sec, timed by the experimenter. The persistence measure is the number of attempts made on the unsolvable items before abandoning them. A total of 30 trials (20 min in all) were allotted for this task, although the subjects were not informed in advance of this time limit.

Mood. After the performance measures, a mood questionnaire was administered. The Russell and Mehrabian (1977) three-factor semantic differential scale was selected for this study (see Appendix I). The questionnaire uses 9-point bipolar scales on 18 pairs of adjectives that form subscales for Pleasure, Arousal, and Dominance. These factors are independent aspects of mood, according to Russell and Mehrabian.

Perceived personal influence. This variable is a measure of the extent to which individuals believe they can influence features of the physical environment in a variety of common settings. The measure used in this study (see Appendix J) was a short form of the Survey of Personal Influence in Common Environments (Gifford & Eso, 1988). It consists of 8 items, each representing a different setting (e.g., home, outdoors, school, work, public spaces). The individual first reads a list of physical features of that setting, then gives a rating on a 5-point scale of the extent to which they actually control those features in that setting and another rating of how important it is to them to be able to control those features. The Actual Influence and Desired Influence ratings were separately averaged to give two scores for each subject. The scale was included in order to use Desired Influence as a covariate.

Postexperimental questionnaire. Prior to being debriefed as to the purpose of the study, subjects completed a questionnaire concerning their beliefs about its aims and its probable outcomes (see Appendix K). They also rated the extent to which they had had control over aspects of the experimental situation, including the lighting. This served as a check on the manipulations.

Procedure

Assignment of each subject to one of the 5 conditions in the modified factorial design was random. A random number table was used to assign a condition to each experimental session. Subjects chose sessions that were convenient to them, having been invited to participate in "a study of office work". The experimental sessions lasted two hours. Two subjects were scheduled for each session. Approximately one-third of the sessions had only one participant because of nonattenders.

Each session began with general instructions, and after the signing of a consent form (Appendix L) all subjects completed the three-part demographic and academic locus of control questionnaire described above. The subjects in the four experimental conditions also completed the preference rating procedure. The experimenter then left the room briefly, going into an adjoining room "to do some addition of the scores before we go on"; actually, this was a ruse to permit the experimenter to assign and to record the seating for the remainder of the session. The subsequent assignment of subjects to workstations was described above.

The first task following the seat assignment was the Self-Efficacy Scale. When both participants had completed this scale, they received the problem booklets. Twenty-five minutes were allotted for this task. The experimenter verbally instructed the subjects concerning the procedure for recording the times to ensure that they understood.

Immediately after the completion of the puzzle booklets, the incidental learning test was administered. This timing was designed to allow a reasonable degree of confidence that the test reflected attentional focus during the task, and not distraction or forgetting subsequent to it.

The perceptual reasoning task followed. The experimenter placed the piles of diagrams in front of each subject, and read the instructions aloud from a printed page. Although there was a maximum duration for this task, the subjects did not know about it. If anyone asked how much time was allotted for the task, the experimenter evaded the question by saying, "Well, we're not going to stay here forever, but don't worry about time." Subjects who were continuing on an unsolvable puzzle at the end of 20 min (30 trials) were asked to stop.

Two min each were allowed for the arithmetic and grammar tasks, timed by the experimenter using a stopwatch. These instructions were not read aloud. After these performance questionnaires, the mood questionnaire and the perceived personal influence questionnaire were administered. The instructions for the latter were read aloud because pilot subjects found the questions confusing.

At this point, the Naive group subjects rated their relative preference for the three workstations. The instructions given to the other subjects were modified somewhat for these subjects to prompt them to think back to the initial questionnaire, when they had moved from workstation to workstation.

All subjects completed the postexperimental questionnaire. Finally, the experimenter debriefed the participants as to the purpose of the study and asked for their cooperation in keeping the details of the hypotheses from future participants. None of the subjects arrived at the experiment having heard about the specifics of the study.

Results

A total of 192 people participated in this experiment. Preference data are available for all subjects; however, performance and mood data from seven subjects were discarded because of experimenter error in seat assignment. Five subjects in the Control-Preference Denied condition chose to sit at a workstation other than the one to which they had been assigned; the data from these subjects were excluded from the statistical analyses, but are discussed below. Their data and the data from the 180 subjects whose data were the basis of the statistical analyses are presented in Appendix M.

This chapter begins with the analysis of variance (ANOVA) model. There were four planned comparisons. The Expectancy effect a contrasted the weighted mean of the No Control groups and mean of the Naive group. This contrast tested for the possibility of biases resulting from the preference pretest procedure. The other three contrasts are standard Control and Preference main effects and a Control X Preference interaction effect.

Analysis of Variance

Manipulation Checks

The postexperimental questionnaire was used to determine how difficult the subjects perceived the tasks to be, whether they had guessed any of the research hypotheses, and how much control they perceived themselves to have had during the experimental session. Each of these sets of data was analyzed separately and the results are discussed below.

Hypothesis-guessing. The postexperimental questionnaire included three open-ended items concerning participants' beliefs about the purposes of the study and the research hypotheses. These questions were intended to serve as a check against subject expectancy effects or other subject biases. Most subjects answered these questions briefly, in point form, and many did not answer all three. Therefore, a simple coding scheme was devised to indicate whether any of the responses suggested that the subject had guessed any of the hypotheses. A score of 0 indicated that no hypothesis had been guessed or independent variable identified; 1 indicated a guess of the Control hypothesis, while 2 indicated that Preference had been identified. If both Control and Preference were identified, a score of 3 was recorded. The contingency table for the variable

Hypothesis Guessing by condition is shown in Table 3.

The chi-square for this table is 21.10, df = 12, N = 180, $p<.05$. The breakdown of hypotheses guessed across conditions is not what one might expect by chance. A substantial number of subjects guessed that Preference played a part in the experiment; those who took the time to explain their answer invariably stated that working under one's preferred conditions would improve performance and said that they knew this because they had been asked to move to their most-preferred seat.

Overall, a large number of subjects (41% of the total) appear, at the least, to have identified the independent variables. Coding the responses to these questions was difficult because of the large number of one-word responses (some subjects were rushed for time; others were tired at the end of a long session). The scoring criterion was conservative in that any indication that the subject might have guessed a hypothesis was scored as a hit. In recognition of this fact and in order not to reduce unduly the power of the analyses, data from all subjects were retained for analysis. Subsequently, the analyses were repeated using only the data from those subjects who had not guessed any hypothesis. These analyses are discussed below.

Perceptions of control. The means and standard deviations for these ratings are presented in Table 4. The items to which they refer are listed in Appendix K. The responses to these ten items were analyzed using MANOVA and the four planned comparisons corresponding to the research hypotheses outlined above.

The Expectancy effect test contrasted the Naive group against the weighted mean of the No Control groups. In the multivariate test of significance, Wilks' lambda = 0.923, F (10, 134) = 1.12, $p>.05$.

The Preference effect test contrasted the subjects who were assigned to sit at the workstation they had rated most highly (Preference Given) with the subjects who were assigned to sit at the workstation they had rated lowest (Preference Denied). In the multivariate test of significance, Wilks' lambda = 0.660, F (10,134) = 6.90, $p<.001$. The univariate tests showed that this effect is associated with significant differences in responses to the items "The experimenter had all the control during the session" (C5), F (1,143) = 4.17, $p<.05$; "I had some control over

Table 3

Contingency Table of Hypothesis-Guessing by Condition

	Condition				
Guess	CPD	CPG	NCPD	NCPG	N
0	18	21	23	16	27
1	8	6	5	8	3
2	5	8	7	12	3
3	5	1	1	0	3

Note. Guess indicates which hypothesis was suggested by subject responses on the open-ended items. 0 indicates no guess; 1 indicates a guess of the Control hypothesis; 2, a guess of the Preference hypothesis; 3, a guess of both Control and Preference hypotheses.

Table 4

Means and Standard Deviations for Manipulation Check Items by Condition

	Condition				
Item	CPD	CPG	NCPD	NCPG	N
	n=30	30	31	29	28
C1	M=2.00	2.47	2.42	2.48	2.14
	SD=0.98	1.07	1.09	1.09	1.21
C2	3.60	3.63	3.61	3.66	3.57
	0.77	0.67	0.84	0.55	0.74
C3	2.47	2.83	2.55	2.70	2.64
	1.22	0.99	1.12	1.13	1.16
C4	2.80	2.60	2.74	2.79	2.89
	0.81	1.00	0.72	0.82	0.99
C5	1.93	2.47	1.97	2.31	1.79
	1.20	1.20	1.02	1.31	1.13
C6	1.60	3.33	0.65	1.90	1.63
	1.43	0.84	1.14	1.47	0.87
C7	3.33	3.03	3.45	3.14	3.07
	0.61	0.85	0.68	0.69	0.66
C8	3.03	2.77	3.03	3.00	3.14
	0.96	1.14	0.84	0.84	0.85

...

Table 4 continued...

	Condition				
Item	CPD	CPG	NCPD	NCPG	N
	n=30	30	31	29	28
C9	2.50	3.50	0.74	2.14	1.07
	1.50	0.86	1.13	1.41	1.12
C10	1.83	2.90	0.84	2.03	0.82
	1.39	1.30	1.07	1.27	1.19

Note. CPD = Control - Preference Denied condition. CPG = Control - Preference Given condition. NCPD = No Control - Preference Denied condition. NCPG = No Control - Preference Given condition. N = Naive condition. Item numbers refer to questions in the post-experimental questionnaire (Appendix K). All items are scaled 0 to 4, where lower values indicate that the respondent believes that he or she has less control; higher values greater perceived control. Unequal cell sizes resulted from missing data.

the lighting in this study" (C6), F (1,143) = 47.73, $p<.001$; "Being able to control my environment makes me feel better" (C7), F(1,143) = 5.72, $p<.05$; "There were choices I could make about the lighting where I worked during the session" (C9), F (1,143) = 28.72, $p<.001$; and, "The experimenter controlled every aspect of what occurred during the session, including where I sat" (C10), F (1,143) = 24.70, $p<.001$. The marginal means and effect sizes for these variables in this contrast are displayed in Table 5.

The subjects who received their preferred lighting condition reported higher perceptions of control on items C5, C6, C9, and C10, than the subjects who did not receive their lighting preference. Preference Given subjects reported higher than neutral (the value 2 was labelled "neutral") agreement with statements such as "I had some control over the lighting in this study" (C6) and "There were choices I could make about the lighting where I worked during the session" (C9). Preference Denied subjects reported, on average, below-neutral disagreement with these statements. The effect sizes for items C6, C9, and C10 indicate that these are strong effects, accounting for 12-19% of the variance.

The direction of the effect differed for the Preference effect on item C7, "Being able to control my environment makes me feel better." Preference Given subjects agreed less with this statement than Preference Denied Subjects, although both group means are greater than 3 on a scale with a maximum value of 4 and the effect size (3.9% explained variance) suggests that this is a weak effect.

The Control effect contrasted those subjects who were told that they had the option of choosing to sit at a seat other than the one suggested by the experimenter (Control) against those subjects who were simply asked to take a particular seat (No Control). In the multivariate test, Wilks' lambda = 0.705, F (10, 134) = 5.62, $p<.001$. Examination of the univariate tests showed that this effect is attributable to three variables, C6 (F (1,143) = 30.64, $p<.001$), C9 (F (1,143) = 48.71, $p<.001$), and C10 (F (1,143) = 16.70, $p<.001$). Table 6 displays the marginal means for these variables.

The direction of these effects is consistent with the manipulation. Control subjects reported having had more control over the lighting in the study (C6) and having been able to

Table 5

Marginal Means and Standard Deviations for Preference Effect Contrast on Control Ratings

Item	Preference Group Denied n=61	Given n=59	η^2
C5. Had some control	M=1.95	2.39	2.75
during session	SD=1.10	1.25	
C6. Had some control	1.12	2.63	19.6
over lighting	1.37	1.39	
C7. Environ. control	3.39	3.09	3.9
makes me feel better	0.64	0.77	
C9. Had choices	1.61	2.83	12.25
about lighting	1.58	1.34	
C10. Had control	1.33	2.48	12.40
over seating	1.33	1.34	

Note. Item numbers refer to questions in the post-experimental questionnaire (Appendix K). All scales 0 to 4, where lower values indicate that the respondent believes that he or she has less control; higher values imply greater perceived control. (Items C5 and C10 were reverse-scored.) Unequal cell sizes resulted from missing data.

Table 6

Marginal Means and Standard Deviations for Control Effect Contrast on Control Ratings

Item	Group		
	Control n=60	No Control n=60	η^2
C6. Had some control over lighting	M=2.47	1.25	12.80
	SD=1.46	1.45	
C9. Had choices about lighting	3.00	1.42	20.70
	1.32	1.44	
C10. Had control over seating	2.37	1.42	8.60
	1.44	1.31	

Note. Item numbers refer to questions in the post-experimental questionnaire (Appendix K). All scales 0 to 4, where lower values indicate that the respondent believes that he or she has less control; higher values imply greater perceived control. (Items C5 and C10 were reverse-scored.) Unequal cell sizes resulted from missing data.

make choices about the lighting where they worked during the study (C9). They also believed that the experimenter had relatively less control over where they sat during the session than No Control subjects (C10). Thus, the manipulation appears to have had the intended effect of creating a sense of control over the lighting.

It is interesting to note, however, that there was no effect of Control on item C5, "The experimenter had all the control during the session" (reverse-coded), although there was a Preference effect on this variable. This effect raises concerns that the measurement and manipulation of Preference might have had a biasing effect on other results.

Task difficulty ratings. The participants rated the difficulty of the puzzle booklets, the arithmetic page, the underlining page, the Feather persistence task, and the tasks overall. The ratings were on a scale from 0 to 4, with higher values indicating increasing difficulty (from "very easy" to "very difficult"). The means and standard deviations for these variables by condition are displayed in Table 7.

In general, the subjects found the Feather persistence task moderately difficult (M = 3.20, SD = 0.74), and the mean puzzle booklet rating is slightly difficult (M = 2.71, SD = 1.02). The arithmetic page rating (M = 2.13, SD = 1.14) is close to neutral. The underlining page was rated as moderately easy (M = 0.94, SD = 0.98). The rating for overall task difficulty (M = 2.32, SD = 0.68) indicates that the participants felt that the tasks, taken together, were neither easy nor difficult.

The five ratings of difficulty were analyzed using MANOVA and the four planned comparisons described above. None of the multivariate tests reached significance. Whatever the effects of the independent variables on performance or speed of performance, they did not affect subjects' perceptions of task difficulty.

Self-reported attention. Five subjects did not answer the postexperimental questionnaire item concerning attention. Of the 175 who did respond, 84.7% reported having paid "good" or "full" attention to the logic puzzles and other tasks. The overall mean score was 3.19 (SD = 0.75), on a scale of 0 ("no attention") to 4 ("full attention"). The means for each group are shown in Table 7. Low scores on the incidental learning test, therefore, should indicate greater

Table 7

Means and Standard Deviations for Task Difficulty Ratings and Self-Reported Attention by Condition

	Condition				
Item	CPD	CPG	NCPD	NCPG	N
	n=35	36	35	36	36
Puzzle	*M*=2.91	2.69	2.63	2.56	2.78
	SD=1.04	0.89	1.06	1.00	1.10
Underlin.	1.06	1.08	0.86	1.03	0.69
	1.14	1.13	1.00	0.85	0.75
Arith.	2.17	2.31	1.94	2.39	1.83
	1.07	1.19	1.14	1.08	1.16
Feather	2.83	3.31	3.23	3.25	3.36
	0.99	0.62	0.65	0.65	0.64
Tasks	2.34	2.31	2.20	2.44	2.31
	0.68	0.71	0.68	0.56	0.75
Attention	*M*=3.12	3.28	3.35	3.06	3.17
	SD=0.73	0.66	0.69	0.79	0.86
	n=34	36	34	36	35

Note. All difficulty items are scaled 0, "very easy", to 4, "very difficult". Attention is scaled 0, "no attention", to 4, "full attention". Cases with missing data were excluded.

attentional focus on the task booklet, not a lack of exposure to it.

Descriptive Statistics

This section concerns univariate statistics for the dependent measures across all subjects. Each variable is discussed in turn. The statistics are summarized in Table 8.

Self-efficacy scale. The scores on this scale were obtained by averaging across the ratings of the 23 items on the Self-Efficacy Scale questionnaire. The ratings of certain items were recoded before averaging so that higher values reflect greater self-efficacy. The scale runs from 0 to 4. The mean self-efficacy score is 2.66, indicating that the participants generally felt moderately self-efficacious. The distribution of scores is negatively skewed (skewness = -0.62; z_{skew} = -3.44, $p < .05$); thus, more than half of the participants obtained scores greater than the mean. The reliability of the scale is good; Cronbach's alpha was 0.87, calculated on 177 subjects. Three subjects had missing data on one or more of the 23 items, and their data were not included in the reliability calculation.

Motivation. The principal measure of motivation is the total number of persistence trials on the Feather perceptual reasoning task. This score was obtained by summing the number of trials attempted on the unsolvable diagrams. A total of 30 trials were allowed; some subjects persisted on the first diagram for the entire time. Other subjects were stopped while still attempting the third diagram. The frequency distributions for both the first and third diagrams are positively skewed. The summed value should give a better index of each subject's willingness to persist on these impossible tasks than either alone. The resulting distribution is still significantly skewed, but to a lesser degree than the separate distributions (M = 14.63; SD = 8.82). This measure remains non-normally distributed, however, being a bimodal distribution (Figure 9).

Whereas the first and third diagrams are unsolvable, the second and fourth diagrams are solvable. These data were not intended for analysis, but it is worth noting that every subject who attempted it found a correct solution to the second puzzle within 5 trials; the modal response was one trial (M = 1.47, SD = 0.83). All but one subject who attempted it found a correct solution to the fourth diagram. The modal values were one and two trials (M = 3.11, SD = 2.77). One

Table 8

Univariate Descriptive Statistics for Dependent Variables

DV	M	SD	Min	Max	N	alpha
SEff	2.66	0.53	1.13	3.65	177	0.87
Motiv	14.63	8.82	2.00	30.00		
Incid	4.59	1.64	1.00	8.00	180	0.37
Domin	4.07	0.96	1.83	6.50	175	0.72
Pleas	3.20	1.13	0.17	6.00	178	0.82
Arous	3.50	1.10	1.17	6.83	180	0.71
Puzzles	4.21	2.76	0.00	10.00	180	0.75
Arith	13.13	5.12	0.00	27.00		
Grammar	17.18	11.93	-19.00	40.00		
Creat	6.39	3.19	0.00	18.00		
PuzTime	1.47	0.56	1.00	5.00	162	
CreaTime	0.79	0.41	0.22	3.00	177	
DesInf	2.09	0.55	0.50	3.63	177	0.71

Note. SEff = Self-Efficacy Scale average score (scale 0 - 4, higher scores indicate greater self-efficacy). Motiv = Total unsolvable trials on perceptual reasoning task (scale 0 - 30). Incid = Total items correct on incidental learning test (scale 0 - 10). Domin = average Dominance scale score (scale 0 - 8, higher scores indicate stronger feelings). Pleas = average Pleasure scale score (scale 0 - 8, higher scores indicate stronger feelings). Arousal = average Arousal scale score (scale 0 - 8, higher scores indicate stronger feelings). Puzzles = number of brain-teaser puzzles correct (scale 0 - 11). Arith = number....

Table 8 continued...

of correct arithmetic problems. Grammar = number of correct nouns/verbs less number of misses. Creat = number of novel uses suggested. PuzTime = average time per correct brain-teaser puzzle. CreaTime = average time per novel use suggested. DesInf = average desired influence over environmental features (scale 0 - 4, lower values reflect greater desire for personal control). Cases with missing data were excluded from alpha calculations but included in scale scores; N = number of cases for alpha calculation for scale variables. For Time variables, missing data occurred when participants scored 0 on Puzzles or Creat; N indicates the number of cases used to calculate M and SD.

subject was unable to find a solution to the fourth puzzle, and gave up after 15 trials. Solvable perceptual reasoning tasks appear to be relatively easy for these subjects.

Incidental learning. The scores on this variable consist of the number of correctly answered items on the memory test for extraneous information from the puzzle booklet. The maximum possible score was 10; however, no one achieved this score. The highest obtained score is 8; the mean is 4.59. Scores on this variable are normally distributed around the mean. The internal consistency is low; alpha = 0.37. The poor performance on this variable was to be expected, given its nature. Given that two-thirds of the subjects scored between 3 and 6, the poor internal reliability is not surprising.

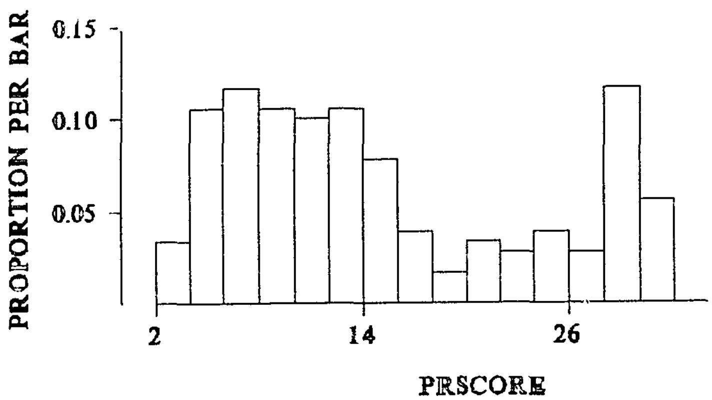
Mood scales. Scores on the three subscales of the Russell and Mehrabian (1977) mood scale (Appendix I) consist of the average score across the six items forming the subscale. The responses were recoded where necessary before averaging so that higher values indicate stronger feelings on the factor. Thus a score of 5 on Arousal indicates greater arousal than a score of 3. Each scale has a theoretical minimum of 0 and maximum 8.

The overall mean for the Dominance scale is 4.07, and the standard deviation is 0.96. The mean is almost exactly at the neutral point for the scale, and the standard deviation is low. This result is not what one would expect. Dominance ought to reflect the extent to which one feels in control of a particular situation; given the manipulation of control over one aspect of the experimental setting, one might expect greater variability in these scores. The reliability of this scale is also lower than expected (alpha = 0.72); Veitch, Gifford, and Hine (1991) obtained a value of 0.89 on the same scale with a smaller sample. Scores on this variable were, however, distributed normally.

The participants appear to have felt more displeased than pleased; the mean Pleasure score is 3.20 (SD = 1.13), slightly below neutral. The reliability of this scale was closer to previously obtained values, but still low. Alpha for this scale is 0.82, lower than the 0.87 obtained by Veitch, Gifford, and Hine (1991). The distribution of scores on this variable is normal.

Across all subjects, the average Arousal score is 3.50 (SD = 1.10), again close to the neutral point. Once again, the reliability of this scale is poorer than previously reported values;

Figure 9
Histogram for perceptual reasoning scores



alpha = 0.71, whereas 0.87 was the value in Veitch, Gifford, and Hine (1991). The frequency distribution for this variable has a slight positive skew (skewness = 0.38; z_{skew} = 2.12, $p > .05$), but it is not sufficient to violate the assumption of normality.

Puzzle score. The score on this variable is the total number out of the 11 puzzles that the subject answered correctly. The mean value, 4.21, suggests that this was a challenging set of problems. The internal consistency of this set of questions is 0.75. The scores on this variable are normally distributed.

Arithmetic score. The number of correctly completely items on the arithmetic page was chosen as the preferred indicator of arithmetic performance; it reflects both speed and accuracy. No subject completed more than half of the page in the allotted time. The mean value, 13.13, falls within the middle of the range (0-27), with good variability (SD = 5.12). The distribution is somewhat negatively skewed (skewness = -.41, z_{skew}= -2.24, $p > .05$), but does not differ significantly from normality.

Grammar accuracy. The degree to which subjects accurately identified the nouns and verbs in the sentences during this task is calculated by subtracting the number of missed or incorrectly identified targets from the number of correctly identified targets. Subjects who made more errors than correct responses, therefore, could obtain negative scores. Variability on this task was high because a few subjects performed particularly poorly or particularly well (M = 17.18; SD = 11.93). The distribution of these data is slightly skewed in the negative direction (skewness = -.39, z_{skew}= -2.20, $p > .05$), but this is not sufficient to violate the normality assumption.

Creativity. Scores on this variable consist of the number of novel or unusual uses suggested for everyday objects (e.g., using a ballpoint pen as a tracheotomy tube; using nylon stockings as an emergency fan belt). In scoring these data, items that were repetitive were counted as one (e.g., using a ballpoint pen as both "a dart" and "a projectile"), and items too vague to understand were excluded. The average number of suggestions offered is 6.38 in a range from 0 to 18 (SD = 3.19). This distribution is significantly skewed in the positive direction (skewness = 0.762; z_{skew}= 4.21, $p < .05$) by a few subjects who scored particularly highly.

Aggregate measure of performance. None of the specific intellectual tasks is one that occurs daily in most offices. The concept of interest is a more general one that might be labelled "complex cognitive performance". Combining the four tasks into an aggregate might give an adequate index of this concept. A general measure of performance is also preferable because a univariate significance test using the aggregate will be more powerful than a multivariate test on the four components (Cohen, 1988). Not only is this true generally of univariate tests, but it is to be expected because by the law of large numbers, the aggregate score should more closely approximate a normal distribution than any of the component distributions.

Principal components analysis demonstrated that the four measures were related. One component was extracted having an eigenvalue greater than one (eigenvalue = 1.57, accounting for 39.1% of the variance). The factor loadings are displayed in Table 9.

The loadings on this factor are not uniformly high, indicating that although the four tasks have some similarities, they differ considerably. Some statisticians might suggest the use of these component loadings as weights in the creation of an aggregate score, but this practice allows the peculiarities of the data to make a theoretical statement: The loadings could be biased by non-normal distributions, outliers, or low reliability. Therefore, following Cohen's (1990) suggestion, the aggregate performance score was formed by first standardizing the scores on each variable, and then summing them. The standardization produces a scale-free metric with mean 0.

The internal consistency of the aggregate is not high; Cronbach's alpha = 0.47. However, for all practical purposes, the data may be said to be normally distributed. The distribution has a standard deviation of 2.48 and skewness of -0.001. The minimum value is -7.21 and the maximum, 5.53. The histogram for this variable, which is used in all subsequent analyses in place of the individual performance measures, is shown in Figure 10.

Performance speed. The participants recorded the times at which they started and finished each item in the puzzle booklets. The measurements were accurate to the nearest minute; in scoring, cases where a subject persisted for less than a minute were scored as one minute. All the subjects remembered to record the times while they worked on the booklets. A fixed time was given for completion of the booklets; the measures of interest concern the

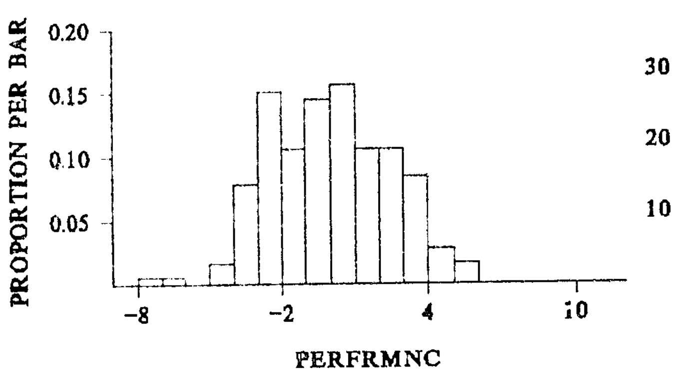
Table 9

<u>Component Loadings for Principal Components Analysis of Performance Measures</u>

Variable	Loading	Communality
Puzzles	0.77	0.60
Grammar	0.62	0.38
Arith	0.59	0.35
Creat	0.49	0.24

<u>Note</u>. Eigenvalue = 1.57. % variance = 39.1.
Abbreviations as in Table 8.

Figure 10
Histogram for aggregate measure of intellectual performance



allotment of time to particular items.

The speed at which each subject reached a correct response on the brain-teaser puzzles was calculated by taking the average time across the items correctly answered. Faster performance is reflected in a lower score. Eighteen participants who solved no puzzles were scored as missing data on this variable. The mean across the remaining 162 participants is 1.47 min per correct puzzle, with standard deviation of 0.56 min. This distribution is positively skewed (skewness = 2.738; z_{skew} = 14.34, $p < .05$). For analysis, these data were transformed using a log(10) transformation. The resulting distribution is still skewed, but to a lesser degree (M = .14; SD = .13; skewness = 1.12; z_{skew} = 5.88, $p < .05$).

There were two questions in the puzzle booklets requiring creative thought. The speed measure was the sum of the time spent on both items divided by the total number of novel uses suggested (the creativity score). Three subjects had creativity scores of zero and were scored as missing data on the speed variable. For the remaining 177 subjects, the mean time per novel use suggested is 0.79 min, with standard deviation 0.41 min. This distribution is positively skewed (skewness = 2.21 , z_{skew} = 12.07, $p < .05$). A log(10) transformation on these data improved the normality of the distribution (M = -.15; SD = .21; skewness = .10; z_{skew} = 0.52, $p > .05$). The transformed data were used in subsequent analyses.

Perceived personal influence scale. The personal influence questionnaire asked subjects to rate the importance to them of having some say in determining physical features in everyday settings. This variable was included as a potential covariate. The score for each individual was obtained by averaging across all available scores. The scale is from 0 to 4, and higher values reflect the desire to have other people control physical features. The mean over the 180 subjects, 2.10 (SD = .55), indicates that reasonable influence over physical features is only mildly important to these people. The distribution of scores is not significantly different from normal (skewness = -.31; z_{skew} = 1.71, $p > .05$).

Inferential Statistics

Separate analyses were conducted for each conceptual group of dependent variables. The analysis of variance model was the same in each case, a modified 2 x 2 factorial design with four planned comparisons. These were the same four comparisons described above: the Expectancy effect; the Control main effect; the Preference main effect; and, the Control by Preference interaction effect. The cell means and standard deviations for each dependent variable are displayed in Table 10.

ANOVA: Self-efficacy scores. The analysis of variance for the self-efficacy scores had no significant effects. For the Expectancy effect, F (1,175) = 1.25, n.s. For the Control effect, F (1,175) = 0.44, n.s. For the Preference effect, F (1,175) = 0.01, n.s. For the Control X Preference interaction, F (1,175) = 0.54, n.s.

ANOVA: Motivation. No significant effects were found in the ANOVA of the persistence scores. For the Expectancy effect, F (1,175) = 0.62, n.s. For the Control effect, F (1,175) = 0.43, n.s. For the Preference effect, F (1,175) = 0.71, n.s. For the Control X Preference interaction, F = 0.00, n.s.

ANOVA: Incidental learning. There were no significant differences found in the ANOVA on the incidental learning test scores. For the Expectancy effect, F (1,175) = 0.04, n.s. For the Control effect, F (1,175) = 0.09, n.s. For the Preference effect, F (1,175) = 0.84, n.s. For the Control X Preference interaction, F (1,175) = 3.37, n.s.

MANOVA: Mood. Multivariate analysis of variance was used to test for significant effects on the mood scales. None of the multivariate contrasts reached statistical significance, and therefore the univariate tests on specific mood variables were not examined. For the Expectancy effect, Wilks' lambda = 0.991, F (3,173) = 0.52, n.s. For the Control effect, Wilks' lambda = 0.969, F (3,173) = 1.873, n.s. For the Preference effect, Wilks' lambda = 0.991, F (3,173) = 0.524, n.s. For the Control X Preference interaction, Wilks' lambda = 0.967, F = 1.986, n.s.

Table 10

Cell Means and Standard Deviations for Dependent Variables

	Condition				
Item	CPD	CPG	NCPD	NCPG	N
SEff	2.61	2.69	2.74	2.68	1.59
	0.56	0.53	0.48	0.52	0.59
Motiv	14.31	15.56	13.33	14.58	15.39
	9.01	8.39	9.19	9.05	8.76
Incid	4.53	4.78	4.94	4.19	4.50
	1.63	1.61	1.67	1.62	1.65
Domin	4.18	4.15	3.91	4.09	4.05
	0.72	1.09	1.10	0.98	0.89
Pleas	3.53	3.05	2.87	3.28	3.29
	1.12	1.17	1.07	1.07	1.18
Arous	3.43	3.26	3.77	3.55	3.51
	1.07	1.05	1.09	1.09	1.19
Perform	-0.98	-0.40	0.45	0.55	0.38
	1.88	2.73	2.36	2.85	2.26

....

Table 10 continued ....

	Condition				
Item	CPD	CPG	NCPD	NCPG	N
n	30	31	33	33	32
PuzTime	1.60	1.53	1.40	1.42	1.31
	0.69	0.55	0.45	0.34	0.35
CreaTime	0.89	0.80	0.80	0.65	0.82
	0.36	0.49	0.49	0.27	0.45

Note. Abbreviations as in Table 8. Perform = intellectual performance score. n = 36 except for PuzTime and CreaTime, as indicated.

ANOVA: Intellectual performance. The analysis of variance results for the aggregated measure of intellectual performance revealed a significant main effect of Control (F (1,175) = 8.55, $p < .05$)[1]. The marginal means and standard deviations for this effect are shown in Table 11. The direction of the effect is opposite to the hypothesis: the Control subjects performed less well than the No Control subjects. This effect accounts for 4.62% of the variance in the dependent measure, and is medium-sized, according to Cohen's (1988) widely-accepted guidelines.

The other three contrasts were not statistically significant. For the Expectancy effect, F (1,175) = 0.06, n.s. For the Preference effect, F (1,175) = 0.70, n.s. For the Control X Preference interaction, F (1,175) = 0.33, n.s.

MANOVA: Performance speed. The log(10) transformations of the two performance speed variables were analyzed using multivariate analysis of variance. Unequal cell sizes resulted when 21 cases were dropped because of missing data. The analysis showed one significant main effect, the Control effect (Wilks' lambda = .961, F (2,153) = 3.10, $p < .05$). The univariate tests revealed a significant difference between the groups in the speed of creativity performance (F (1,154) = 4.28, $p < .05$). The means and standard deviations of the transformed scores and raw scores are shown in Table 11. The direction of the effect is inconsistent with the hypothesis that Control subjects would work more quickly; Control subjects took longer per novel suggestion on the creativity items than No Control subjects. This effect, accounting for 2.62% of the variance, is small, according to Cohen (1988).

The remaining three contrasts in this MANOVA were not statistically significant. For the Expectancy effect, Wilks' lambda = 0.985, F (2,153) = 1.16, n.s. For the Preference effect, Wilks' lambda = 0.978, F (2,153) = 1.72, n.s. For the Control X Preference interaction, Wilks' lambda = 0.998, F (2,153) = 0.14, n.s.

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[1]MANOVA results for the four variables comprising the aggregate measure of intellectual performance agree with this outcome. Only the multivariate F for the Control effect was significant (Wilks' lambda = 0.930, F (4,172) = 3.233, $p < .02$). The effect was associated with a significant univariate F for the Creativity measure (F (1,175) = 12.25, $p < .01$). Control subjects suggested fewer novel uses for familiar items than No Control subjects. The mean differences for the other variables were not significant, but the trend of lower scores for the Control condition was consistent.

Table 11

Marginal Means and Standard Deviations for Control Effects

	Group	
Variable	Control	No Control
Perform	M= -0.69	0.50
	SD= 2.34	2.60
	n = 72	72
log(10)CreaTime	-0.116	-0.190
	0.184	0.208
	61	66
CreaTime	0.84	0.73
	0.43	0.40
	61	66

Note. Abbreviations as in Tables 8 and 10. Unequal cell sizes for CreaTime analysis resulted from missing data.

Examination of Residuals

Data collection for this experiment occurred over a five-month period. The manipulation of Control resided in an instruction set and could have been biased by changes in the experimenter's behaviour over that time. Therefore, for each of the analyses reported above, the residuals were examined for any correlation with the time of measurement. This procedure consisted of saving the residuals for each case, matching them to an indexing variable, and creating a bivariate scatterplot of the index variable by the residual score.

The results of the experiment would have been suspect had any correlation existed between the residual error scores and the time of measurement. Visual examination of these scatterplots found no such correlation. Figure 11 shows, as an example, the scatterplot of the residuals for the ANOVA on the intellectual performance score (r = -.05, n.s.). The scatterplots for the other analyses are in Appendix N.

ANOVAs Excluding Hypothesis-Guessers

The above analyses were repeated for the 105 subjects who had not guessed any of the hypotheses. The exclusion of certain subjects poses two problems for interpretation of these results: The smaller sample size reduces the degrees of freedom, and the uneven distribution of hypothesis-guessing across experimental conditions leaves cell sizes unequal. Thus, these analyses must be considered exploratory.

With the reduction in the degrees of freedom, it is not surprising that the significant effects of Control on intellectual performance and log(10) creativity time failed to emerge. More surprising, however, is the discovery of an effect that did not appear in the initial analyses, a Control X Preference interaction effect on incidental learning scores, F (1,100) = 8.16, p<.001 The cell statistics for this effect are in Table 12. The unequal cell sizes might account for the effect; nevertheless, it warns that subject biases may obscure real effects.

Analyses of Covariance: Desired Influence

In designing the experiment, it was thought that individual differences in the desire for control might influence the Control manipulation. This appeared unlikely when the small degree of variability in Desired Influence scores was noted (Table 8). Nonetheless, the analyses above

Figure 11
Scatterplot of Performance analysis residuals by Session

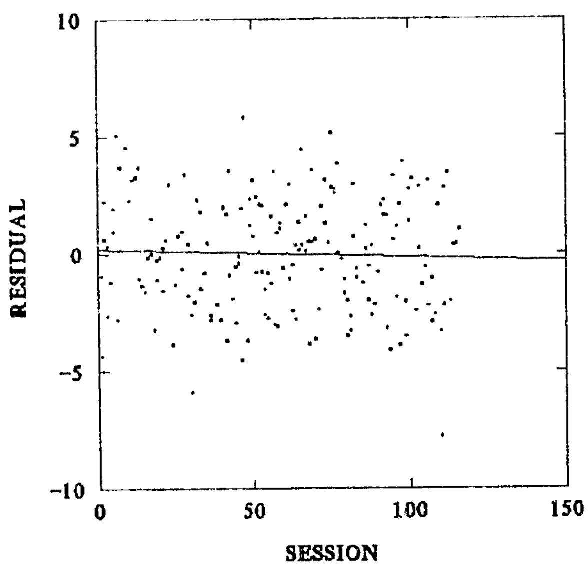

Table 12

<u>Cell Statistics for Control X Preference Effect on Incidental Learning (Hypothesis-Guessers Excluded)</u>

	Control	No Control
Preference	*M*=5.19	3.94
Given	*SD*=1.12	1.98
	n=21	16
Preference	4.06	4.87
Denied	1.47	1.66
	18	23

Note. DV = incidental learning, scaled 0 - 10. Higher scores suggest less attention was paid to puzzles. F (1,100) = 8.16, $p<.01$. η^2= 2.36%.

were repeated using Desired Influence as a covariate. For each model, the presence of Desired Influence interactions with each contrast was first tested, as recommended by Wilkinson (1988). None was significant, and the analyses proceeded with the covariate. The pattern of results was identical to the original analyses.

Power Analysis

At several points above there are references to the power of a statistical test. One wishes to have adequate power for a test of significance; that is, one wishes to be confident that if a statistically significant effect exists, the test used will correctly reject the false null hypothesis. Power is "the probability that [the statistical test] will lead to the rejection of the null hypothesis" (Cohen, 1988, p. 4, italics in original). This probability depends on the size of the effect, the degrees of freedom for the test, the size of the sample, and the alpha level chosen as the criterion for statistical significance. Given these four parameters one may determine the power of a test by using tables or graphs of noncentral F distributions in standard references (e.g., Cohen, 1988).

The most difficult parameter to determine for a power analysis is the effect size estimate. In conducting an a priori power analysis to determine the necessary sample size for a given power, one relies principally on the research literature to guide the selection. In a post hoc power analysis to determine whether a nonsignificant result might reflect a true null hypothesis, it is common to estimate the effect size from the data. Both analyses are discussed here.

This study used a multivariate model; however, most of the important analyses were univariate tests of significance. For the purposes of example, the univariate model is used here. In any case, the multivariate power estimate would be lower, not higher, than the univariate (Cohen, 1988). The variable chosen for the post hoc effect size estimate was the intellectual performance score.

Post hoc Power Analysis

This analysis includes power calculations for each of the four planned comparisons. Table 13 is a summary table for the power analysis. The alpha level for rejection of the null hypothesis was set at .05. The effective cell sizes for each contrast and the effect size estimates (f) were calculated following Cohen's (1988) method.

Table 13

Summary Table for post hoc Power Analysis

Effect	*df*	n'	f	Power
Expectancy	1	54	.020	.032
Control	1	88.5	.239	.885
Preference	1	88.5	.069	.155
Control X Preference	1	88.5	.061	.127
ERROR	175			
Total	179			

Note. Alpha = .05. Linear interpolation was used to find power estimates falling between tabled values.

This experiment used an unusual model that requires explanation. The Expectancy effect involved a comparison between two groups having unequal cell sizes (n=36 for the Naive group; n=72 for the No Control groups combined). Cohen (1988) gives the following formula for effective cell size: N/k = n' (where k = number of cells in the contrast). The effect size estimate for this contrast is analogous to the standardized difference between means for equal cell sizes, being the difference between each cell mean and the grand mean weighted by the cell size:

$$f = \frac{[n_1/N\,(m_1 - M)^2 + n_2/N\,(m_2 - M)^2]^{1/2}}{SD}$$

The effect size estimates for the Control and Preference main effects are those for contrasts between two groups having equal cell sizes. The f statistic is one-half the standardized difference between the two cell means (Cohen, 1988). The design of the present experiment, however, complicates somewhat the determination of the effective cell size. The formula (Cohen, 1988, p. 365) is:

$$n' = \frac{\text{denominator } \mathbf{df}}{\text{effect } \mathbf{df} + 1} + 1$$

The Control X Preference interaction effect is the standard interaction effect for a factorial design. The formula for the estimated effect size, f, is given in Cohen (1988). It is the standard deviation of differences between the individual cell means divided by the population standard deviation (usually represented by the estimator from the data). The effective cell size is the same as for the main effects.

The summary table shows that the one contrast having adequate power is the Control main effect, where power = .89. There is a high probability, therefore, that analysis could lead to the rejection of the null hypothesis that the manipulation had no effect.

However, the same is not true for the other three contrasts. There are only slight differences between these means, and therefore the effect size estimates are low and the corresponding power is low. Over 1000 cases would have been necessary to reject a false null hypothesis if the true effect sizes were as low as estimated here.

This points to one drawback of the post hoc power analysis: If for any reason the effect size estimate is reduced, the power estimate will also be low. For example, if there were undetected errors in the experimental manipulation that reduced the difference between the groups, it might appear that an effect would have been detected with a larger sample size. Replication with the larger sample would probably be a waste of time and resources unless the sloppy execution were also remedied.

A more reasonable way to estimate the power of a study to detect true differences between means is the a priori power analysis. Estimates of effect sizes are predicted by the experimenter based on the literature and on past experience. The peculiarities of any one data set therefore ought not to unduly bias the outcome.

A priori Power Analysis

In this analysis, the power of the present study was estimated using the actual cell sizes, the design as given, and an alpha level of .05. The effect size for each contrast was predicted based on experience and on the literature, and using guidelines suggested by Cohen (1988). The summary table for this analysis is shown in Table 14.

None of these contrasts have a precise equivalent in the research literature. Effect size estimates therefore represent a kind of "best guess"; the final choice of a sample size, as always, represents a compromise between the desired power for a comparison and practical considerations.

The most interesting effects in the present study are those in the factorial part of the design. Of the two variables, Control is by far the best understood. Within both the psychology literature and the popular press, the desire for control is understood to be one of the more important factors in determining our behaviour; although, as discussed above, circumstances are known in which the perception of control is a hindrance, not a help. The case might be made for the hypothesis of a strong effect. However, intellectual performance is a complex behaviour that

Table 14

Summary Table for a priori Power Analysis

Effect	df	n'	f	Power
Expectancy	1	54	.100	.17
Control	1	88.5	.204	.77
Preference	1	88.5	.204	.77
Control X Preference	1	88.5	.204	.77
ERROR	175			
Total	179			

Note. Alpha = .05. Linear interpolation was used to find power estimates falling between tabled values.

depends more on verbal and mathematical skill and past experience than on any situational factor. This fact must temper any estimate of the Control effect on this behaviour.

Balancing these facts, the prediction was made that the effect of Control on performance would explain at most 4% of the variance in the dependent variable. This translates into f = 0.204, a moderate effect. The same effect size was predicted for the Preference effect and for the interaction of the two because it was expected that there would be moderately strong motivational effects associated with obtaining (or not obtaining) one's preferred lighting condition. A literature search found no experimental evidence concerning the effects of preference for any environmental condition to contribute to this estimate.

The power of a statistical test to detect an effect of this magnitude using the sample size in this study is 0.77 (77%). This is a respectable level, close to the 0.80 that is a generally accepted goal (Cohen, 1988).

Estimating the effect size for the Expectancy effect was more difficult still. There is ample literature to demonstrate that subject expectancy effects can bias research results, but no way to predict how large an effect hypothesis-guessing or other biases might have in the present circumstances. The effect was not expected to be large; therefore, Cohen's (1988) guideline for a small effect was used.

The power of the present study to detect an Expectancy effect was not high. A larger sample size would have been necessary; to achieve power = .80, given a small effect size, would have required n' = 393 for this contrast for a total sample size of 786 (recall that there are two groups in the Expectancy contrast). Resources did not permit the enlargement of the sample size. Instead, analysis of the hypothesis-guessing data will have to suffice for consideration of this effect. The evidence that more subjects in the experimental groups than the Naive group guessed the hypothesis means that the possibility that subject biases obscured the results cannot be eliminated. Future research will have to address the question more specifically.

Path Analysis

When the unexpected results for the effect of Control on intellectual performance and creativity speed were noted, it appeared that the original specifications for the attentional and motivational models would be inadequate. Moreover, the non-normality of the motivation measure and the low variability of the self-efficacy measure augured poorly for the success of the planned path analyses. The analyses showed that neither model fit the data. Details of these analyses may be found in Appendix O.

Subjects' Lighting Preferences

Table 15 shows the frequencies with which subjects ranked each lighting type as their first, second, or third choice. Eight subjects gave the same rating to two lighting conditions. Their data were excluded from this table for clarity, but were used for assigning them to seats for the experimental session. Of these eight, five chose the compact fluorescent (CF) desk lamp with overhead fluorescent lighting (OH) as their highest-ranking choice; two chose OH-only as their first choice. One gave OH-only the lowest rating.

In general, lighting conditions providing a combination of local illumination from a desk lamp and ambient illumination from overhead fluorescents were preferred. Over 65% of the participants listed OH-only as their third choice. It appears that the CF option was preferable to the incandescent (IN) option for desk lamps, but the margin is slight. Many subjects remarked that they found it difficult to discern the difference between the two, which may account for the narrow edge of CF over IN.

Chi-square for this table of rankings is 144.5 (df=4, N= 552, p<.001). If the ranking of the light types were random, one would expect the frequency with which each option was ranked first, second, or third to be equal; the significant chi-square test allows the rejection of the null hypothesis.

Lighting Type Analysis

The participants in the Naive group were each randomly assigned to a lighting type for the experimental session. Preference data are available for these subjects because they completed the preference rating at the end of the session. Errors in the random assignment procedure for the seating of these subjects resulted in an unequal distribution of subject across lighting types. Furthermore, it is already known that subjects differ in their preferences for the different lighting types and that these preferences are not equally distributed across the lighting types used in this

Table 15

Frequencies of Ranks of Lighting Choices

	Rank		
Lighting Type	1	2	3
CF w/ OH Fl	80	69	35
	43.5%	37.5%	19.0%
IN w/ OH Fl	62	94	28
	33.7%	51.1%	15.2%
OH Fl only	42	21	121
	22.8%	11.4%	65.8%

Note. CF is an abbreviation for "Compact Fluorescent Desk Lamp". IN stands for "Incandescent Desk Lamp". OH Fl is an abbreviation for "Overhead Fluorescent Lighting".

study. Any analysis of the variable Lighting Type within the Naive group is therefore confounded by the varying preferences for each type, as demonstrated in Table 16.

Table 16 shows that participants in the Naive group were more likely to be assigned to work under either of the desk lamp + overhead fluorescent light combinations, which also were the more preferred combinations. Any breakdown of the data for these subjects for comparisons by lighting type would, therefore, be meaningless. It is therefore impossible to test the hypothesis that lighting type itself might have caused varying performance or mood in the subjects. To do so would require a larger sample size and more careful assignment to lighting conditions, so that every possible combination of lighting type and preference rank had an adequate sample size. Practical considerations placed this beyond the scope of the present study.

Examination of Excluded Data

Five subjects in the Control-Preference Denied condition chose to take control; that is, they chose to sit at a workstation other than the one suggested by the experimenter. These data were examined visually to determine whether these participants differed systematically from participants who did not exercise their option to choose another seat. The small number of control-taking subjects precluded more formal analyses. The raw data for these subjects (and all others) are in Appendix M.

Three of the five subjects were male, and two female. Their ages ranged from 18 to 32. They ranged from first to fourth year of university, and represented four different fields of study. Demographically, they did not differ from the rest of the participants.

Their lighting preferences were not different from the rest of the subjects in any noticeable way. Table 17 presents the frequencies of each lighting type by rank; the pattern reflects the pattern seen in Table 15 for the rest of the participants. The two desk lamp options were clearly preferred over the overhead fluorescent illumination. Each of the subjects who chose a seat chose one of the desk lamp options (the one whose strongest preference was for the overhead fluorescent light had less freedom to choose this option because the other subject in that session had been assigned to that seat).

Table 18 compares the subjects who took control with the rest of the subjects in the

Table 16

Lighting Type Frequencies of Naive Group Subjects by Seat Preference Rank

	Preference Rank of Light Type			
Light Type	1	2	3	Row Total
CF w/ OH Fl	7	4		11
IN w/ OH Fl	6	6	3	15
OH Fl only	2		7	9
Column Total	15	10	10	

Note. Data from one subject are missing because of an error in completing the preference rating.

Control-Preference Denied condition on the major dependent variables. The results are consistent with the direction of the treatment effect in that the participants who exercised their control tended to perform less well than the subjects who did not. The intellectual performance scores for the excluded subjects were calculated using the mean and standard deviation from the rest of the sample to estimate z scores for each component, which were summed as for the rest of the subjects to create an aggregate. Three of the five excluded subjects had performance scores below the mean of the Control-Preference Denied group, so the difference was not caused by a single outlying score.

The subjects who exercised control also reported having more control over the lighting in the study than those who did not. The mean values for items C6 ("Had some control over lighting") and C9 ("Had choices about lighting") from the postexperimental questionnaire illustrate this point.

Table 17

Frequencies of Ranks of Lighting Choices for Excluded Subjects

	Rank		
Lighting Type	1	2	3
CF w/ OH Fl	2	2	1
IN w/ OH Fl	2	2	1
OH Fl only	1	1	3

Note. CF is an abbreviation for "Compact Fluorescent Desk Lamp". IN stands for "Incandescent Desk Lamp". OH Fl is an abbreviation for "Overhead Fluorescent Lighting".

Table 18

Dependent Variable Means for Excluded and Control-Preference Denied Subjects

DV	Excluded	CPD
SEff	2.83	2.61
Motiv	12.20	14.31
Incid	4.40	4.53
Domin	3.70	4.18
Pleas	3.57	3.53
Arous	3.83	3.43
Puzzles	2.40	3.39
Arith	12.00	11.69
Grammar	6.40	15.67
Creat	5.20	5.53
Perform[*]	-2.22	-0.98
PuzTime	1.79 (n=3)	1.60 (n=30)
CreaTime	0.75	0.89 (n=30)
Had some control over lighting (C6)	3.40	1.60
Had choices about lighting (C9)	3.60	2.50

Note. Abbreviations and scoring as in earlier tables.
[*] Perform estimated for excluded subjects using means and standard deviations from experimental sample (*N* = 180) to estimate z scores for components, which were then summed.

Discussion

This experiment set out to test attention and motivation models of alleged personal control benefits in the workplace. However, control over workplace lighting led to a statistically significant decrease in intellectual performance and to slower performance on one of the intellectual tasks. These effects, although contrary to the hypotheses, are moderately strong. Furthermore, if effects of comparable size existed for other dependent measures, the research design was sufficiently powerful to have detected them. Conventional wisdom among environmental psychologists and designers alike holds that personal control over physical features enhances performance, mood, and self-esteem. This experiment shows that personal control is not beneficial in all circumstances. At first glance, the results are puzzling. The circumstances of this experiment seem not to conform to any of Burger's (1989) conditions that lead to undesirable outcome following perceived control. Why, then, did the Control manipulation lead to poorer performance?

The manipulation checks found that the manipulation of Control was not the only source of perceived control over lighting. Perceived control was also associated with receiving one's preferred lighting configuration. A number of subjects in the Preference Given condition remarked on the connection in their postexperimental questionnaire responses. Preference Given subjects reported having had considerably more control over the lighting, more choices about the lighting, and more control during the session, than Preference Denied subjects. Some of these effects were very strong. Nonetheless, there was no effect of Preference on any of the principal dependent measures.

Theoretical Implications

The present study manipulated control in the sense used by Barnes (1981); he argued that the provision of choice in built environments is a means of preventing the adverse effects of insufficient perceived control. In this case, control was limited to the lighting at one's workstation. When control is manipulated by offering choices to individuals, its effects can be confounded with the effect of having obtained something one likes or prefers; in the present case, the effect of obtaining one's preference was separated from the effect of having had a choice.

This had theoretical implications for the question of whether control over lighting operates by a motivational mechanism or an attentional one.

A more useful view of the manipulations in the present study might have been Averill's (1973) typology of personal control For example, the Preference effect on perceived control might be understood to be the outcome of unintended opportunities for participants to exercise cognitive control. Cognitive control "refers to the way an event is interpreted, appraised, or incorporated into a cognitive set" (Cornelius & Averill, 1980, p. 503). Reports of perceived control over the lighting occurred in those subjects who made the logical connection between their seat assignment and their prior ratings of lighting preferences.

The Control manipulation can be understood (and was intended) to be an example of decisional control. Cornelius and Averill (1980) provided this definition of the concept: "volitional [decisional] control refers to the opportunity to choose the course of action one wants to take, or, alternatively, to be in agreement with a course of action that must be taken anyway" (p. 503). This manipulation was successful in that subjects given such control reported greater perceived control than subjects denied it.

In this framework, the outcome of the present study suggests that different types of control lead to different outcomes. Cognitive control had no effect on performance or mood; decisional control decreased performance, but had no effect on mood. Weak evidence exists that suggests an interaction between the two. Excluding from analysis those subjects who guessed one or more of the hypotheses, there was a significant interaction of Control and Preference on incidental learning, in which Control-Preference Denied subjects paid better attention to the puzzles than Control-Preference Given subjects. There was no effect of Preference in the No Control groups.

Prior evidence supports the suggestion that different types of control may have different effects. Cornelius and Averill (1980) studied the effects of behavioural, cognitive, and decisional control on reactions to electric shock. Their findings indicated that the effects of each type of control are not substitutive. Decisional control decreased heart rate immediately before the shock, but had no effect on self-reported control or ratings of the unpleasantness of the shock. Behavioural and cognitive control interacted to affect anticipatory heart rate, skin conductance, and attention deployment (a measure of the degree to which the subjects' thoughts focused on the experimental manipulations as the shock approached).

A field experiment that examined responses to donating blood found that the effects of cognitive and decisional control were not additive in reducing adverse outcomes. Mills and Krantz (1979) found that providing either information about the procedure (cognitive control) or the choice of which arm to use (decisional control) was more effective in reducing discomfort and nurse interventions than providing both. They suggested that there might be contexts in which too much choice might not be desirable.

This suggestion arose also in Paciuk's (1989) study of the effects of personal control on satisfaction with the thermal environment. Different effects were noted for actual control (measured as the self-reported frequency of occurrence of manipulative (e.g., opening or closing blinds) or adaptive (e.g., adding or removing clothing) behaviours related to the thermal environment) and perceived control. Actual control led to dissatisfaction with the thermal environment; perceived control enhanced satisfaction. Paciuk suggested that the act of exercising control carries a cost. It appears that people like to be able to alter environmental conditions; they are less pleased with having to.

In the present study, the Control condition subjects were required to agree with the experimenter in moving to another workstation; although they had greater perceptions of control, perhaps their poorer performance reflects the cost of that control. The data from the five subjects who chose to exercise their option in the Control-Preference Denied condition -- three of whom performed below the mean for the 36 Control-Preference Denied subjects who did not take control -- support this suggestion.

The perceptions of control in the Preference comparison were not based on any such agreement or action, but on the interpretation of events; it seems that this inference carried no cost in performance or mood. Perhaps perceived control over lighting did not alter performance or mood because it was not important to the subjects; in general, having control over the features of their physical environment was only mildly important.

Design Implications

The utility of providing personal control over workplace lighting appears dubious at present. At best, it appears to have no effect on intellectual performance or mood. At worst, it may diminish performance. Furthermore, data supplied by Gifford (personal communication, July 19, 1991) show that having control over lighting type, location, and brightness is only mildly important to many people[2].

The present study manipulated control through the suggestion of an authority figure, the experimenter. The instruction was slanted to encourage the agreement of the participant. To disagree would have been an act of defiance. In any situation, suggestions from a more powerful individual could compromise choice; decisional control offered in this manner, according to this study, is more a hindrance than a help.

Working with limited resources, the present study was unable to assess directly the effect of having behavioural control over lighting -- that is, lighting adjusted by the individual at his or her workstation. It may be that this type of control differs substantially from the decisional control manipulated in this study. Further research will be necessary to answer this question.

In Paciuk's (1989) study of thermal satisfaction, the presence of opportunities to alter the thermal environment enhanced perceptions of control; perceived control was associated with thermal satisfaction. It may be that a similar relationship exists in the luminous environment: Providing opportunities for alterations to lighting, even if they are never used, could have the beneficial effects expected by designers.

The use of individual task lamps at workstations is often justified in terms of the personal control they offer to workers. Whether or not the control aspect is important, the present study does show that this is the preferred option, at least for this sample: Almost two-thirds of the sample rated overhead fluorescent illumination as their third choice. Over 78% chose one of the task lamp with overhead fluorescent combinations as their most preferred option. This tendency to dislike bright overhead fluorescent illumination is consistent with the findings of Veitch, Hine,

[2]Data from the Survey of Personal Influence in Common Environments (Gifford & Eso, 1988), based on data from 212 respondents from a variety of occupations.

and Gifford (1991).

In sum, personal control over lighting may not be a panacea; however, the changes in lighting design that include giving more control to the individual user have not been entirely discredited. Other outcomes not examined [illegible] include the possibility of energy savings to be realized through the use of individual control. For example, one person working late would not need to light the entire floor to working levels. It is also possible that individuals who have a preference for the type of lighting at their workstation may rate its quality more highly; lighting quality is one contributor to overall environmental satisfaction (Marans & Yan, 1989).

Like the concept of personal control, lighting is difficult to separate into independent dimensions. To accommodate changing demands for varying tasks over the course of a day may require individual task lamps; this may provide individual control, but also reduce glare, alter lighting geometry and change luminance distributions. There still are many reasons to choose this lighting option; personal control, however, may not be one of them.

Directions for Future Research

The outcome of the present experiment poses several challenges for environmental psychology. Personal control has been one of the theoretical structures most favoured by environmental psychologists (Gifford, 1987). These results suggest that researchers should pay renewed attention to the clarification of its relation to the physical environment.

For example, Steele (1980) recognized that not all experiences with choices about the physical environment will lead to the desired outcome. Jutras and Cullen (1983) speculated that feelings of weakness or powerlessness accompany failed attempts at environmental manipulation. The present study has demonstrated that decisional control over lighting can lead to poorer performance; environmental psychologists should attempt to identify the circumstances in which decisional control over the physical environment may lead to desirable outcomes, and those in which decisional control is undesirable.

The clarification of the personal control environment relationship should include an exploration of the varying roles of decisional, cognitive, and behavioural control. That the outcomes may differ appears clear; however, we do not as yet understand the specific environmental operations that may improve the fit between person and environment. One view of the complexity of these relationships emerges from Paciuk's (1989) findings, which suggest that in order to increase thermal satisfaction, it might be best to provide for the possibility of making thermally-relevant choices, without making it necessary for the individual to do so.

The possibility that individual differences moderate the relationship between personal control and behaviour should not be overlooked. The detrimental effect of decisional control on performance found in the present study may be partly attributable to the relatively low importance these subjects gave to personal control over the environment. This and other interpersonal differences merit further investigation. One obvious direction is the further exploration of the speculation that successful attempts at control over the physical environment lead to greater self-esteem or feelings of mastery (e.g., Jutras & Cullen, 1983; Steele, 1973, 1980).

Subject biases should not be overlooked in future research. The Control X Preference interaction on incidental learning scores that occurred only for subjects who had not guessed any of the experimental hypotheses was not consistent with either the attentional or the motivational model, and might have been an artifact of the unequal cell sizes. Nevertheless, the possibility that subject biases obscured the outcome cannot be rejected. Lighting researchers in particular should be sensitive to the possibility of such Hawthorne-type effects.

Research in this field must take a multivariate approach, encompassing a variety of human behaviours. Given the complexity of effects associated with personal control, the generalization from studies concerned with indices of environmental satisfaction to those concerned with performance measures may be unwarranted.

Concurrently, there is need for greater attention to measurement issues. Advanced correlational analyses such as path analysis and LISREL will require stronger measures as well as multiple means of measuring each construct. For example, the measurement of self-efficacy in the present study, although internally consistent, had little variability. It is unlikely that it could have detected small differences in self-efficacy associated with the situational effects of the Control manipulation; in hindsight, the items seem to refer more to self-efficacy as a <u>trait</u> than as a <u>state</u>. Environmental psychology may require its own scales to assess constructs adopted from other subdisciplines.

Lighting researchers in the past took a narrow view, considering the luminous environment only as the provider of visual input. The present study demonstrated that moderately strong effects on behaviour are caused by peoples' perceptions of their control over the lighting where they work. Even within the range of human adaptability to luminous conditions, variations in lighting design matter. Future research should seek, both in the laboratory and in the field, the elaboration of the relationships between lighting design and human responses. Cross-setting, cross-cultural, and interindividual differences in these relationships remain fruitful areas for research in both the applied and basic research traditions.

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Appendix A
Initial Questionnaires

This group of three questionnaires was completed at the beginning of the session. One part was placed at each workstation in random order. Subjects moved from workstation to workstation to complete all three parts.

Part 1

Background Information

It is helpful to us to know a little about you and some of your experiences that might affect how you answer the other questionnaires we will be giving you. Please take a few minutes to complete this set of questions, recording your answers in pencil on the computer answer sheet. Remember to make your marks dark and to fill in the circles completely so that the scanning machine can read them. As with all the data in this study, your responses will be kept confidential. Only the experimenter will know the identity of any respondent.

A. Demographic Information

Age: Record your age in the "Date" portion of the form by blackening the appropriate circles in the two columns labelled "YR" (e.g., if you are 19, enter 1 and 9, not your year of birth). Leave the other Date columns empty.

Sex: Blacken the appropriate circle.

Completed years of education: Please fill in the circle corresponding to the number of years of schooling you have finished (i.e., not including the current one). Thus, if you are in second year, you have completed 13 years of education, etc.

B. Numbered Items

1. **Major.** Please fill in the circle that corresponds to the area in which you are enrolled:

0 = Fine Arts	4 = Engineering
1 = Humanities	5 = Education
2 = Social Science	6 = Physical Education
3 = Natural Science	7 = other

2. Do you need glasses for distance vision?

0 = No 1 = Yes

3. Do you need glasses for reading or other close work?

0 = No 1 = Yes

4. Do you have any hearing impairment that you know of?

0 = No 1 = Yes

Questions 5 - 8: We would like to know the kinds of settings where you have worked in the past and where you expect to work during your career.

In lines 5, 6, and 7, please blacken the circle that corresponds to the settings where you held your last three paying jobs (part time, full time, or summer), starting with the most recent (or current) in line 5. If you have had fewer than three jobs, start in line 5 and leave the other(s) blank.

In line 8, enter the setting where you expect to work during your career.

Select your responses from this list of settings:

0 = office	5 = retail store
1 = library/school	6 = hospital
2 = home/day care	7 = factory
3 = restaurant (kitchen)	8 = park, outdoor setting
4 = restaurant (service)	9 = other

When you have finished this questionnaire, please let the experimenter know that you are ready to go on to the next task.

Part 2

This questionnaire is a series of statements about your personal beliefs. Read each statement and decide to what extent it describes you. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. If the statement is one that you consider to be false, fill in the circle marked 0 next to the item number on the computer answer sheet. If the statement is one that you consider to be true, fill in the circle marked 1.

9. University grades most often reflect the effort you put into classes.

10. I came to university because it was expected of me.

11. I have largely determined my own career goals.

12. Some people have a knack for writing, while others will never write well no matter how hard they try.

13. I have taken a course because it was an easy grade at least once.

14. Professors sometimes make an early impression of you and then no matter what you do, you cannot change that impression.

15. There are some subjects in which I could never do well.

16. Some students, such as student leaders and athletes, get free rides in university classes.

17. I sometimes feel that there is nothing I can do to improve my situation.

18. I never feel really hopeless -- there is always something I can do to improve my situation.

19. I would never allow social activities to affect my studies.

20. There are many more important things for me than getting good grades.

21. Studying every day is important.

22. For some courses it is not important to go to class.

Part 3

This questionnaire is a series of statements about your personal beliefs. Read each statement and decide to what extent it describes you. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. If the statement is one that you consider to be false, fill in the circle marked 0 next to the item number on the computer answer sheet. If the statement is one that you consider to be true, fill in the circle marked 1.

23. I consider myself highly motivated to achieve success in life.

24. I am a good writer.

25. Doing work on time is always important to me.

26. What I learn is more determined by university and course requirements than by what I want to learn.

27. I have been known to spend a lot of time making decisions which others do not take seriously.

28. I am easily distracted.

29. I can be easily talked out of studying.

30. I get depressed sometimes and then there is no way I can accomplish what I know I should be doing.

31. Things will probably go wrong for me sometime in the near future.

32. I keep changing my mind about my career goals.

33. I feel I will someday make a real contribution to the world if I work hard at it.

34. There has been at least one instance in school where social activity impaired my academic performance.

35. I would like to graduate from university, but there are moreimportant things in my life.

36. I plan well and I stick to my plans.

Appendix B
Preference Rating Forms

Control Subjects

You have spent a few minutes at each of the three workstations in the room. You probably noticed that each one had different lighting. Now, please rate your relative preference for the lighting at each of the three desks. The ratings you make now will affect the lighting you work under for the rest of the session.

To do this, imagine that you have 10 "preference units" to divide between the options. Give the most units to the lighting setup you would most prefer to work at, and the fewest units to the one you least prefer. You may divide the units any way you like, but the total must not exceed 10 units and there must not be any ties.

Workstation A ________

Workstation B ________

Workstation C ________

TOTAL: 10

No Control and Naive Subjects

You have spent a few minutes at each of the three workstations in the room. You probably noticed that each one had different lighting. Now, please rate your relative preference for the lighting at each of the three desks. To do this, imagine that you have 10 "preference units" to divide between the options. Give the most units to the lighting setup you would most prefer to work at, and the fewest units to the one you least prefer. You may divide the units any way you like, but the total must not exceed 10 units and there must not be any ties.

Workstation A ________

Workstation B ________

Workstation C ________

TOTAL: 10

Appendix C
Self-Efficacy Scale

The scoring criteria for this scale are in boldface. **GSE** identifies items contributing to the General Self-Efficacy subscale; **SSE** identifies items making up the Social Self-Efficacy subscale. **REV** identifies items that are reverse-coded.

This questionnaire is a series of statements about your personal attitudes and traits. Each statement represents a commonly held belief. Read each statement and decide to what extent it describes you. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by filling in the circle on the answer form that corresponds to the letter that best describes your attitude or feeling. Please be very truthful and describe yourself as you really are, not as you would like to be.

A = disagree strongly
B = disagree moderately
C = neither agree nor disagree
D = agree moderately
E = agree strongly

37. I like to grow house plants. **filler**

38. When I make plans, I am certain I can make them work. **GSE**

39. One of my problems is that I cannot get down to work when I should. **GSE; REV**

40. If I can't do a job the first time, I keep trying until I can. **GSE**

41. Heredity plays the major role in determining one's personality. **filler**

42. It is difficult for me to make new friends. **SSE; REV**

43. When I set important goals for myself, I rarely achieve them. **GSE; REV**

44. I give up on things before completing them. **GSE; REV**

45. I like to cook. **filler**

46. If I see someone I would like to meet, I go to that person instead of waiting for him or her to come to me. **SSE**

47. I avoid facing difficulties. **GSE; REV**

48. If something looks too complicated, I will not even bother to try it. **GSE; REV**

49. There is some good in everybody. **filler**

50. If I meet someone interesting who is very hard to make friends with, I'll soon stop trying to make friends with that person. **SSE; REV**

51. When I have something unpleasant to do, I stick to it until I finish it. **GSE**

52. When I decide to do something, I go right to work on it. **GSE**

53. I like science. **filler**

54. When trying to learn something new, I soon give up if I am not initially successful. **GSE; REV**

55. When I'm trying to become friends with someone who seems uninterested at first, I don't give up very easily. **SSE**

56. When unexpected problems occur, I don't handle them well. **GSE; REV**

57. If I were an artist, I would like to draw children. **filler**

58. I avoid trying to learn new things when they look too difficult for me. **GSE; REV**

59. Failure just makes me try harder. **GSE**

60. I do not handle myself well in social gatherings. **SSE; REV**

61. I very much like to ride horses. **filler**

62. I feel insecure about my ability to do things. **GSE; REV**

63. I am a self-reliant person. **GSE**

64. I have acquired my friends through my personal abilities at making friends. **SSE**

65. I give up easily. **GSE; REV**

66. I do not seem capable of dealing with most problems that come up in my life. **GSE; REV**

Appendix D
Arithmetic Task

In scoring this task, each correct answer was scored as 1. If one error broke the sequence, only the first incorrect blank was deducted. Subsequent answers were counted as correct if they followed the rule for that line.

Please complete the following arithmetic problems. You will have 2 min to complete this page.

Subtract 13 from the first number (5809) and put the answer in the next blank (5796), subtract 13 from it and write the answer in the next blank, etc, until all the blanks are full:

5809 5796 ____ ____ ____ ____ ____ ____ ____

Subtract by 7 from this number, as before:

7823 ____ ____ ____ ____ ____

Add by 17 to this number:

4735 ____ ____ ____ ____ ____ ____

Multiply this number by 3, as for the problems above:

617 ____ ____ ____ ____ ____

Add 23 to this number in the same method as before:

3272 ____ ____ ____ ____ ____ ____

Add 19 to this number:

4721 ____ ____ ____ ____ ____ ____ ____ ____

Appendix E

Grammar Task

The correct responses are underlined. A miss was counted when a word was incorrectly underlined, or when a target word or phrase was not underlined correctly.

Please complete the following. You will have 2 min to complete this page.

Underline all the nouns in the following sentences:

John played with the puppy he received for his birthday.

The dog jumped up on the couch and licked the boy's face.

A supermarket contains many types of foods from all over the world.

Customers can choose a variety of items to fulfil the requirements of any recipe.

After dining in a romantic restaurant, the young couple took a refreshing stroll along the beach.

They watched the water wash up on the sandy shoreline as the full moon reflected off the tips of the waves.

Please underline the verbs in the following sentences:

Annette stormed out of the room, slamming the door behind her.

The force made the whole house shake; I was sorry to have angered her.

The thunderstorm was thrilling and loud, and the air tingled with electricity.

The dog was afraid of the thunder and she howled all night.

On New Year's Eve, many people gather in Times Square in New York City to see the old year out and to ring in the new.

The rest of the world can see the excitement on television, or they can make their own fun.

Appendix F
Intellectual Task Booklet

These are the thirteen logic and creative problems from the task booklets, with their solutions. The fonts are as in the original. Each quesion appeared on a separate page in the task booklet, and each page was a different colour. The paper colours are noted after each question, following the correct answer, given in boldface. At the bottom of each page was a set of spaces for the recording of the start and finish times of each attempt on that problem:

Have you seen this puzzle before today? yes ____ no ____

Start time: 1)__________ 2)__________ 3)__________

Finish time: 1)__________ 2)__________ 3)__________

The front page of the booklet was white, and contained the following instructions:

These are puzzles and problems that will challenge you. None of them requires any special knowledge; to solve them requires a logical leap, a flash of insight. Some of these questions are creative ones seeking new uses for familiar objects; others are plays on numbers or language.

Please go through this booklet in order. Complete as many items as you can in the time allotted. Answer each one on the page it is printed on, using the back if necessary (the experimenter will give you extra paper if you need it). When you begin the item, please record the time from the clock on your desk. Record the time again when you go on to the next item. If you have difficulty with a particular item, go on to the next one; you can always go back if a solution occurs to you later (if you go back to an item, please record the start and end times of that attempt, too). You will have twenty-five minutes to complete the items in this booklet, and then the experimenter will collect it.

The following are the puzzles and their solutions:

1. How many times does the digit 9 appear from 1 to 100?

20

The paper was yellow.

2. This question is taken from the Fixx Mental Flexibility Test. The expression contains the initials of words that will make it correct. Your task is to find the missing words.

40 = D. and N. of the G.F.

Days and nights of the Great Flood.

The paper was blue.

3. A strong, intrepid hunter arose early, ate breakfast, and headed south. Half a mile from camp he tripped and skinned his nose. He picked himself up, cursed, and continued south. Half a mile further along, he spotted a bear. Drawing a bead, he pulled the trigger, but the safety was on. The bear saw him and headed east at top speed. Half a mile later the hunter caught up, fired, but only wounded the beast, which limped on toward the east. The hunter followed and half a mile later caught and killed the bear. Pleased, the hunter walked the mile north back to his camp to find that it had ben ransacked by a second bear.

What colour was the bear that tore up his camp? The clues are all there.

The bear was white.

The paper was white.

4. Carmichael's collection of puzzles was the source of this question. Your task is to rephrase the statement in its more familiar form:

The warm-blooded, feathered, egg-laying vertebrate animal that is among the first invariably comes into the possession of a small, legless, crawling invertebrate animal.

The early bird gets the worm.

The paper was yellow.

5. What do the following words (taken from the Woodson list) have in common?

deft	first	calmness	canopy
laughing	stupid	crabcake	hijack

Each has three consecutive letters in alphabetical order.

The paper was green.

6. Nylon stockings have many uses in addition to being articles of clothing. What are some uncommon ones?

This was a creativity item.

The paper was pink.

7. You have 10 grey socks and 20 blue socks in your dresser drawer. If you reach into it in the dark, how many socks must you take out to be sure of having a pair that matches?

3

The paper was green.

8. Another of Carmichael's statements for decoding:

Where there is a gaseous remain of flammable matter, there is an indicated insinuation of incendiary pyrotechnic.

Where there's smoke, there's fire.

The paper was blue.

9. List as many uses as you can think of for a ballpoint pen, besides writing.

This was a creativity item.

The paper was pink.

10. Here is another item from the Fixx Mental Flexibility Test:

32 = D.F. at which W.F.

Degrees Fahrenheit at which water freezes.

The paper was yellow.

11. Marshall modified this from Carmichael's collection. What was she trying to say?

Deviation from the ordinary of common routine is that which gives zest to the cycle of existence.

Variety is the spice of life

The paper was green.

12. Try this item from the Fixx test:

29 = D. in F. in a L.Y.

Days in February in a leap year.

The paper was blue.

13. One last item from Carmichael:

Do not utter loud or passionate vocal expressions because of the accidental overturning of a receptacle containing an opaque whitish nutritive liquid.

Don't cry over spilt milk.

The paper was pink.

Appendix G
Incidental Learning Test

The typefaces are as they appeared in the task materials for the subjects, except that the correct alternatives for each question are presented here in boldface.

These questions refer to aspects of the problem booklet that you have just completed. Please blacken the appropriate circle on the computer answer sheet to record your answers. Please don't guess; if you are unsure of an answer, choose the "Don't know" option.

67. Which of the following examples looks like the instruction pages on your booklets?

(a) These are puzzles and problems that will challenge you.

(b) These are puzzles and problems that will challenge you.

(c) These are puzzles and problems that will challenge you.

(d) Don't know.

68. Which of the following format features appeared in the puzzle booklet?

(a) page numbers

(b) italic lettering

(c) extra-wide margins

(d) Don't know.

69. The following is a question that appeared in the problem booklet. Which choice is printed in the same font (typeface) as it was in the booklet?

(a) List as many uses as you can think of for a ballpoint pen, besides writing.

(b) List as many uses as you can think of for a ballpoint pen, besides writing.

(c) List as many uses as you can think of for a ballpoint pen, besides writing.

(d) Don't know.

70. What was the source of this question:

29 = D. in F. in a L.Y.

(a) Feather Mental Dexterity Test

(b) Fixx Mental Flexibility Test

(c) McMichael Canadian Collection

(d) Campbell Intelligence Inventory

(e) Don't know.

71. What was the colour of the paper on which this item appeared?

Where there is a gaseous remain of flammable matter, there is an indicated insinuation of incendiary pyrotechnic.

(a) pink

(b) green

(c) blue

(d) yellow

(e) white

(f) Don't know.

72. Was Marshall a man or a woman?

(a) not enough information to say

(b) man

(c) woman

(d) Don't know.

73. What kind of hunter was looking for bears?

(a) a weak, clumsy hunter

(b) an experienced, savvy hunter

(c) a strong, intrepid hunter

(d) Don't know.

74. Another question from the problem booklets. Choose the colour of the paper on which it originally appeared.

How many times does the digit 9 appear from 1 to 100?

(a) yellow

(b) green

(c) blue

(d) pink

(e) white

(f) Don't know.

75. This is another question from the problem booklets. Choose the option that is printed in the same font as it was when you first saw it.

(a) The warm-blooded, feathered, egg-laying vertebrate animal ...

(b) The warm-blooded, feathered, egg-laying vertebrate animal ...

(c) The warm-blooded, feathered, egg-laying vertebrate animal ...

(d) The warm-blooded, feathered, egg-laying vertebrate animal ...

(e) Don't know.

76. Which of the following options was the source of this item?

What do the following words have in common?

deft	first	calmness	canopy
laughing	stupid	crabcake	hijack

(a) The Fixx Mental Flexibility Test

(b) The Woodson List

(c) The Carmichael Puzzle Collection

(d) The McNally-Robinson Book

(d) Don't know.

Appendix H
Perceptual Reasoning Task

Procedure

The perceptual puzzles were printed in black on white paper approximately 4 in x 6 in (see attached examples). Copies of each item were stacked in a pile and the four piles of cards placed face down in front of the subject, with the piles labelled 1-4. For each item the subject's task was to trace over all the lines of the diagram. Two rules applied: The subject could not lift the pen from the figure, nor could he/she trace over any line twice. The subject could take as many trials as desired on each item; each trial was 40 sec, timed by the experimenter.

Instructions to Subjects

"This job involves the four piles in front of you labelled from 1 to 4. Please do not look at them yet. Here is what you will have to do. Each pile of papers has a different diagram on them. When you turn over a paper, your job is to trace over the diagram. However, two rules must be met:

"1. You cannot trace or cross over any line you have previously drawn on.

"2. You cannot lift your pencil from the paper.

"Other restrictions have been placed on this job. For example, you can only work at a diagram for 40 seconds. I will tell you when 40 sec have passed.You can have as many of these 40 second trials on a particular figure as you want. If you do not succeed in tracing over all the lines in that figure, you will then have the choice of trying that figure again in the next 40 second trial, or you may go on to the next pile of diagrams. Once you have stopped working on a pile, you cannot go back to it again.

"We will review your job one more time before we start. When I tell you, take a paper from pile number one. Your job is to trace over all the lines of the figure without lifting the pencil from the paper or tracing over any line twice. When I call the end of the trial, you can go to the next pile if you have been successful. If you did not complete the job, you may take another copy of the same diagram from the same pile, or go on to the next pile. Once you have moved to another pile, you cannot go back to an earlier figure.

"Keep working until you are told to stop, you have completed the task, or you wish to stop. If you have any questions, please ask them before we begin. If you stop working before the other person, please wait quietly until we finish."

Perceptual Reasoning Diagrams

The following two pages contain the four perceptual reasoning diagrams. Numbers one and three are unsolvable; numbers two and four are solvable.

Diagram 1: Unsolvable.

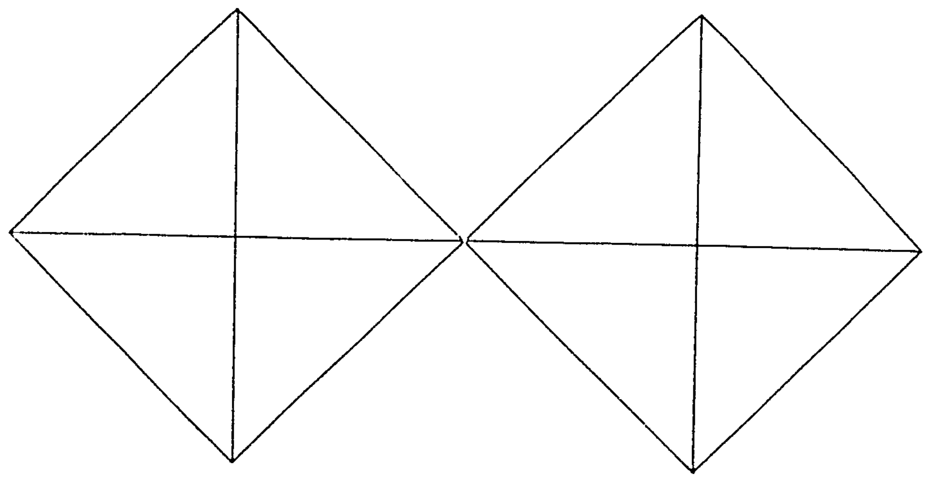


Diagram 2: Solvable.

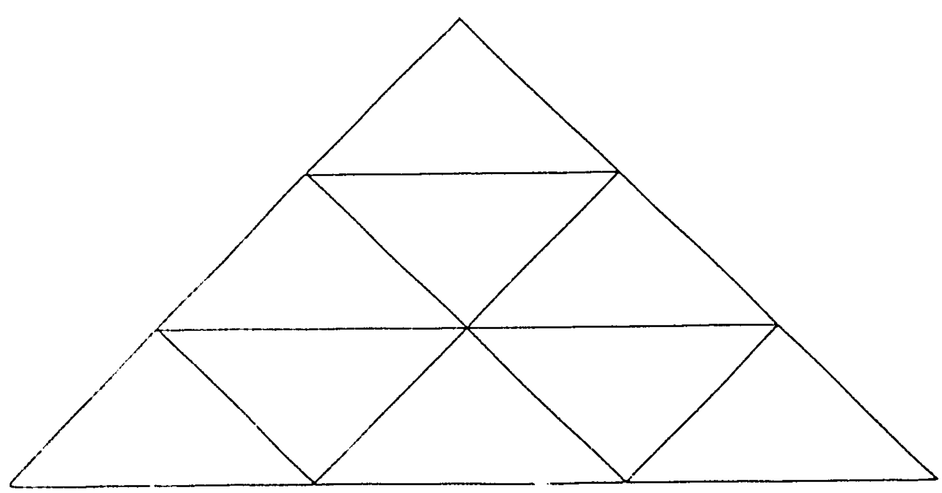


Diagram 3: Unsolvable.

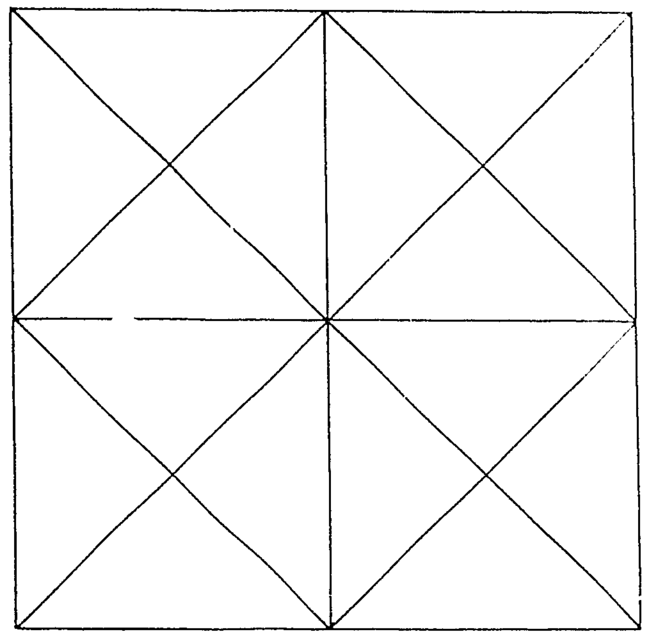
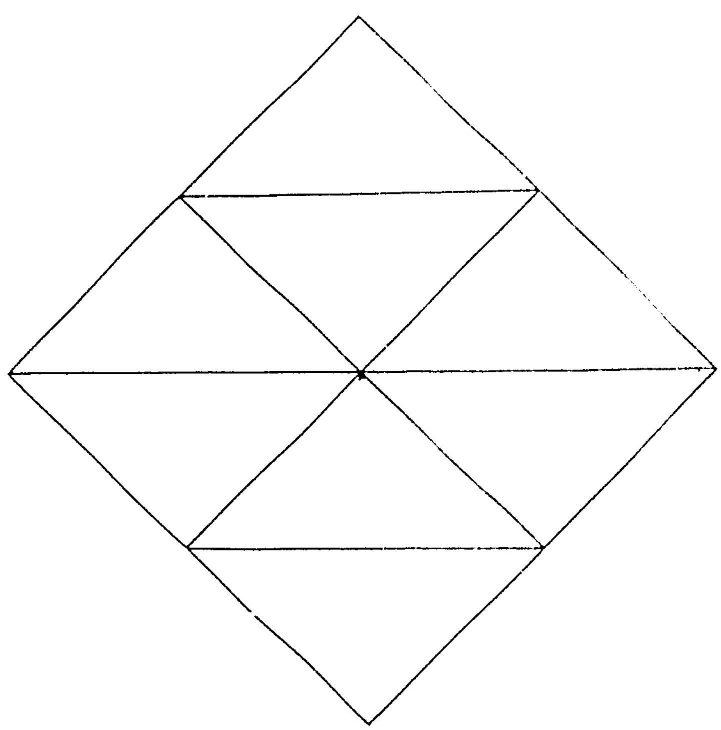


Diagram 4: Solvable.



Appendix I
Mood Questionnaire

The scale to which each item contributes is indicated below in boldface. **PL** indicates pleasure; **AR** indicates Arousal; **DO** indicates Dominance. **REV** indicates an item that is reverse-coded.

Take about two minutes to really get into the mood of the situation; then rate your feelings in the situation with the adjective pairs below. Some of the pairs might seem unusual, but you'll probably feel more one way than the other. So, for each pair, blacken a circle in the appropriate row on your answer sheet with a number close to the adjective which you believe to describe your feelings better. The more appropriate that adjective seems, the closer the circle you fill in. Start with question 77 on the computer answer sheet.

77. Happy	0	1	2	3	4	5	6	7	8	Unhappy **PL**
78. Annoyed	0	1	2	3	4	5	6	7	8	Pleased **PL; REV**
79. Jittery	0	1	2	3	4	5	6	7	8	Dull **AR**
80. Influenced	0	1	2	3	4	5	6	7	8	Influential **DO; REV**
81. Stimulated	0	1	2	3	4	5	6	7	8	Relaxed **AR**
82. Satisfied	0	1	2	3	4	5	6	7	8	Unsatisfied **PL**
83. Sluggish	0	1	2	3	4	5	6	7	8	Frenzied **AR; REV**
84. Autonomous	0	1	2	3	4	5	6	7	8	Guided **DO**
85. Hopeful	0	1	2	3	4	5	6	7	8	Despairing **PL**
86. Aroused	0	1	2	3	4	5	6	7	8	Unaroused **AR**
87. Awed	0	1	2	3	4	5	6	7	8	Important **DO; REV**
88. Contented	0	1	2	3	4	5	6	7	8	Melancholic **PL**
89. Dominant	0	1	2	3	4	5	6	7	8	Submissive **DO**
90. Sleepy	0	1	2	3	4	5	6	7	8	Wide-awake **AR; REV**
91. Relaxed	0	1	2	3	4	5	6	7	8	Bored **PL; REV**
92. Cared-for	0	1	2	3	4	5	6	7	8	In control **DO; REV**
93. Excited	0	1	2	3	4	5	6	7	8	Calm **AR**
94. Controlling	0	1	2	3	4	5	6	7	8	Controlled **DO**

Appendix J
Perceived Personal Influence Measure

The Survey of Personal Influence in Common Environments

This questionnaire asks your opinion about how much influence you have concerning various features of your everyday physical surroundings, and how important it is to you that you have this influence. The survey covers features of your home, the place where you spend most days (e.g., work or school), and public settings. There are no correct answers: give your own opinion, from your own experience.

In the choice or use of physical features of your surroundings (e.g., windows), you may have no influence, some influence, or complete control. Also, having reasonable influence may or may not be very important to you, whether or not you actually have influence now. So, you may have considerable influence even though having that influence is not very important to you, or you may have little influence even though having some influence is important to you, etc. For some features, you may want no control, preferring that others decide. For each setting, then, give two separate answers, one referring to your present, actual influence in the choices and uses of features in that setting, and one referring to the importance to you of having reasonable influence in the choices and uses of features in that setting.

Use this scale to give your INFLUENCE answers:

A = I have the final say or complete control concerning this setting
B = Others have more influence, but my opinion has more weight
C = My influence is about equal to that of others
D = I have some influence, but the opinion of others carries more weight
E = I have very little influence concerning this setting

Use this scale to give your IMPORTANCE answers:

A = Reasonable influence concerning this setting is very important to me
B = Reasonable influence is quite important to me
C = Reasonable influence is mildly important to me
D = Reasonable influence is not important to me
E = I prefer that others control this setting

On the next page you will find a list of settings and a list of physical features common in each of these settings. You should read the list of features and think about your actual influence over them and the importance to you of having that influence. Then, fill in the appropriate circle on your answer sheet to record your OVERALL influence and importance answers for that setting. Use the scales given above, and the item numbers as indicated.

First, we need to find out a little about the settings you work and live in. Please blacken the appropriate circle next to the corresponding question on your answer sheet.

95. Primary setting away from home (e.g., work or school)
If you work and go to school, please choose only the one that takes most of your time and respond only to questions concerning that setting:

0 = work 1 = school

96. If you chose work, where do you work?

0 = office
1 = store
2 = factory
3 = hospital
4 = other

97. If you chose school, choose one setting that your responses will pertain to and blacken the appropriate ... le:

0 = classroom
1 = library
2 = cafeteria
3 = gymnasium
4 = administrative offices

98. Public Setting. Choose one public setting (any place other than home, work, or school) and base your responses for the Indoor Public Setting items on that setting only.

0 = shopping mall
1 = public library
2 = gymnasium/swimming pool
3 = restaurant/bar
4 = theatre

Okay, now you are ready to proceed with your Influence and Importance ratings for these settings:

I. Where you live:

A. Indoor features:
Temperature
Lighting: location of lamps and fixtures
Lighting: brightness
Lighting: type of bulbs
Wall decorations
Colours
Furniture: style, comfort
Furniture: arrangement
Smoke from cigarettes, pipes, etc.
Flooring (e.g., carpet, tile)
Noise (sources inside your dwelling)
TV (on/off, programme selection)
Radio/stereo (on/off, selection)
Privacy
Pets
Plants
Taste of tap water
Size of your living area
Odours (sources inside your dwelling)

99. Overall, your influence on these features in your home.
100. Overall, the importance to you of influencing these features in your home.

B. Transition to outdoors:
Ventilation
Odours (from outdoor sources)
View of outdoors
Curtains, drapes
Noise (from outside your dwelling)
Bugs, pests (e.g., ants, spiders, termites)

101. Overall, your influence on these transition features.
102. Overall, the importance to you of influencing these features.

C. Outdoors:
Neighbours
Landscaping/gardening
Traffic
Parking

103. Overall, your influence on these outdoor features.
104. Overall, the importance to you of influencing these features.

II. Primary setting away from home (e.g., work, school), chosen above:
A. Indoors
Lighting: type of bulb
Lighting: location of lamps and fixtures
Lighting: brightness
Temperature
Wall decorations
Colours
Furniture: style, comfort
Furniture: arrangement (e.g., desk, workstation)
Bathrooms (all aspects)
Flooring (e.g., carpet, tile)
Noise (sources inside the building)
Music
Privacy
Taste of tap water
Size of my area
Smoke from cigarettes, pipes, etc.
Decorations of personal work area (e.g., posters, photos)
Indoor traffic
Number of people around you
Lineups
Odours (from indoor sources)

105. Overall, your influence in this setting.
106. Overall, the importance to you of having influence.

B. Transition to outdoors:
Ventilation
Odours (from outdoor sources)
View of outdoors
Noise (from outdoor sources)
Bugs, pests (e.g., ants, spiders)

107. Overall, your influence on these transition features.
108. Overall, the importance to you of having influence.

C. Outdoors:
Landscaping/gardening
Traffic
Parking

109. Overall, your <u>influence</u> in this setting.
110. Overall, the <u>importance</u> to you of having influence.

III. Public Setting (i.e., the one you chose earlier).
A. Indoors:
Decor
Furniture: style, comfort
Furniture: arrangement
Furniture: amount
Flooring (e.g., carpet, tile)
Bathrooms (all aspects)
Music
Smoking/no smoking areas
Construction/renovation
Stairs, elevators, escalators (e.g., their speed, design, number)
Odours (from indoor sources)
Number of people around you
Noise (inside public buildings)
Lineups

111. Overall, your <u>influence</u> in this public setting.
112. Overall, the <u>importance</u> to you of having influence.

B. Outdoors (In your whole community):
Landscaping
Litter
Architectural beauty/ugliness
Advertising signs
Traffic: patterning (e.g., one-way streets, traffic circles, etc.)
Traffic: amount
Traffic: signs, lights
Traffic: smoothness, slow-downs
Street signs
Speed limits
Road surface quality
Parking
Road construction/renovation
Land development projects
Public transport: location of stops
Public transport: schedules
Odours (outdoor sources)
Noise (outdoors)

113. Overall, your <u>influence</u> over these features in your community.
114. Overall, the <u>importance</u> to you of having influence.

Appendix K
Post-Experimental Quesionnaire

The results of this study will be more meaningful to us if we know what your thoughts and feelings were during the experiment. Please answer the following questions honestly and carefully. This will help us to understand what factors might have influenced the other responses you have made in the course of this session.

A. Please rate the difficulty of each task you performed on the following 5-point scale, filling in the appropriate circle on the computer answer sheet:

0	1	2	3	4
very easy	moderately easy	neither easy nor difficult	moderately difficult	very difficult

115. The problems in the puzzle booklets

116. The underlining page

117. The arithmetic page

118. The tracing puzzles

119. All the tasks, in general

B. Please write your answers in the spaces provided below. Please answer as completely and as honestly as you can. Your full cooperation is appreciated.

Briefly describe the purpose of the study in your own words. What do you think the experimenters were trying to learn from the study?

Do you believe anything might have influenced your performance on the written tasks, or the way you answered the questionnaires? If so, what? What was its effect on you?

Do you think the experimenters have any specific beliefs (hypotheses) about the effects of the physical environment on performance and mood? If yes, please explain.

The three items in section B were coded as a single score:

0	=	**no hypothesis guessed**
1	=	**Control hypothesis guessed**
2	=	**Preference hypothesis guessed**
3	=	**both hypotheses guessed**

C. Please rate the extent of your agreement with the following statements using the scale below:

0	1	2	3	4	9
strongly disagree	somewhat disagree	neutral	somewhat agree	strongly agree	don't know

Write your responses in the spaces provided.

C1. I had some control over events during the session. ___

C2. I work better when I like the physical setting I am in. ___

C3. How well I perform depends entirely on me. ___

C4. My mood depends on the features of my environment. ___

C5. The experimenter had all the control during the session. ___

C6. I had some control over the lighting in this study. ___

C7. Being able to control my environment makes me feel better. ___

C8. The type of lighting where I work affects my performance. ___

C9. There were choices I could make about the lighting where I worked during the session. ___

C10. The experimenter controlled every aspect of what occurred during the session, including where I sat. ___

D. Think back to when you were working on the puzzles and the other tasks. Try to remember how it felt to be working on them. How much attention did you focus on the work you were doing?
Blacken the appropriate circle on the computer sheet.

120.

0 = no attention

1 = a little attention

2 = moderate attention

3 = good attention

4 = full attention

Thank you for your help! The experimenter will collect your booklet now and will explain to you the purpose of the experiment. Please keep this information confidential, as many other students will be participating in the study in the coming weeks.

Appendix L

Consent Form

I, ________________________________, agree to participate in a study of simulated office work to be conducted by Jennifer Veitch (experimenter) under the supervision of Dr. R. Gifford. The study will last approximately 90 minutes and will involve my completing several questionnaires and intellectual tasks. I will receive an honorarium at the end of the session.

I understand that any personal information I give will be kept strictly confidential and that my test scores will be available only to the experimenter and her supervisors. I understand that I am free to withdraw from the experiment at any time; if I choose to do so for any reason, I will still receive the honorarium. A full explanation of the nature and purpose of the study will be provided to me at the end of the session, and I agree to keep this information confidential from other potential participants.

My signature below indicates that I have read this form completely, understand the procedures to be used, and agree to participate in this study. If for any reason I have a complaint concerning this study, I may .odge it in writing using a form provided by the Psychology General Office, Cornett A234.

Signature: ________________________________

Date: ________________________________

Experimenter Signature: ________________________________

Appendix M

Raw Data

```
VARIABLE LABELS
        COND  "CONDITION LABEL"
        CONTROL "CONTROL OVER LIGHTING"
        PREF "PREFERENCE FOR LIGHTING"
        ID    "SUBJECT CODE"
        N       "NUMBER IN SESSION"
        SAMECOND "SAME CONDITION AS PARTNER?
        SESSION "SESSION # (1-133)"
        SEAT "LIGHTING CONDITION DURING TASKS"
        YRSED    "YEARS OF EDUCATION"
        DISTVIS  "DISTANCE VISION CORRECTION"
        CLOSEVIS "CLOSE VISION CORRECTION"
        HEARING  "HEARING AID NO/YES"
        PREFA    "PREF COMPACT FLUOR"
        PREFB    "PREF INCANDESCENT"
        PREFC    "PREF FLUORESCENT"
        SES2 TO SES30 "SELF-EFFICACY ITEMS"
        SSEAVE "AVERAGE SOCIAL SELF-EFFICACY"
        GSEAVE "AVERAGE GENERAL SELF-EFFICACY"
        SESAVE "AVERAGE SELF-EFFICACY SCORE"
        PLEAS1 TO DOM6 "MOOD SCALE ITEMS"
        DOMIN "MEAN DOMINANCE SCORES"
        PLEASURE "MEAN PLEASURE SCORES"
        AROUSAL "MEAN AROUSAL SCORES"
        AWAYSET  "SETTING AWAY FROM HOME"
        WORKLOC  "WORK LOCATION"
        SCHOOL   "AT-SCHOOL SETTING"
        PUBSET   "PUBLIC SETTING"
        HOMEINF  "HOME FEATURE INFLUENCE"
        HOMEIMP  "HOME FEATURE IMPORTANCE"
        HMTRINF  "HOME TRANSITION INFLUENCE"
        HMTRIMP  "HOME TRANSITION IMPORTANCE"
        HMOUTINF "HOME OUTDOORS INFLUENCE"
        HMOUTIMP "HOME OUTDOORS IMPORTANCE"
        AWAYINF  "AWAYSET INFLUENCE"
        AWAYIMP  "AWAYSET IMPORTANCE"
        AWTRINF  "AWAY TRANSITION INFLUENCE"
        AWTRIMP  "AWAY TRANSITION IMPORTANCE"
        AWOUTINF "AWAY OUTDOORS INFLUENCE"
        AWOUTIMP "AWAY OUTDOORS IMPORTANCE"
        PUBSTINF "PUBLIC SETTING INFLUENCE"
        PUBSTIMP "PUBLIC SETTING IMPORTANCE"
        COMMINF  "COMMUNITY INFLUENCE"
        COMMIMP  "COMMUNITY IMPORTANCE"
        AVESPINF "SPICE -- AVERAGE ACTUAL CONTROL"
        AVESPIMP "SPICE -- AVE. DESIRED CONTROL"
        HGUESS   "HYPOTHESIS GUESS"
        C1 TO C10 "POST-EXP QUES ON CONTROL"
        DIFFPUZ  "PUZZLE DIFFICULTY"
        DIFFUND  "UNDERLINING DIFFICULTY"
        DIFFAR   "ARITHMETIC DIFFICULTY"
        DIFFEATH "FEATHER TASK DIFFICULTY"
        DIFFTASK "TASK DIFFICULTY"
```

```
        ATTEN     "ATTENTION SELF-REPORT"
        PUZCOR1 TO PUZCOR11  "PUZZLE ITEMS"
        PUZTIM1 TO PUZTIM11  "PUZZLE TIMES"
        PUZSCORE  "PUZZLES CORRECT"
        PCORTIME  "AVE. TIME CORRECT PUZZLES"
        CRITEM1 TO CRITEM2   "CREATIVITY ITEMS"
        CRTIME1 TO CRTIME2   "CREATIVITY TIMES"
        CRITEM  "# NOVEL USES SUGGESTED"
        CRTIME  "AVE. TIME PER NOVEL USE"
        INCID1 TO INCID10  "INCID LEARN ITEMS"
        INCIDLRN  "INCID LEARN SCORE"
        ARITHATT  "ARITH ATTEMPTS"
        ARITHCOR  "ARITH ITEMS CORRECT"
        ARITHACC  "ARITHMETIC PAGE % ACCURACY"
        UNDMISS   "UNDERLINING MISSES"
        UNDCORR   "UNDERLINING CORRECTS"
        UNDERACC "UNDERLINING ACCURACY SCORE"
        PERFORM2  "ZPUZSCOR + ZCRITEM + ZARITHCO +
                                        ZUNDERAC"
        FEATHER1  "UNSOLVABLE"
        FEATHER2  "SOLVABLE"
        FEATHER3  "UNSOLVABLE"
        FEATHER4  "SOLVABLE"
        FEATHUNS  "TOTAL UNSOLVABLE TRIALS"

VALUE LABELS   COND          CPD "CONTROL - PREFERENCE DENIED"
                             CPG "CONTROL - PREFERENCE GIVEN"
                             NCPD "NO CONTROL - PREFERENCE DENIED"
                             NCPG "NO CONTROL - PREFERENCE GIVEN"
                             TC "CPD SUBJECT WHO EXERCISED CONTROL"/
             PUZCOR1 TO PUZCOR11
                                              0 "NO ATTEMPT"
                    1 "ATTEMPT"
                    2 "CORRECT ATTEMPT"/
        HGUESS      0 "NO GUESS"
                    1 "CONTROL GUESS"
                    2 "PREFERENCE GUESS"
                    3 "BOTH GUESSED"/
        C1 TO C10   0 "DISAGREE (NO CONTROL)"
                    4 "AGREE (CONTROL)"/
        CONTROL TO PREF     0 "DENIED"
                            1 "GIVEN" /
        SAMECOND     0 "Ss IN DIFFERENT PREF CONDITIONS"
             1 "Ss IN SAME PREF CONDITION"
                                  . "IRRELEVANT (N=1)"/
             SEAT                 1 "COMPACT FLUORESCENT DESK LAMP"
                                  2 "INCANDESCENT DESK LAMP"
                                  3 "OVERHEAD FLUORESCENT ONLY"
```

Data from 185 subjects are listed here, sorted by condition. The first 180 cases are the data used in the analyses; the last 5 cases (IDs #102, 104, 113, 114, 140) were subjects in the CPD group who chose to exercise control. These data were excluded from the analyses.

Scoring and scale values are given in the appendix for each measure. Missing data are indicated by a lone decimal point.

ID	COND	CONTROL	PREF	N	SAMECOND	SESSION	SEAT	AGE	SEX	DISTVIS	CLOSEVIS	HEARING	MAJOR	PREFA	PREFB	PREFC
101	CPD	1.00	.00	2	1	13	3	19	0	0	0	0	7	5.0	3.0	2.0
103	CPD	1.00	.00	2	1	13	2	19	1	1	0	0	1	5.0	1.0	4.0
105	CPD	1.00	.00	2	1	14	1	25	1	0	0	0	7	1.0	7.0	2.0
106	CPD	1.00	.00	2	1	21	3	21	1	0	0	0	0	6.0	3.0	1.0
107	CPD	1.00	.00	1	.	20	3	21	1	1	0	0	7	5.0	3.0	2.0
108	CPD	1.00	.00	2	1	21	2	22	1	1	1	0	7	3.0	.0	7.0
109	CPD	1.00	.00	1	.	25	2	27	0	0	0	0	0	3.0	2.0	5.0
110	CPD	1.00	.00	[illegible]	.	24	3	20	1	1	0	0	5	5.0	3.0	2.0
111	CPD	1.00	.00	1	.	26	3	28	1	0	0	0	2	6.0	4.0	.0
112	CPD	1.00	.00	1	.	28	3	21	1	1	1	0	7	6.0	3.0	1.0
116	CPD	1.00	.00	2	0	41	3	23	0	0	0	1	0	6.0	3.0	1.0
117	CPD	1.00	.00	2	1	44	3	20	1	1	0	0	2	5.0	3.0	2.0
118	CPD	1.00	.00	2	1	44	1	21	1	0	0	0	2	2.0	5.0	3.0
119	CPD	1.00	.00	2	0	54	3	19	1	1	0	0	7	3.0	5.0	2.0
120	CPD	1.00	.00	2	1	56	1	20	0	1	1	0	3	2.0	5.0	3.0
121	CPD	1.00	.00	2	1	56	3	18	0	1	0	0	2	5.0	3.0	2.0
122	CPD	1.00	.00	2	1	60	1	22	0	0	0	0	2	2.0	3.0	5.0
123	CPD	1.00	.00	2	1	60	3	18	0	0	0	0	7	6.0	3.0	1.0
124	CPD	1.00	.00	1	.	61	2	31	0	0	0	0	2	3.0	1.0	6.0
125	CPD	1.00	.00	2	0	63	3	20	0	1	1	0	7	2.0	7.0	1.0
126	CPD	1.00	.00	2	1	65	3	17	0	1	0	0	7	5.0	3.0	2.0
127	CPD	1.00	.00	2	1	65	2	18	0	0	0	0	2	5.0	2.0	3.0
128	CPD	1.00	.00	2	1	67	3	18	1	1	0	0	3	5.0	4.0	1.0
129	CPD	1.00	.00	2	1	67	1	21	0	0	0	0	2	2.0	3.0	5.0
130	CPD	1.00	.00	2	0	80	1	22	0	1	0	0	4	2.0	3.0	5.0
131	CPD	1.00	.00	1	.	89	3	18	1	0	0	0	1	5.0	3.0	2.0
132	CPD	1.00	.00	1	.	91	3	21	1	0	0	0	1	5.0	3.0	2.0
133	CPD	1.00	.00	2	0	92	3	19	0	1	0	0	7	3.0	6.0	1.0
135	CPD	1.00	.00	2	0	93	3	19	1	1	0	0	2	5.0	4.0	1.0
136	CPD	1.00	.00	2	0	100	2	21	0	1	0	0	2	5.0	2.0	3.0
137	CPD	1.00	.00	2	0	97	1	24	0	1	1	0	4	2.0	3.0	5.0
138	CPD	1.00	.00	1	.	105	2	19	1	0	0	0	0	5.0	2.0	3.0
139	CPD	1.00	.00	2	0	106	2	23	0	1	0	1	2	5.0	2.0	3.0
141	CPD	1.00	.00	2	1	114	3	21	1	1	0	0	6	3.0	5.0	2.0
143	CPD	1.00	.00	2	1	115	1	20	1	0	0	0	6	2.0	3.0	5.0
144	CPD	1.00	.00	1	.	116	2	31	0	0	0	0	2	3.0	2.0	5.0
201	CPG	1.00	1.00	1	.	7	1	28	0	1	1	0	5	5.0	3.0	2.0
202	CPG	1.00	1.00	2	1	12	1	21	1	1	0	0	1	5.0	3.0	2.0
204	CPG	1.00	1.00	2	1	16	2	18	0	0	0	0	7	1.0	6.0	3.0
205	CPG	1.00	1.00	2	1	16	1	26	1	1	1	0	1	5.0	4.0	1.0
206	CPG	1.00	1.00	2	1	22	2	23	1	1	1	0	7	1.0	5.0	4.0
208	CPG	1.00	1.00	2	1	30	1	27	0	0	0	0	5	4.0	3.0	3.0
209	CPG	1.00	1.00	2	1	30	2	18	0	1	1	0	1	3.0	6.0	1.0
210	CPG	1.00	1.00	2	1	33	3	19	0	1	1	0	7	1.0	3.0	6.0
211	CPG	1.00	1.00	2	1	33	1	20	1	1	0	0	2	5.0	3.0	2.0
212	CPG	1.00	1.00	2	1	35	1	19	0	0	0	0	3	5.0	3.0	2.0
214	CPG	1.00	1.00	2	1	42	3	21	1	1	0	0	2	2.0	2.0	6.0
215	CPG	1.00	1.00	2	1	42	1	18	0	1	1	0	1	4.0	3.0	3.0
216	CPG	1.00	1.00	2	0	41	2	16	1	1	0	0	7	3.0	5.0	2.0
217	CPG	1.00	1.00	1	.	47	3	18	1	0	0	0	5	2.0	3.0	5.0
218	CPG	1.00	1.00	2	1	58	2	19	1	1	0	0	5	3.0	5.0	2.0
219	CPG	1.00	1.00	2	0	54	2	19	1	0	0	0	7	4.0	5.0	1.0
220	CPG	1.00	1.00	2	1	58	3	18	0	1	0	0	7	2.0	3.0	5.0
221	CPG	1.00	1.00	2	1	59	1	19	1	1	0	0	1	5.0	2.0	3.0
222	CPG	1.00	1.00	2	1	59	3	18	1	1	0	0	7	1.0	3.0	6.0
223	CPG	1.00	1.00	2	1	62	3	21	0	1	0	0	5	3.0	1.0	6.0
224	CPG	1.00	1.00	2	1	62	2	23	0	0	0	0	5	3.0	5.0	2.0

ID	COND	CONTROL	PREF	N	SAMECOND	SESSION	SEAT	AGE	SEX	DISTVIS	CLOSEVIS	HEARING	MAJOR	PREFA	PREFB	PREFC
225	CPG	1.00	1.00	2	0	63	1	22	1	0	0	0	5	5.0	3.0	2.0
226	CPG	1.00	1.00	2	1	64	1	33	1	1	0	0	2	6.0	4.0	.0
227	CPG	1.00	1.00	2	1	64	2	18	0	0	0	0	1	2.0	8.0	.0
228	CPG	1.00	1.00	2	0	80	3	33	0	1	0	0	7	1.0	2.0	7.0
231	CPG	1.00	1.00	2	0	92	2	18	1	1	1	0	3	3.0	6.0	1.0
232	CPG	1.00	1.00	2	0	93	2	.	1	0	0	0	2	3.5	4.0	2.5
233	CPG	1.00	1.00	2	0	97	3	20	0	0	0	0	7	1.0	2.0	7.0
234	CPG	1.00	1.00	1	.	98	1	25	0	1	0	0	4	5.0	3.0	2.0
235	CPG	1.00	1.00	2	0	100	1	24	0	1	0	0	4	5.0	4.0	1.0
236	CPG	1.00	1.00	1	.	310	3	19	0	1	0	0	7	3.0	2.0	5.0
237	CPG	1.00	1.00	1	.	104	3	23	0	0	0	0	2	2.0	1.0	7.0
238	CPG	1.00	1.00	2	0	106	1	36	1	1	1	0	4	5.0	3.0	2.0
239	CPG	1.00	1.00	2	1	111	3	22	1	1	0	0	2	.0	2.0	8.0
240	CPG	1.00	1.00	2	1	111	1	23	0	1	0	0	4	5.0	4.0	1.0
241	CPG	1.00	1.00	1	.	113	1	21	1	1	0	0	1	5.0	4.0	1.0
301	NCPD	.00	.00	2	1	1	2	18	0	1	0	0	7	4.0	3.0	3.0
302	NCPD	.00	.00	2	1	1	3	20	1	1	1	0	2	5.0	3.0	2.0
303	NCPD	.00	.00	2	1	3	3	17	0	1	1	0	2	5.0	4.0	1.0
304	NCPD	.00	.00	2	1	3	1	18	0	1	0	0	2	2.0	3.0	5.0
305	NCPD	.00	.00	1	.	4	3	19	1	0	0	0	2	4.0	5.0	1.0
306	NCPD	.00	.00	2	1	6	3	18	0	0	0	0	5	5.0	4.0	1.0
307	NCPD	.00	.00	2	1	6	1	17	0	0	0	0	2	1.0	3.0	6.0
308	NCPD	.00	.00	2	1	15	3	23	1	0	0	0	6	3.0	5.0	2.0
310	NCPD	.00	.00	2	1	39	3	25	0	0	0	0	3	5.0	4.0	1.0
311	NCPD	.00	.00	1	.	23	2	22	1	0	0	0	6	6.0	1.0	3.0
313	NCPD	.00	.00	2	0	40	3	23	1	1	0	0	2	5.0	4.0	1.0
314	NCPD	.00	.00	2	1	66	3	20	1	1	1	0	1	4.0	5.0	1.0
315	NCPD	.00	.00	2	0	46	3	20	1	0	0	0	2	5.0	4.0	1.0
316	NCPD	.00	.00	1	.	55	3	18	1	1	0	0	5	5.0	3.0	2.0
317	NCPD	.00	.00	1	.	43	3	18	0	1	0	0	2	5.0	3.0	2.0
318	NCPD	.00	.00	1	.	48	1	22	1	1	0	0	2	1.0	7.0	2.0
319	NCPD	.00	.00	2	1	49	2	21	1	1	1	0	2	3.0	2.0	5.0
320	NCPD	.00	.00	2	1	49	1	19	0	0	0	0	2	2.0	5.0	3.0
321	NCPD	.00	.00	2	0	50	3	18	0	1	0	0	1	3.0	6.0	1.0
322	NCPD	.00	.00	2	0	52	3	18	0	1	1	0	7	3.0	5.0	2.0
323	NCPD	.00	.00	2	1	66	1	22	1	1	0	0	6	2.0	5.0	3.0
324	NCPD	.00	.00	2	0	70	3	25	1	1	1	0	1	3.0	6.0	1.0
325	NCPD	.00	.00	2	0	73	3	20	0	1	1	0	3	4.0	5.0	1.0
326	NCPD	.00	.00	2	0	72	3	18	1	0	0	0	3	4.0	5.0	1.0
327	NCPD	.00	.00	1	.	74	3	18	1	0	0	0	6	3.0	5.0	2.0
328	NCPD	.00	.00	2	1	79	3	29	0	1	0	0	4	5.0	3.0	2.0
329	NCPD	.00	.00	2	0	76	3	24	0	1	1	0	0	3.0	5.0	2.0
330	NCPD	.00	.00	1	.	78	3	21	1	1	1	0	2	3.0	5.0	2.0
331	NCPD	.00	.00	2	1	81	2	18	1	1	0	0	1	3.0	2.0	5.0
332	NCPD	.00	.00	2	1	81	1	19	0	0	0	0	7	2.0	5.0	3.0
333	NCPD	.00	.00	2	0	87	3	.	1	1	1	0	1	3.0	6.0	1.0
335	NCPD	.00	.00	1	.	90	1	20	0	0	0	0	2	1.0	3.0	6.0
336	NCPD	.00	.00	2	1	95	3	24	0	1	0	0	4	5.0	4.0	1.0
337	NCPD	.00	.00	2	1	95	1	18	1	1	1	0	5	2.0	3.0	5.0
338	NCPD	.00	.00	2	0	109	3	18	1	0	0	0	0	4.0	5.0	1.0
339	NCPD	.00	.00	2	0	110	3	24	0	0	0	0	4	3.0	5.0	2.0
401	NCPG	.00	1.00	2	1	2	3	22	0	0	0	0	4	3.0	2.0	5.0
402	NCPG	.00	1.00	2	1	2	1	20	1	0	0	0	1	5.0	2.0	3.0
403	NCPG	.00	1.00	1	.	18	1	19	0	0	0	0	0	4.0	3.0	3.0
404	NCPG	.00	1.00	1	.	11	3	23	0	0	0	0	2	2.0	3.0	5.0
405	NCPG	.00	1.00	2	1	27	2	23	1	0	0	0	2	3.0	5.0	2.0
406	NCPG	.00	1.00	2	1	27	1	20	1	0	0	0	2	5.0	3.0	2.0

ID	COND	CONTROL	PREF	N	SAMECOND	SESSION	SEAT	AGE	SEX	DISTVIS	CLOSEVIS	HEARING	MAJOR	PREFA	PREFB	PREFC
408	NCPG	.00	1.00	2	1	32	1	18	0	1	1	0	1	5.0	2.0	3.0
409	NCPG	.00	1.00	2	1	34	1	20	1	1	0	0	7	6.0	3.0	1.0
411	NCPG	.00	1.00	2	0	40	2	19	0	0	0	0	0	3.0	5.0	2.0
412	NCPG	.00	1.00	2	0	46	1	21	0	1	0	0	1	6.0	4.0	.0
413	NCPG	.00	1.00	2	0	50	2	18	1	1	1	0	0	4.0	5.0	1.0
414	NCPG	.00	1.00	2	1	53	2	33	0	1	0	0	5	3.0	5.0	2.0
415	NCPG	.00	1.00	2	1	53	1	19	1	1	0	0	3	6.0	3.0	1.0
416	NCPG	.00	1.00	2	0	52	2	18	1	0	0	0	7	3.0	6.0	1.0
417	NCPG	.00	1.00	2	1	45	2	18	0	0	0	0	0	5.0	3.0	2.0
418	NCPG	.00	1.00	2	1	45	3	24	0	1	0	1	3	2.0	3.0	5.0
419	NCPG	.00	1.00	2	0	55	1	22	0	0	0	0	1	8.0	2.0	.0
420	NCPG	.00	1.00	2	1	57	2	18	0	1	1	0	5	4.0	5.0	1.0
421	NCPG	.00	1.00	2	1	57	1	22	1	0	0	0	1	5.0	3.0	2.0
422	NCPG	.00	1.00	2	0	70	1	23	0	1	0	0	3	5.0	3.0	2.0
423	NCPG	.00	1.00	1	.	71	1	24	1	0	1	0	7	5.0	4.0	1.0
424	NCPG	.00	1.00	2	0	72	1	18	0	1	1	0	0	5.0	4.0	1.0
425	NCPG	.00	1.00	2	0	73	2	18	1	1	1	0	1	2.0	7.0	1.0
426	NCPG	.00	1.00	2	0	76	1	26	0	0	0	0	4	5.0	3.0	2.0
427	NCPG	.00	1.00	2	1	77	2	18	0	0	0	0	3	2.0	7.0	1.0
428	NCPG	.00	1.00	2	1	77	3	18	1	0	0	0	7	1.0	4.0	5.0
429	NCPG	.00	1.00	2	0	79	1	30	0	1	0	0	4	5.0	4.0	1.0
430	NCPG	.00	1.00	2	1	82	3	21	1	1	1	0	2	3.0	2.0	5.0
431	NCPG	.00	1.00	2	1	82	2	20	1	1	1	0	2	3.0	6.0	1.0
432	NCPG	.00	1.00	2	0	87	2	18	1	1	0	0	0	3.0	6.0	1.0
433	NCPG	.00	1.00	1	.	94	1	21	0	0	0	0	6	5.0	3.0	2.0
434	NCPG	.00	1.00	1	.	101	3	24	1	1	0	0	2	3.0	2.0	5.0
435	NCPG	.00	1.00	2	1	107	2	18	0	1	0	0	7	3.0	5.0	2.0
436	NCPG	.00	1.00	2	1	107	3	31	0	1	1	0	2	3.0	3.0	4.0
438	NCPG	.00	1.00	2	0	110	1	20	1	0	0	0	2	6.0	3.0	1.0
439	NCPG	.00	1.00	1	.	112	2	21	1	1	0	0	1	3.0	5.0	2.0
501	N	.	.	2	1	5	2	22	1	1	0	0	2	3.0	2.0	5.0
502	N	.	.	2	1	5	1	18	0	0	0	0	0	5.0	4.0	1.0
503	N	.	.	2	1	17	1	18	0	1	0	0	3	3.0	5.0	2.0
504	N	.	.	1	.	9	3	24	1	1	0	0	2	3.5	4.0	2.5
505	N	.	.	1	.	10	1	21	1	0	0	0	2	5.0	4.0	1.0
506	N	.	.	2	1	17	3	18	0	1	0	0	7	5.0	3.0	2.0
507	N	.	.	2	1	19	2	19	0	0	0	0	0	2.0	3.0	5.0
508	N	.	.	2	1	19	1	22	1	1	1	0	3	5.0	3.0	2.0
509	N	.	.	2	1	29	1	21	1	0	0	0	1	3.0	5.0	2.0
510	N	.	.	2	1	29	2	20	1	1	0	0	2	4.0	5.0	1.0
511	N	.	.	2	1	36	2	18	0	1	0	0	2	5.0	3.0	2.0
512	N	.	.	1	.	31	2	21	1	0	0	0	7	3.0	2.0	5.0
513	N	.	.	2	1	36	1	20	0	0	0	0	2	4.0	4.0	2.0
514	N	.	.	1	.	38	2	33	1	0	0	0	2	1.0	3.0	6.0
515	N	.	.	2	1	51	1	18	0	0	0	0	1	3.0	1.0	6.0
516	N	.	.	2	1	51	3	18	0	0	0	0	7	2.0	3.0	5.0
517	N	.	.	2	1	68	3	19	0	1	0	0	3	5.0	4.0	1.0
518	N	.	.	2	1	68	2	18	1	0	0	0	3	3.0	5.0	2.0
519	N	.	.	2	1	69	2	33	1	1	0	0	2	4.0	5.0	1.0
520	N	.	.	2	1	69	3	18	1	1	1	0	3	1.0	4.0	5.0
521	N	.	.	2	1	75	1	20	0	0	0	0	2	5.0	4.0	1.0
522	N	.	.	2	1	75	2	18	1	0	1	0	2	3.0	6.0	1.0
523	N	.	.	2	1	83	3	19	1	0	0	0	2	5.0	4.0	1.0
524	N	.	.	2	1	83	1	18	0	1	0	0	2	7.0	2.0	1.0
525	N	.	.	1	.	85	2	29	1	1	0	0	0	6.0	4.0	.0
526	N	.	.	2	1	86	2	25	0	0	0	0	4	2.0	3.0	5.0
527	N	.	.	2	1	86	1	27	0	0	0	0	4	4.0	3.0	3.0

ID	COND	CONTROL	PREF	N	SAMECOND	SESSION	SEAT	AGE	SEX	DISTVIS	CLOSEVIS	HEARING	MAJOR	PREFA	PREFB	PREFC
528	N	.	.	2	1	88	2	18	1	0	0	0	2	3.0	5.0	2.0
529	N	.	.	2	1	88	3	19	0	1	1	0	7	5.0	4.0	1.0
530	N	.	.	2	1	96	2	18	1	1	1	0	2	4.0	5.0	1.0
531	N	.	.	2	1	96	1	19	0	0	0	0	6	5.0	3.0	2.0
532	N	.	.	2	1	99	3	19	0	0	0	0	0	5.0	3.0	2.0
533	N	.	.	2	1	99	2	19	1	0	0	0	0	3.0	2.0	5.0
534	N	.	.	2	1	103	1	19	0	1	0	0	2	3.0	6.0	1.0
535	N	.	.	2	1	103	3	18	1	1	1	0	3	3.0	6.0	1.0
536	N	.	.	1	.	108	2	19	0	0	0	0	2	2.0	3.0	5.0
102	TC	1.00	.	1	.	.	2	18	0	1	0	0	5	5.0	3.0	2.0
104	TC	1.00	.	2	1	.	2	19	0	0	0	0	0	2.0	5.0	3.0
113	TC	1.00	.	1	.	.	1	.	1	0	0	0	2	6.0	3.0	1.0
114	TC	1.00	.	1	.	.	2	21	1	0	1	0	5	3.0	6.0	1.0
140	TC	1.00	.	2	1	.	1	32	0	0	0	0	6	3.0	2.0	5.0

ID	SES2	SES3	SES4	SES6	SES7	SES8	SES10	SES11	SES12	SES14	SES15	SES16	SES18	SES19	SES20	SES22	SES23	SES24	SES26	SES27	SES28	SES29	SES30
101	3	1	4	3	3	4	1	1	3	3	3	2	4	1	3	3	3	3	1	3	3	4	4
103	3	3	4	3	4	3	2	1	3	3	3	3	4	1	4	3	2	3	4	4	2	4	4
105	4	3	3	1	4	3	2	1	3	3	3	3	2	3	4	4	2	3	2	3	3	3	4
106	1	3	3	4	4	4	2	3	4	0	3	3	3	1	2	2	3	4	3	3	4	3	4
107	1	0	1	3	3	1	0	1	1	1	3	1	1	0	1	1	3	4	0	3	3	1	3
108	1	4	1	4	3	3	3	1	1	4	1	3	1	0	4	1	1	4	4	1	4	1	4
109	3	1	3	2	3	2	3	1	1	1	3	1	0	1	1	0	4	4	1	2	2	1	1
110	3	2	3	4	3	3	3	2	2	3	2	1	2	3	2	2	3	4	3	2	4	3	3
111	1	1	2	4	4	3	4	3	3	3	1	2	2	4	3	2	3	4	3	4	4	2	4
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ID	SES2	SES3	SES4	SES6	SES7	SES8	SES10	SES11	SES12	SES14	SES15	SES16	SES18	SES19	SES20	SES22	SES23	SES24	SES26	SES27	SES28	SES29	SES30
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523	1	0	3	2	2	1	1	1	3	2	2	1	3	2	1	3	1	2	1	1	3	3	2
524	3	2	2	1	1	2	1	2	3	1	2	2	3	3	3	3	2	2	1	3	2	3	3
525	3	3	3	0	3	4	2	4	3	3	4	3	4	1	3	3	3	3	2	4	0	4	4
526	2	0	1	1	4	1	1	2	0	0	0	1	1	0	2	1	0	3	3	3	3	0	4
527	4	4	3	4	4	4	2	3	3	1	3	3	3	1	3	4	0	4	4	4	3	3	4
528	3	1	3	4	4	4	3	1	3	4	4	3	3	3	3	3	3	4	3	3	4	3	4
529	2	3	2	4	4	4	0	2	1	0	3	3	1	0	1	1	1	3	2	2	4	2	2
530	3	3	3	3	3	4	2	3	3	3	3	3	3	2	3	3	2	4	3	2	3	4	4
531	3	2	4	3	3	4	2	3	3	2	2	3	3	3	3	3	4	3	4	4	4	4	4
532	3	0	3	3	3	3	2	3	3	2	3	2	3	2	3	3	2	3	3	3	2	3	3
533	4	3	3	3	4	3	1	3	3	2	1	3	4	1	4	3	1	3	3	3	2	3	4
534	3	1	1	1	2	3	0	4	3	0	3	0	3	0	2	4	1	2	3	4	0	4	4
535	4	1	4	3	4	4	2	2	1	3	2	4	3	3	3	1	2	4	1	4	3	4	4
536	3	1	2	3	3	1	3	3	4	3	3	3	4	3	2	4	3	4	4	2	4	4	4
102	3	4	4	4	3	2	0	0	2	1	3	2	3	0	3	4	2	2	1	2	3	2	4
104	2	3	2	0	4	3	4	2	1	4	0	0	0	4	4	4	0	4	4	1	0	4	4
113	3	3	4	3	4	4	2	4	3	2	4	3	4	2	3	3	3	3	3	3	2	4	3
114	4	3	4	4	4	3	4	4	4	4	3	3	3	3	4	4	4	3	4	4	4	4	0
140	4	1	3	3	4	4	1	4	1	1	4	4	3	1	2	1	4	3	3	4	3	3	3

ID	GSEAVE	SSEAVE	SESAVE	FEATHER1	FEATHER2	FEATHER3	FEATHER4	FEATHUNS
101	2.88	2.33	2.74	5	1	24	0	29.00
103	3.29	2.33	3.04	30	0	0	0	30.00
105	3.00	2.50	2.87	5	1	4	7	9.00
106	3.00	2.50	2.87	7	1	1	1	8.00
107	1.47	1.83	1.57	7	1	4	5	11.00
108	2.06	3.17	2.35	5	1	4	1	9.00
109	1.65	2.17	1.78	29	1	0	0	29.00
110	2.41	3.50	2.70	6	2	6	1	12.00
111	2.53	3.83	2.87	5	1	9	2	14.00
112	3.29	2.50	3.09	25	2	3	0	28.00
116	3.29	1.50	2.83	2	1	6	2	8.00
117	2.71	2.33	2.61	4	1	11	3	15.00
118	1.94	.60	1.64	2	4	2	7	4.00
119	3.06	3.00	3.04	4	1	8	3	12.00
120	2.88	3.17	2.96	30	0	0	0	30.00
121	3.59	3.83	3.65	5	1	8	1	13.00
122	2.76	2.67	2.74	4	2	5	2	9.00
123	3.47	3.67	3.52	2	2	2	15	4.00
124	2.76	2.83	2.78	2	1	3	1	5.00
125	2.24	2.83	2.39	3	1	4	7	7.00
126	2.18	.67	1.78	10	1	4	3	14.00
127	2.35	3.33	2.61	3	1	6	3	9.00
128	2.71	2.67	2.70	13	1	3	2	16.00

ID	GSEAVE	SSEAVE	SESAVE	FEATHER1	FEATHER2	FEATHER3	FEATHER4	FEATHUNS
129	1.47	1.50	1.48	4	1	2	1	6.00
130	2.18	2.83	2.35	4	1	25	0	29.00
131	3.06	2.17	2.83	22	1	6	1	28.00
132	2.24	2.67	2.35	2	1	3	3	5.00
133	3.65	2.67	3.39	3	1	6	1	9.00
135	3.65	2.50	3.35	3	3	24	0	27.00
136	1.71	1.83	1.74	3	1	2	3	5.00
137	3.18	2.50	3.00	3	2	3	2	6.00
138	2.53	2.50	2.52	6	2	2	2	8.00
139	2.47	2.33	2.43	10	1	15	4	25.00
141	2.41	1.33	2.13	4	1	7	2	11.00
143	2.35	1.50	2.13	13	1	9	2	22.00
144	3.19	3.17	3.18	4	1	5	2	9.00
201	3.35	2.33	3.09	7	2	4	2	11.00
202	3.18	3.33	3.22	30	0	0	0	30.00
204	3.59	1.67	3.09	4	1	11	1	15.00
205	1.53	1.67	1.57	3	5	7	2	10.00
206	3.29	2.67	3.13	4	1	10	2	14.00
208	2.94	3.33	3.04	3	1	13	1	16.00
209	2.94	2.83	2.91	7	2	13	8	20.00
210	1.71	1.17	1.57	2	1	1	3	3.00
211	2.12	3.17	2.39	2	2	13	3	15.00
212	3.59	1.67	3.09	20	1	9	0	29.00
214	2.76	1.83	2.52	4	2	6	6	10.00
215	2.71	2.17	2.57	4	2	4	8	8.00
216	2.71	2.83	2.74	1	3	4	7	5.00
217	2.82	2.00	2.61	5	1	8	2	13.00
218	3.59	3.00	3.43	7	1	22	0	29.00
219	3.06	2.50	2.91	5	1	5	5	10.00
220	2.06	2.50	2.17	5	2	9	3	14.00
221	2.88	2.67	2.83	30	0	0	0	30.00
222	2.88	2.33	2.74	21	1	8	0	29.00
223	2.12	2.17	2.13	5	1	11	1	16.00
224	2.71	3.17	2.83	9	1	8	0	17.00
225	2.47	2.17	2.39	5	2	6	2	11.00
226	3.06	2.83	3.00	21	1	8	0	29.00
227	2.35	3.00	2.52	10	1	8	1	18.00
228	3.71	3.50	3.65	7	2	19	2	26.00
231	3.53	3.33	3.48	2	1	2	6	4.00
232	2.59	2.67	2.61	5	3	9	14	14.00
233	2.71	1.50	2.39	3	2	2	4	5.00
234	3.12	2.83	3.04	3	2	5	1	8.00
235	3.12	3.00	3.09	5	1	24	0	29.00
236	1.65	2.00	1.74	4	3	4	2	8.00
237	3.12	3.00	3.09	11	2	11	1	22.00
238	3.12	2.67	3.00	3	1	8	2	11.00
239	2.35	2.67	2.43	5	1	8	2	13.00
240	2.12	1.67	2.00	6	1	6	1	12.00
241	1.65	1.67	1.65	2	1	4	1	6.00
301	3.06	3.17	3.09	1	1	1	4	2.00
302	3.24	2.83	3.13	3	1	7	3	10.00
303	1.00	1.50	1.13	2	1	8	2	10.00
304	2.88	3.67	3.09	5	1	24	0	29.00
305	3.35	3.67	3.43	13	1	10	3	23.00
306	1.94	3.00	2.22	2	1	1	1	3.00
307	3.00	2.33	2.83	2	2	4	8	6.00
308	2.71	2.67	2.70	4	1	7	2	11.00
310	2.88	2.50	2.78	13	1	16	0	29.00
311	3.35	3.50	3.39	7	3	7	3	14.00
313	3.41	1.83	3.00	2	1	3	1	5.00
314	2.94	2.00	2.70	1	1	1	1	2.00
315	3.5[illegible]	2.00	3.17	30	0	0	0	30.00
316	2.29	1.50	2.09	6	4	6	3	12.00

ID	GSEAVE	SSEAVE	SESAVE	FEATHER1	FEATHER2	FEATHER3	FEATHER4	FEATHUNS
317	3.18	3.17	3.17	3	1	3	10	6.00
318	3.65	3.00	3.48	16	1	13	0	29.00
319	2.76	2.67	2.74	4	1	7	2	11.00
320	1.76	3.67	2.26	5	1	15	2	20.00
321	2.88	3.17	2.96	4	1	2	1	6.00
322	3.00	.17	2.26	2	1	4	2	6.00
323	2.82	3.33	2.96	5	1	8	5	13.00
324	3.06	.50	2.39	3	1	9	3	12.00
325	3.12	2.17	2.87	4	1	6	1	10.00
326	3.06	3.00	3.04	5	2	19	2	24.00
327	2.82	3.17	2.91	6	1	7	2	13.00
328	2.71	2.33	2.61	1	4	1	4	2.00
329	2.59	2.17	2.48	7	1	13	1	20.00
330	2.88	2.50	2.78	5	1	16	3	21.00
331	2.76	2.50	2.70	3	2	3	3	6.00
332	3.12	.50	2.43	5	1	7	2	12.00
333	2.59	1.67	2.35	5	1	4	4	9.00
335	3.53	2.83	3.35	2	1	2	2	4.00
336	2.53	1.33	2.22	3	1	2	1	5.00
337	3.00	3.00	3.00	4	1	3	5	7.00
338	2.71	2.67	2.70	8	1	21	0	29.00
339	1.94	2.50	2.09	19	1	10	0	29.00
401	1.94	.50	1.57	3	1	9	4	12.00
402	2.12	2.17	2.13	3	1	10	2	13.00
403	3.41	2.17	3.09	4	1	5	3	9.00
404	3.00	1.83	2.70	7	1	11	1	18.00
405	3.18	3.50	3.26	21	1	1	5	22.00
406	2.41	2.33	2.39	30	0	0	0	30.00
408	2.35	.83	1.96	3	1	5	5	8.00
409	3.18	3.33	3.22	20	1	5	4	25.00
411	2.53	2.33	2.48	2		1	3	3.00
412	1.71	3.00	2.04	3	2	8	2	11.00
413	3.71	3.00	3.52	2	1	3	1	5.00
414	3.29	3.00	3.22	2	1	2	3	4.00
415	2.76	1.17	2.35	3	1	4	7	7.00
416	1.88	2.67	2.09	3	1	3	2	6.00
417	2.65	3.17	2.78	11	1	18	0	29.00
418	1.82	1.00	1.61	24	1	5	0	29.00
419	2.24	3.00	2.43	3	2	2	4	5.00
420	3.00	3.33	3.09	5	2	10	4	15.00
421	2.71	2.17	2.57	3	1	5	8	8.00
422	3.47	2.50	3.22	4	2	6	6	10.00
423	3.29	3.33	3.30	8	1	8	3	16.00
424	3.00	2.67	2.91	20	5	5	0	25.00
425	2.59	2.33	2.52	7	1	6	6	13.00
426	3.29	2.83	3.17	3	2	21	1	24.00
427	3.06	2.67	2.96	3	2	2	5	5.00
428	2.18	1.83	2.09	5	1	7	1	12.00
429	2.29	2.67	2.39	6	1	6	1	12.00
430	1.94	1.67	1.87	12	1	17	0	29.00
431	2.76	2.67	2.74	13	2	15	0	28.00
432	3.53	2.67	3.30	19	1	10	0	29.00
433	2.88	2.33	2.74	11	2	13	1	24.00
434	3.35	2.33	3.09	8	2	8	2	16.00
435	2.82	3.67	3.04	2	2	4	1	6.00
436	2.94	2.50	2.83	5	3	3	1	8.00
438	2.76	2.17	2.61	2	1	2	13	4.00
439	3.12	3.33	3.17	4	1	1	5	5.00
501	3.06	1.67	2.70	4	1	2	2	6.00
502	1.24	1.17	1.22	10	3	17	0	27.00
503	3.59	2.33	3.26	3	1	4	3	7.00
504	1.65	2.67	1.91	3	2	3	6	6.00
505	3.65	3.00	3.48	12	1	11	2	23.00

ID	GSEAVE	SSEAVE	SESAVE	FEATHER1	FEATHER2	FEATHER3	FEATHER4	FEATHUNS
506	2.71	2.33	2.61	16	1	2	3	18.00
507	3.00	2.00	2.74	6	1	11	4	17.00
508	3.24	2.17	2.96	9	1	4	2	13.00
509	2.47	2.17	2.39	3	1	5	1	8.00
510	2.29	2.50	2.35	10	1	5	4	15.00
511	3.24	3.33	3.26	5	2	4	1	9.00
512	3.53	2.83	3.35	30	0	0	0	30.00
513	2.94	2.50	2.83	5	2	1	12	6.00
514	2.41	.67	1.96	3	1	21	2	24.00
515	2.76	2.33	2.65	4	1	7	6	11.00
516	2.59	3.00	2.70	4	1	16	1	20.00
517	3.00	2.50	2.87	30	0	0	0	30.00
518	3.24	2.50	3.04	30	0	0	0	30.00
519	1.94	1.00	1.70	1	1	3	3	4.00
520	1.76	.83	1.52	4	2	6	3	10.00
521	2.44	2.00	2.32	7	2	8	2	15.00
522	3.24	2.83	3.13	4	1	9	1	13.00
523	1.71	2.00	1.78	3	1	3	15	6.00
524	2.35	1.67	2.17	4	1	3	2	7.00
525	3.35	1.50	2.87	2	4	4	1	6.00
526	1.47	1.33	1.43	5	3	5	1	10.00
527	3.29	2.50	3.09	10	4	16	0	26.00
528	3.00	3.67	3.17	9	1	11	2	20.00
529	2.12	1.83	2.04	2	1	4	1	6.00
530	3.06	2.83	3.00	8	2	7	2	15.00
531	3.29	2.83	3.17	9	3	5	3	14.00
532	2.71	2.33	2.61	30	0	0	0	30.00
533	3.06	2.00	2.78	2	2	26	0	28.00
534	2.65	.50	2.09	2	1	3	1	5.00
535	2.82	3.00	2.87	6	1	6	1	12.00
536	2.94	3.33	3.04	15	3	12	0	27.00
102	2.59	1.67	2.35	6	1	3	9	9.00
104	2.23	2.67	2.35	5	2	4	4	9.00
113	3.41	2.33	3.13	4	1	5	1	9.00
114	3.47	3.67	3.52	11	1	1	2	12.00
140	3.06	2.00	2.78	16	1	6	5	22.00

ID	PUZCOR1	PUZCOR2	PUZCOR3	PUZCOR4	PUZCOR5	PUZCOR6	PUZCOR7	PUZCOR8	PUZCOR9	PUZCOR10	PUZCOR11	PUZSCORE	CRITEM1	CRITEM2	CRITEM
101	1	2	1	2	1	2	2	2	1	2	2	7	3	3	6.00
103	1	1	1	1	1	1	1	2	1	0	1	1	4	3	7.00
105	1	1	1	1	1	2	0	0	0	0	0	1	4	1	5.00
106	1	1	1	1	1	1	1	1	1	1	2	1	2	2	4.00
107	1	1	1	1	1	2	1	1	1	1	1	1	2	1	3.00
108	1	1	1	1	1	1	1	1	1	1	1	0	5	1	6.00
109	1	1	1	2	1	1	2	2	2	1	0	4	4	4	8.00
110	1	1	1	1	1	1	1	0	0	0	1	0	3	3	6.00
111	2	1	1	2	1	2	2	1	1	1	2	5	3	1	4.00
112	1	1	2	2	1	1	1	2	1	1	2	4	3	1	4.00
116	1	1	1	1	1	1	1	1	1	1	0	0	5	2	7.00
117	1	1	2	1	0	2	1	1	1	1	1	2	2	1	3.00
118	2	0	1	0	0	1	1	0	0	0	0	1	5	2	7.00
119	1	1	1	1	1	1	1	1	1	1	1	0	6	2	8.00
120	2	1	1	1	0	2	1	1	1	0	1	2	3	0	3.00
121	1	2	2	1	1	2	1	2	2	2	2	7	1	3	4.00
122	2	1	1	2	1	1	2	1	2	1	2	5	2	4	6.00

ID	PUZCOR1	PUZCOR2	PUZCOR3	PUZCOR4	PUZCOR5	PUZCOR6	PUZCOR7	PUZCOR8	PUZCOR9	PUZCOR10	PUZCOR11	PUZSCORE	CRITEM1	CRITEM2	CRITEM
123	1	1	2	1	1	2	1	1	1	2	0	3	1	2	3.00
124	1	2	1	1	1	1	1	2	1	2	0	3	6	5	11.00
125	1	1	1	2	1	2	2	1	1	2	2	5	1	2	3.00
126	1	1	1	2	1	2	2	1	1	1	2	4	3	5	8.00
127	2	1	1	1	1	1	1	1	1	1	1	1	3	5	8.00
128	2	2	1	2	1	1	1	1	1	1	2	4	5	2	7.00
129	1	2	2	2	1	2	2	2	2	2	2	9	0	0	.00
130	1	1	2	2	1	1	2	2	1	2	1	5	2	2	4.00
131	1	2	1	1	2	1	0	0	0	0	1	2	4	0	4.00
132	1	0	2	1	1	2	2	0	2	0	2	5	8	3	11.00
133	2	1	2	1	1	2	2	1	2	2	1	6	4	0	4.00
135	1	2	1	1	1	2	2	2	1	2	2	6	2	3	5.00
136	2	1	2	2	1	2	2	1	1	1	1	5	5	4	9.00
137	2	2	2	2	1	1	2	2	1	2	2	8	2	2	4.00
138	1	1	1	1	1	1	1	1	1	1	1	0	2	2	4.00
139	1	1	1	1	1	1	1	1	1	2	1	1	0	2	2.00
141	1	2	1	1	1	2	2	1	2	2	2	6	4	2	6.00
143	1	1	1	2	1	2	1	1	2	1	0	3	4	3	7.00
144	1	2	2	1	1	2	1	2	0	2	0	5	6	2	8.00
201	2	1	2	2	2	2	2	1	2	1	2	8	2	4	6.00
202	2	1	2	2	1	1	1	1	2	1	2	5	4	6	10.00
204	2	1	1	2	1	1	1	0	1	0	2	3	3	2	5.00
205	1	1	2	2	1	1	2	1	1	1	2	4	2	1	3.00
206	1	1	1	2	1	2	2	1	0	0	0	3	4	2	6.00
208	1	1	1	1	2	1	1	1	1	1	0	1	5	2	7.00
209	1	0	1	1	0	2	1	2	1	0	2	3	0	0	.00
210	1	2	2	2	1	2	1	2	2	2	2	8	2	4	6.00
211	1	1	1	1	1	1	1	0	1	0	0	0	3	2	5.00
212	2	1	2	2	1	1	2	2	1	2	2	7	2	0	2.00
214	2	1	2	1	1	2	0	0	1	1	0	3	4	0	4.00
215	2	1	1	2	2	2	2	1	1	2	2	7	4	1	5.00
216	1	1	1	2	1	2	2	1	1	1	2	4	4	4	8.00
217	2	2	1	2	2	2	2	2	2	2	2	10	4	6	10.00
218	1	1	1	2	1	2	2	1	1	1	1	3	3	2	5.00
219	1	0	1	1	1	0	0	0	1	0	0	0	3	2	5.00
220	1	2	2	2	1	1	2	2	2	2	2	8	3	3	6.00
221	2	1	1	2	1	1	2	1	1	0	1	3	2	2	4.00
222	2	1	1	2	1	2	1	1	1	2	1	4	3	3	6.00
223	1	1	1	1	1	1	1	1	1	0	0	0	2	2	4.00
224	2	2	1	2	1	1	2	2	2	2	2	8	3	5	8.00
225	2	1	1	2	1	1	2	1	2	2	1	5	5	2	7.00
226	2	1	1	1	1	2	2	0	1	0	2	4	3	2	5.00
227	2	2	1	1	1	1	1	0	0	0	0	2	2	0	2.00
228	1	1	1	2	1	1	1	2	1	1	2	3	0	3	3.00
231	1	1	2	1	1	2	2	2	2	2	2	7	4	2	6.00
232	2	1	1	0	1	2	0	0	0	0	0	2	2	0	2.00
233	1	1	1	1	1	2	1	1	1	1	1	1	3	1	4.00
234	2	2	2	1	1	2	2	2	2	2	2	9	5	2	7.00
235	1	1	1	2	1	2	2	1	2	1	2	5	3	4	7.00
236	1	2	2	1	1	1	1	1	1	2	1	3	1	1	2.00
237	1	1	2	2	1	2	1	1	1	1	2	4	2	4	6.00
238	2	1	2	2	1	2	2	2	2	2	2	9	3	4	7.00
239	1	1	2	1	1	1	1	1	0	0	0	1	6	2	8.00
240	1	2	2	1	2	1	2	2	2	2	2	8	3	4	7.00
241	1	1	1	1	0	0	1	0	1	0	0	0	1	0	1.00
301	2	1	1	2	1	2	1	1	1	0	0	3	2	0	2.00
302	2	1	2	2	1	2	1	1	1	1	2	5	1	1	2.00

ID	PUZCOR1	PUZCOR2	PUZCOR3	PUZCOR4	PUZCOR5	PUZCOR6	PUZCOR7	PUZCOR8	PUZCOR9	PUZCOR10	PUZCOR11	PUZSCORE	CRITEM1	CRITEM2	CRITEM
303	2	1	2	2	1	1	2	1	2	2	2	7	5	5	10.00
304	1	1	1	2	1	2	2	1	1	0	2	4	2	3	5.00
305	1	1	1	1	1	1	1	1	2	2	2	3	5	4	9.00
306	2	2	2	2	2	2	2	1	1	2	2	9	5	4	9.00
307	1	2	1	2	1	2	1	1	1	2	2	5	4	3	7.00
308	1	1	1	2	1	2	2	1	1	1	0	3	4	4	8.00
310	1	1	1	1	1	2	1	1	1	0	1	1	6	2	8.00
311	1	1	2	2	1	1	2	0	2	2	2	6	6	4	10.00
313	1	1	1	2	1	1	2	1	0	0	0	2	7	5	12.00
314	2	2	1	2	1	1	2	2	1	2	2	7	5	4	9.00
315	1	1	2	2	1	1	2	2	2	2	1	6	4	6	10.00
316	1	1	1	1	1	1	1	0	1	0	0	0	5	1	6.00
317	1	1	1	1	1	1	1	1	1	1	1	0	3	1	4.00
318	1	1	2	1	1	0	0	0	0	0	0	1	0	0	.00
319	2	2	2	2	1	2	1	2	1	2	1	7	6	4	10.00
320	1	1	1	1	1	2	2	2	0	2	2	5	3	4	7.00
321	2	1	2	2	1	2	1	1	1	2	1	5	2	2	4.00
322	2	1	1	2	1	2	2	1	1	1	2	5	2	2	4.00
323	2	1	1	1	1	2	1	1	1	0	1	2	4	1	5.00
324	2	2	1	2	1	1	2	2	2	2	2	8	3	1	4.00
325	1	1	2	2	1	2	2	2	1	2	2	7	3	3	6.00
326	1	2	1	2	1	2	2	2	2	2	2	8	3	2	5.00
327	1	1	1	1	1	2	1	0	1	0	0	1	4	5	9.00
328	1	2	2	2	1	1	2	2	2	2	2	8	3	4	7.00
329	1	1	1	2	1	1	2	1	2	1	2	4	7	5	12.00
330	2	1	2	2	1	2	1	2	1	1	1	5	4	1	5.00
331	1	1	2	1	1	2	2	1	1	1	1	3	1	2	3.00
332	1	1	2	2	1	1	1	1	2	1	1	3	3	2	5.00
333	1	1	1	2	1	2	2	1	1	1	2	4	3	2	5.00
335	1	1	2	2	1	2	1	1	1	2	2	5	3	2	5.00
336	1	1	2	2	1	2	2	2	2	1	2	7	2	3	5.00
337	2	1	1	2	2	1	1	1	2	1	2	5	3	1	4.00
338	1	1	2	2	1	2	1	1	1	1	2	4	7	9	16.00
339	1	1	1	2	1	1	1	1	1	1	0	1	4	3	7.00
401	2	1	2	2	1	1	2	2	0	0	0	5	5	6	11.00
402	1	2	1	2	1	2	2	1	1	2	2	6	3	2	5.00
403	1	1	1	1	1	1	1	0	0	0	0	0	5	0	5.00
404	1	2	2	2	1	2	2	2	2	2	2	9	2	7	9.00
405	1	1	2	1	1	2	1	1	1	2	1	3	4	0	4.00
406	2	1	1	1	1	1	1	2	2	2	1	4	3	4	7.00
408	1	2	2	2	1	1	2	2	2	2	2	8	5	6	11.00
409	1	2	1	1	1	1	1	2	1	2	2	4	6	7	13.00
411	2	1	1	2	1	2	2	2	1	2	2	7	3	4	7.00
412	1	1	1	1	1	2	2	0	2	0	2	4	3	2	5.00
413	1	2	1	2	2	2	2	2	1	2	2	8	4	4	8.00
414	1	2	2	2	1	2	2	2	1	2	2	8	4	4	8.00
415	2	2	1	2	1	2	1	1	2	1	2	6	3	2	5.00
416	2	1	1	2	1	2	1	1	2	2	2	6	4	4	8.00
417	1	1	1	1	1	1	1	1	1	1	2	1	3	1	4.00
418	1	1	1	2	1	2	2	0	1	0	2	4	8	5	13.00
419	1	1	1	1	1	1	1	1	2	1	1	1	1	2	3.00
420	2	1	1	2	1	2	1	1	1	2	2	5	5	7	12.00
421	1	1	1	1	1	1	1	1	1	1	1	0	4	5	9.00
422	1	1	1	1	1	2	1	1	1	1	2	2	4	5	9.00
423	1	1	2	1	1	2	1	1	0	1	1	2	4	0	4.00
424	1	1	2	2	1	1	1	1	1	1	2	3	6	5	11.00
425	1	2	2	2	1	2	2	2	2	2	2	9	5	4	9.00

ID	PUZCOR1	PUZCOR2	PUZCOR3	PUZCOR4	PUZCOR5	PUZCOR6	PUZCOR7	PUZCOR8	PUZCOR9	PUZCOR10	PUZCOR11	PUZSCORE	CRITEM1	CRITEM2	CRITEM
426	2	1	2	2	1	2	2	2	2	1	2	8	6	4	10.00
427	1	2	2	2	1	2	1	2	1	2	1	6	6	4	10.00
428	1	1	2	1	1	1	2	1	1	1	2	3	4	4	8.00
429	1	1	2	1	1	1	2	1	1	1	1	2	5	3	8.00
430	1	2	2	1	1	2	2	1	1	2	1	5	6	4	10.00
431	1	1	2	2	2	2	2	1	1	2	2	7	4	2	6.00
432	1	1	2	2	1	1	2	1	1	1	2	4	4	4	8.00
433	1	1	1	2	1	1	1	1	1	1	1	1	5	0	5.00
434	1	2	2	2	1	2	2	2	2	2	2	9	8	6	14.00
435	2	1	2	1	1	2	1	1	1	1	2	4	2	2	4.00
436	2	1	2	2	1	2	2	2	2	2	2	9	3	2	5.00
438	1	1	1	1	0	1	1	0	0	0	0	0	3	0	3.00
439	1	2	2	2	2	2	2	2	1	2	2	9	4	4	8.00
501	2	1	2	1	1	2	1	1	1	1	1	3	6	7	13.00
502	2	2	2	2	1	2	2	2	1	2	2	9	3	9	12.00
503	1	2	1	2	1	2	2	2	2	2	2	8	3	1	4.00
504	1	2	2	2	1	2	1	2	1	2	1	6	7	8	15.00
505	2	1	1	2	2	2	2	1	2	0	2	7	6	10	16.00
506	1	2	2	2	2	1	2	2	2	2	1	8	3	3	6.00
507	1	2	2	1	1	2	1	2	1	2	2	6	3	1	4.00
508	1	1	2	1	1	2	1	1	1	1	1	2	3	0	3.00
509	1	2	1	2	1	2	2	2	1	2	0	6	2	0	2.00
510	1	1	1	1	1	2	1	1	1	1	1	1	4	2	6.00
511	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2.00
512	1	1	1	1	1	1	1	1	1	0	1	0	2	5	7.00
513	1	1	1	2	1	2	2	1	1	1	2	4	1	0	1.00
514	1	1	1	1	1	2	1	0	0	0	0	1	4	1	5.00
515	2	1	2	2	1	1	2	2	1	2	2	7	4	6	10.00
516	1	1	2	1	1	2	1	1	1	1	1	2	3	4	7.00
517	1	1	1	2	1	1	2	1	0	0	0	2	4	0	4.00
518	1	1	2	2	1	2	2	1	0	1	2	5	2	1	3.00
519	2	2	1	1	1	2	2	2	2	2	2	8	6	4	10.00
520	2	1	2	2	1	1	2	1	2	1	2	6	4	2	6.00
521	1	2	1	2	1	2	2	2	1	2	2	7	5	4	9.00
522	2	1	2	2	1	2	2	2	2	2	2	9	4	4	8.00
523	1	1	1	1	1	2	0	0	0	0	2	2	3	0	3.00
524	1	1	1	1	1	2	1	1	1	2	1	2	4	2	6.00
525	1	1	1	1	1	1	1	1	1	1	0	0	5	3	8.00
526	2	2	1	1	1	2	2	2	1	2	2	7	4	2	6.00
527	1	1	1	1	1	2	2	1	2	2	2	5	1	4	5.00
528	1	1	1	1	1	2	1	2	1	1	1	2	5	4	9.00
529	1	1	1	1	1	2	1	2	1	2	1	3	3	1	4.00
530	2	2	1	2	1	2	2	2	1	2	2	8	4	3	7.00
531	1	1	2	2	2	1	1	2	1	1	2	5	1	1	2.00
532	1	1	1	1	1	1	1	1	1	0	0	0	2	2	4.00
533	1	1	1	1	1	2	1	0	0	0	0	1	3	5	8.00
534	1	1	2	2	1	2	1	2	1	1	2	5	1	6	7.00
535	2	1	1	1	1	2	0	0	0	0	0	2	11	7	18.00
536	1	1	1	1	1	1	1	0	0	0	0	0	4	0	4.00
102	1	1	1	1	1	1	1	1	1	1	1	0	2	3	5.00
104	1	1	2	1	1	1	1	1	1	0	0	1	2	2	4.00
113	1	1	1	1	1	1	1	0	1	0	0	0	2	2	4.00
114	2	2	2	1	1	2	2	2	1	2	2	8	4	2	6.00
140	1	1	1	1	1	2	1	2	0	2	0	3	6	1	7.00

ID	PUZTIM1	PUZTIM2	PUZTIM3	PUZTIM4	PUZTIM5	PUZTIM6	PUZTIM7	PUZTIM8	PUZTIM9	PUZTIM10	PUZTIM11	PCORTIME	CRTIME1	CRTIME2	CRTIME
101	1	3	5	1	3	1	1	1	1	1	1	1.29	3	4	1.17
103	1	2	2	2	4	1	1	1	1	0	3	1.00	3	3	.86
105	1	2	3	1	3	3	0	0	0	0	0	3.00	5	1	1.20
106	1	1	6	2	1	2	4	1	1	1	1	1.00	1	3	1.00
107	1	2	3	3	2	2	1	1	2	2	1	2.00	2	2	1.33
108	1	1	1	4	2	1	2	1	1	1	1	.	3	1	.67
109	3	3	4	1	4	1	1	2	1	2	0	1.25	1	4	.63
110	1	1	5	1	2	1	1	0	0	0	1	.	2	1	.50
111	1	3	4	1	2	1	1	1	2	1	1	1.00	5	3	2.00
112	1	2	2	1	3	1	1	2	1	3	1	1.50	1	1	.50
116	2	1	3	3	1	3	1	1	2	1	0	.	1	2	.43
117	1	2	1	2	0	2	2	3	1	2	4	1.50	1	1	.67
118	4	0	3	0	0	1	1	0	0	0	0	4.00	4	3	1.00
119	1	1	2	3	1	1	2	1	2	1	2	.	2	2	.50
120	2	2	1	2	0	1	1	1	2	0	2	1.50	1	1	.67
121	1	2	4	2	3	1	3	3	1	1	1	1.86	1	3	1.00
122	1	1	3	1	4	1	1	1	1	1	1	1.00	4	3	1.17
123	1	3	3	2	1	2	1	3	1	1	0	2.00	1	3	1.33
124	1	2	5	2	1	1	2	2	1	1	0	1.67	2	2	.36
125	1	3	4	2	1	1	2	2	2	1	1	1.40	1	1	.67
126	2	4	4	1	1	1	1	2	2	1	1	1.00	3	4	.88
127	1	2	4	1	4	1	1	1	1	1	1	1.00	2	5	.88
128	1	2	4	2	4	3	1	2	1	1	1	1.50	4	1	.71
129	1	3	4	1	1	1	1	1	1	1	1	1.56	1	1	.
130	1	6	2	1	3	1	4	1	2	1	1	1.80	1	2	.75
131	1	1	2	5	5	2	0	0	0	0	2	3.00	5	0	1.25
132	1	0	1	1	2	2	1	0	1	0	1	1.20	4	3	.64
133	1	5	3	1	1	1	1	6	1	2	1	1.50	1	1	.50
135	1	2	2	2	1	2	2	1	1	1	1	1.50	2	3	1.00
136	2	3	3	2	3	1	1	1	1	1	1	1.80	3	3	.67
137	2	4	2	1	5	1	1	1	1	2	1	1.75	1	1	.50
138	1	2	2	2	1	1	1	1	2	1	1	.	1	1	.50
139	1	2	2	5	1	1	2	1	2	1	1	1.00	2	1	1.50
141	1	1	5	1	3	2	2	3	1	1	1	1.33	1	2	.50
143	1	1	6	1	3	1	2	2	1	1	0	1.00	2	3	.71
144	1	2	3	3	2	1	2	1	0	1	0	1.60	4	2	.75
201	1	7	1	1	3	1	1	3	1	1	1	1.25	2	3	.83
202	1	3	3	1	1	1	2	2	1	1	1	1.40	2	3	.50
204	1	2	2	1	2	1	2	0	2	0	1	1.00	3	3	1.20
205	1	2	7	1	3	1	1	1	1	1	1	2.50	1	1	.67
206	1	2	5	1	7	1	1	1	0	0	0	1.00	2	3	.83
208	1	1	5	2	2	2	2	1	3	1	0	2.00	1	3	.57
209	1	0	.	.	0	1	1	1	1	0	1	1.00	0	0	.
210	1	2	1	4	3	1	1	1	1	2	1	1.63	2	4	1.00
211	1	1	2	5	5	1	1	0	2	0	0	.	3	2	1.00
212	1	2	3	1	2	1	1	2	1	1	1	1.43	1	1	1.00
214	1	1	1	3	3	1	0	0	1	1	0	1.00	2	[illegible]	.75
215	2	2	6	1	3	1	1	3	1	1	1	1.43	1	2	.60
216	1	2	2	1	2	1	1	1	3	1	1	1.00	2	1	.38
217	2	3	6	1	2	2	1	1	1	1	1	1.50	2	2	.40
218	1	1	2	2	3	1	3	2	1	2	2	2.00	1	2	.60
219	1	0	.	2	3	0	0	0	2	0	0	.	3	3	1.20
220	1	2	2	1	3	1	1	1	1	1	1	[illegible]	1	1	.33
221	1	1	3	2	2	2	1	1	1	0	1	[illegible]	2	2	1.00
222	1	2	5	2	2	1	1	1	1	1	1	1.25	1	3	.67
223	1	2	3	3	3	1	2	1	2	0	0	.	3	3	1.50
224	1	2	6	1	2	1	2	1	2	1	[illegible]	1.38	2	4	.75

ID	PUZTIM1	PUZTIM2	PUZTIM3	PUZTIM4	PUZTIM5	PUZTIM6	PUZTIM7	PUZTIM8	PUZTIM9	PUZTIM10	PUZTIM11	PCORTIME	CRTIME1	CRTIME2	CRTIME
225	1	2	4	1	3	1	1	3	1	2	1	1.20	2	2	.57
226	1	2	6	7	1	1	1	0	1	0	1	1.00	2	1	.60
227	1	5	7	2	6	2	1	0	0	0	0	3.00	2	0	1.00
228	1	3	7	3	2	1	2	1	1	2	1	1.67	2	2	1.33
231	1	1	1	1	1	1	2	1	1	.	1	1.17	1	2	.50
232	2	4	7	0	1	4	0	0	0	0	0	3.00	1	1	1.00
233	1	1	2	6	1	1	3	1	2	1	1	1.00	1	1	.50
234	3	2	2	1	10	1	1	2	1	1	1	1.56	1	3	.57
235	1	2	10	2	1	1	1	1	2	1	1	1.40	2	2	.57
236	2	1	1	2	1	3	3	1	2	1	3	1.00	4	2	3.00
237	2	2	1	2	7	1	1	2	1	1	1	1.25	2	2	.67
238	1	2	4	1	2	4	1	1	1	1	1	1.67	2	2	.57
239	1	2	2	2	1	2	1	1	0	0	0	2.00	5	5	1.25
240	1	5	1	3	7	2	1	1	1	1	1	2.25	1	2	.43
241	1	1	7	10	0	0	3	0	2	0	0	.	1	0	1.00
301	2	2	1	3	1	1	1	2	2	0	0	2.00	2	4	3.00
302	1	2	6	2	2	1	3	1	1	1	1	2.20	1	1	1.00
303	3	2	5	1	4	2	1	2	1	1	1	1.86	1	2	.30
304	1	1	1	3	2	1	3	1	2	0	2	2.25	2	2	.80
305	2	3	1	2	3	1	1	1	1	1	1	1.00	3	2	.56
306	1	2	1	1	2	1	1	2	1	1	1	1.22	4	6	1.11
307	1	3	3	1	1	1	2	3	1	1	1	1.40	1	1	.29
308	1	1	3	2	3	2	1	2	2	1	0	1.67	4	4	1.00
310	1	3	3	3	2	1	1	2	1	0	1	1.00	2	2	.50
311	3	2	2	1	2	1	1	0	1	1	1	1.17	4	3	.70
313	1	5	3	2	3	1	1	1	0	0	0	1.50	3	2	.42
314	1	3	4	1	5	1	1	1	1	1	1	1.29	3	3	1.50
315	1	1	2	3	2	2	4	1	1	1	1	2.00	2	2	.40
316	1	1	3	3	3	3	1	0	2	0	0	.	2	1	.50
317	1	3	6	3	3	3	2	1	1	1	1	.	3	1	1.00
318	1	3	5	8	1	0	0	0	0	0	0	5.00	0	0	.
319	1	1	2	1	5	1	4	1	2	1	1	1.14	3	2	.50
320	2	1	3	2	4	1	1	1	0	1	1	1.00	1	2	.43
321	1	2	2	1	1	1	3	1	1	1	2	1.20	1	3	1.00
322	1	4	3	1	3	1	1	2	1	2	1	1.00	1	3	1.00
323	1	2	6	1	2	1	1	1	1	0	1	1.00	2	2	.80
324	1	2	2	2	8	1	1	1	1	1	1	1.25	2	1	.75
325	1	4	1	1	1	2	1	1	2	1	1	1.14	2	3	.83
326	1	2	6	1	4	1	1	1	1	1	1	1.13	2	2	.80
327	1	2	2	3	2	1	1	0	1	0	0	1.00	1	1	.22
328	2	4	1	1	4	2	1	1	1	1	1	1.38	1	2	.43
329	1	1	2	1	2	1	1	2	2	3	1	1.25	4	6	.83
330	2	2	1	1	4	1	2	1	2	1	1	1.20	2	2	.80
331	1	5	1	1	1	1	1	1	1	1	1	1.00	1	1	.67
332	2	2	2	1	1	2	1	1	1	1	3	1.33	2	3	1.00
333	1	2	2	2	3	1	1	1	2	1	1	1.25	1	3	.80
335	1	2	2	1	1	1	2	1	1	1	1	1.20	1	1	.40
336	2	7	2	1	3	2	1	3	1	2	1	1.57	2	3	1.00
337	1	2	4	2	2	2	2	1	1	1	1	1.40	3	1	1.00
338	1	1	1	2	2	1	1	2	2	1	1	1.25	5	5	.63
339	1	2	3	3	2	5	2	1	1	1	0	3.00	3	3	.86
401	1	1	3	1	3	3	1	2	0	0	0	1.60	3	4	.64
402	1	2	2	1	4	1	1	3	1	1	1	1.17	2	2	.80
403	1	1	3	2	4	1	1	0	0	0	0	.	3	0	1.00
404	1	1	1	1	7	1	1	1	1	1	1	1.00	2	4	.67
405	1	1	2	1	1	1	2	2	1	1	1	1.33	3	2	1.25
406	1	8	2	1	1	2	1	2	1	1	1	1.25	2	2	.57

ID	PUZTIM1	PUZTIM2	PUZTIM3	PUZTIM4	PUZTIM5	PUZTIM6	PUZTIM7	PUZTIM8	PUZTIM9	PUZTIM10	PUZTIM11	PCORTIME	CRTIME1	CRTIME2	CRTIME
408	1	2	1	1	1	1	1	1	1	1	1	1.13	4	5	.82
409	1	3	1	1	5	1	2	1	2	1	1	1.50	1	3	.31
411	1	5	3	4	2	1	3	1	1	1	1	1.71	1	1	.29
412	1	10	2	1	3	1	1	0	1	0	1	1.00	2	3	1.00
413	1	2	5	1	3	1	1	2	1	1	1	1.50	2	1	.38
414	1	5	1	1	4	1	1	1	1	1	1	1.50	2	3	.63
415	1	2	4	2	1	1	2	2	1	1	1	1.33	3	2	1.00
416	1	1	3	4	1	1	3	2	3	1	1	1.83	1	2	.38
417	1	1	2	3	2	2	2	3	1	1	2	2.00	2	2	1.00
418	1	4	5	2	1	1	1	0	1	0	1	1.25	4	4	.62
419	1	2	2	4	3	2	1	2	2	2	2	2.00	1	1	.67
420	1	1	2	3	4	1	2	1	1	1	1	1.40	2	3	.42
421	1	1	3	4	1	1	1	1	1	1	1	.	3	4	.78
422	1	2	4	1	1	1	1	2	1	1	1	1.00	1	2	.33
423	1	3	2	3	1	1	1	1	0	1	3	1.50	2	2	1.00
424	1	4	2	3	1	1	3	1	2	1	1	2.00	2	2	.36
425	1	2	1	1	9	1	1	1	1	2	1	1.22	3	4	.78
426	1	4	1	1	4	1	1	2	1	4	1	1.13	2	2	.40
427	1	1	1	1	4	1	2	1	1	1	1	1.00	4	5	.90
428	1	2	3	3	6	1	1	1	1	1	1	1.67	3	1	.50
429	1	4	1	1	2	2	1	1	3	1	1	1.00	2	2	.50
430	1	2	2	1	3	1	1	3	1	2	1	1.60	3	5	.80
431	1	2	1	1	4	2	1	3	1	1	1	1.57	1	2	.50
432	1	2	1	1	2	1	1	2	1	2	1	1.00	2	2	.50
433	1	1	3	2	1	1	2	2	1	1	2	2.00	2	2	.80
434	1	2	2	1	4	1	1	1	1	1	1	1.22	4	5	.64
435	1	2	1	1	3	1	1	2	3	3	1	1.00	2	3	1.25
436	3	4	4	1	1	1	1	1	1	2	1	1.67	2	1	.60
438	1	2	5	5	2	1	1	0	0	0	0	.	3	1	1.33
439	1	3	2	1	4	1	1	2	1	1	1	1.78	1	1	.25
501	1	2	4	2	1	1	2	1	1	1	2	2.00	2	4	.46
502	2	3	1	3	3	1	1	1	1	1	1	1.56	3	4	.58
503	1	2	4	4	2	1	1	1	1	1	1	1.50	1	1	.50
504	1	4	1	1	4	1	1	2	1	3	1	2.00	2	3	.33
505	1	3	5	1	1	1	1	1	1	0	1	1.00	2	3	.31
506	1	1	1	1	2	3	1	1	1	1	1	1.13	2	2	.67
507	1	1	3	3	3	1	4	1	2	1	2	1.50	2	2	1.00
508	1	5	1	2	3	1	2	1	2	1	1	1.00	2	1	1.00
509	1	2	6	4	2	2	2	2	2	1	0	2.17	1	1	1.00
510	1	1	3	2	3	1	1	1	1	1	1	1.00	5	3	1.33
511	1	2	4	4	3	1	2	1	1	1	1	1.00	1	2	1.50
512	1	3	4	2	1	4	3	1	2	0	1	.	1	3	.57
513	1	3	4	3	2	2	1	1	4	1	1	1.75	1	1	2.00
514	1	1	6	4	1	1	2	0	0	0	0	1.00	2	1	.60
515	2	5	2	1	1	1	1	2	1	1	1	1.43	2	8	1.00
516	1	2	1	2	3	2	2	1	1	1	1	1.50	2	2	.57
517	1	4	7	1	3	1	1	1	0	0	0	1.00	4	1	1.25
518	1	1	1	1	1	4	1	5	0	5	1	1.60	1	2	1.00
519	1	1	4	4	1	2	2	1	1	1	1	1.25	2	2	.40
520	2	2	3	1	2	4	1	1	1	1	1	1.50	3	3	1.00
521	1	1	4	1	2	1	1	1	1	1	1	1.00	4	8	1.33
522	3	3	2	1	3	1	1	1	1	2	1	1.44	3	3	.75
523	1	1	5	4	1	1	0	0	0	0	1	1.00	1	0	.33
524	1	2	2	1	2	1	1	2	1	1	1	1.00	1	1	.33
525	1	1	2	5	1	3	4	1	1	1	0	.	2	3	.63
526	1	2	4	1	4	1	1	1	2	1	1	1.14	2	3	.83
527	1	2	4	1	4	2	1	1	1	1	1	1.20	1	2	.60

ID	PUZTIM1	PUZTIM2	PUZTIM3	PUZTIM4	PUZTIM5	PUZTIM6	PUZTIM7	PUZTIM8	PUZTIM9	PUZTIM10	PUZTIM11	PCORTIME	CRTIME1	CRTIME2	CRTIME
528	1	3	5	1	1	1	1	1	1	2	1	1.00	3	2	.56
529	1	2	4	1	3	1	1	1	1	1	1	1.00	1	2	.75
530	1	5	4	1	6	1	1	2	1	2	1	1.75	2	2	.57
531	1	5	2	2	2	1	1	1	2	3	1	1.60	2	2	2.00
532	1	3	4	3	2	2	1	1	1	0	0	.	1	2	.75
533	1	1	6	3	1	1	2	0	0	0	0	1.00	1	1	.25
534	1	3	1	1	2	1	3	1	3	1	1	1.00	1	5	.86
535	1	1	5	1	3	1	0	0	0	0	0	1.00	8	2	.56
536	1	2	4	5	4	1	1	0	0	0	0	.	1	0	.25
102	1	4	6	2	2	1	4	1	1	1	2	.	1	2	.60
104	1	1	3	5	3	2	2	1	1	0	0	3.00	1	3	1.00
113	3	3	4	5	1	1	2	0	1	0	0	.	1	2	.75
114	2	2	2	1	1	1	1	1	1	1	1	1.38	2	2	.67
140	1	3	3	2	2	1	4	1	0	1	0	1.00	4	1	.71

ID	ARITHATT	ARITHCOR	ARITHACC	UNDMISS	UNDCORR	UNDERACC	PERFORM2
101	18	18	100.00	6	34	28.00	2.75
103	11	7	63.64	12	31	19.00	-2.02
105	11	9	81.82	13	31	18.00	-2.34
106	15	13	86.67	7	39	32.00	-.70
107	16	15	93.75	7	33	26.00	-1.12
108	9	4	44.44	7	35	28.00	-2.52
109	6	2	33.33	16	27	11.00	-2.26
110	8	6	75.00	25	21	-4.00	-4.82
111	13	9	69.23	5	35	30.00	-.19
112	22	20	90.91	0	40	40.00	2.43
116	10	9	90.00	29	16	-13.00	-4.67
117	15	11	73.33	7	33	26.00	-1.54
118	2	2	100.00	18	26	8.00	-3.92
119	7	7	100.00	15	29	14.00	-2.49
120	19	17	89.47	22	26	4.00	-2.21
121	13	13	100.00	9	31	22.00	.64
122	14	12	85.71	17	23	6.00	-.99
123	19	15	78.95	16	28	12.00	-1.57
124	23	20	86.96	21	24	3.00	1.16
125	18	17	94.44	21	21	.00	-1.46
126	16	10	62.50	10	34	24.00	.39
127	16	15	93.75	15	26	11.00	-.81
128	18	15	83.33	11	30	19.00	.63
129	8	8	100.00	10	32	22.00	-.86
130	13	12	92.31	28	18	-10.00	-2.96
131	6	5	83.33	13	30	17.00	-3.15
132	10	10	100.00	12	29	17.00	1.10
133	19	18	94.74	13	28	15.00	.67
135	18	18	100.00	15	26	11.00	.65
136	15	15	100.00	10	31	21.00	1.79
137	18	18	100.00	16	28	12.00	1.14
138	8	7	87.50	0	40	40.00	-1.56
139	16	15	93.75	19	24	5.00	-3.20
141	15	10	66.67	15	26	11.00	-.60
143	6	6	100.00	5	35	30.00	-.57
144	17	13	76.47	16	25	9.00	.08
201	21	19	90.48	8	36	28.00	3.31
202	13	12	92.31	3	40	37.00	2.86
204	18	17	94.44	15	27	12.00	-.55

ID	ARITHATT	ARITHCOR	ARITHACC	UNDMISS	UNDCORR	UNDERACC	PERFORM2
205	17	15	88.24	8	32	24.00	-.20
206	10	9	90.00	2	38	36.00	.21
208	19	17	89.47	30	14	-16.00	-3.00
209	15	6	40.00	26	14	-12.00	-6.28
210	13	11	84.62	9	33	24.00	1.41
211	18	14	77.78	12	28	16.00	-1.89
212	18	18	100.00	18	29	11.00	.07
214	19	19	100.00	19	21	2.00	-1.31
215	22	20	90.91	5	37	32.00	3.16
216	17	16	94.12	10	31	21.00	1.31
217	21	21	100.00	9	34	25.00	5.42
218	8	8	100.00	25	23	-2.00	-3.48
219	15	5	33.33	9	33	24.00	-2.98
220	12	9	75.00	12	30	18.00	.51
221	19	19	100.00	8	34	26.00	.70
222	15	13	86.67	5	36	31.00	.93
223	16	16	100.00	12	32	20.00	-1.48
224	16	15	93.75	10	31	21.00	2.56
225	5	4	80.00	23	22	-1.00	-2.83
226	22	20	90.91	19	26	7.00	-.02
227	11	11	100.00	16	26	10.00	-3.19
228	7	4	57.14	15	25	10.00	-3.89
231	14	12	85.71	4	36	32.00	1.91
232	14	12	85.71	19	22	3.00	-3.59
233	6	4	66.67	16	26	10.00	-4.30
234	21	18	85.71	8	33	25.00	3.53
235	20	18	90.00	15	27	12.00	.99
236	9	8	88.89	12	29	17.00	-2.83
237	14	11	78.57	19	23	4.00	-1.72
238	17	13	76.47	6	33	27.00	2.73
239	14	14	100.00	24	16	-8.00	-2.60
240	19	18	94.74	12	28	16.00	2.42
241	12	10	83.33	5	39	34.00	-2.42
301	3	3	100.00	13	29	16.00	-3.89
302	16	15	93.75	12	32	20.00	-.49
303	16	10	62.50	18	26	8.00	.76
304	14	11	78.57	21	23	2.00	-2.20
305	13	13	100.00	19	23	4.00	-.75
306	20	19	95.00	1	40	39.00	5.53
307	7	6	85.71	26	26	.00	-2.36
308	11	9	81.82	17	29	12.00	-1.18
310	16	13	81.25	22	19	-3.00	-2.38
311	18	17	94.44	7	35	28.00	3.44
313	14	14	100.00	4	37	33.00	2.45
314	20	20	100.00	2	40	38.00	4.92
315	19	18	94.74	16	29	13.00	2.38
316	19	18	94.74	11	32	21.00	-.38
317	17	16	94.12	10	30	20.00	-1.48
318	18	15	83.33	15	27	12.00	-3.23
319	12	11	91.67	5	35	30.00	2.80
320	16	15	93.75	7	34	27.00	1.67
321	21	20	95.24	11	32	21.00	1.20
322	19	16	84.21	10	32	22.00	.50
323	18	16	88.89	3	38	35.00	.82
324	18	16	88.89	12	28	16.00	1.09
325	18	18	100.00	13	29	16.00	1.74
326	19	18	94.74	8	32	24.00	2.46
327	18	18	100.00	10	31	21.00	.92
328	8	7	87.50	18	23	5.00	-.65
329	19	19	100.00	13	33	20.00	3.06
330	19	19	100.00	19	27	8.00	.23
331	9	6	66.67	11	29	18.00	-2.82
332	19	11	57.89	18	24	6.00	-2.23

ID	ARITHATT	ARITHCOR	ARITHACC	UNDMISS	UNDCORR	UNDERACC	PERFORM2
333	18	15	83.33	14	32	18.00	-.08
335	18	17	94.44	17	23	6.00	-.33
336	21	21	100.00	2	39	37.00	3.77
337	16	12	75.00	2	40	38.00	1.06
338	10	9	90.00	9	31	22.00	2.53
339	18	16	88.89	27	15	-12.00	-2.86
401	20	20	100.00	15	29	14.00	2.80
402	15	13	86.67	6	35	29.00	1.18
403	10	10	100.00	12	28	16.00	-2.67
404	19	18	94.74	11	31	20.00	3.74
405	21	21	100.00	15	27	12.00	-.09
406	18	17	94.44	8	33	25.00	1.53
408	16	14	87.50	12	28	16.00	2.89
409	3	0	.00	11	32	21.00	-.25
411	15	14	93.33	6	37	31.00	2.53
412	4	2	50.00	22	24	2.00	-3.96
413	20	14	70.00	2	39	37.00	3.71
414	18	17	94.44	12	29	17.00	2.62
415	15	14	93.33	17	27	10.00	-.22
416	17	15	88.24	5	36	31.00	2.68
417	20	19	95.00	6	34	28.00	.14
418	13	11	84.62	18	22	4.00	.47
419	19	19	100.00	22	26	4.00	-2.18
420	21	19	90.48	7	35	28.00	4.10
421	8	6	75.00	15	28	13.00	-2.45
422	6	2	33.33	17	23	6.00	-3.10
423	18	14	77.78	14	26	12.00	-1.81
424	6	4	66.67	9	34	25.00	-.12
425	13	11	84.62	3	39	36.00	3.72
426	23	20	86.96	16	27	11.00	3.33
427	19	18	94.74	2	39	37.00	4.39
428	18	12	66.67	7	33	26.00	.58
429	13	12	92.31	16	26	10.00	-1.12
430	18	18	100.00	5	36	31.00	3.53
431	14	14	100.00	10	30	20.00	1.30
432	8	8	100.00	17	24	7.00	-1.43
433	12	10	83.33	21	22	1.00	-3.57
434	11	10	90.91	9	29	20.00	3.74
435	12	10	83.33	18	24	6.00	-2.37
436	8	6	75.00	14	26	12.00	-.53
438	6	5	83.33	32	13	-19.00	-7.21
439	21	21	100.00	10	30	20.00	4.01
501	12	12	100.00	6	34	28.00	2.32
502	8	7	87.50	20	26	6.00	1.36
503	18	15	83.33	16	26	10.00	.39
504	18	18	100.00	10	35	25.00	4.95
505	12	9	75.00	15	26	11.00	2.70
506	18	17	94.44	12	28	16.00	1.91
507	14	11	78.57	14	29	15.00	-.70
508	18	17	94.44	5	37	32.00	.14
509	19	18	94.74	10	34	24.00	.80
510	13	11	84.62	11	32	21.00	-1.38
511	21	20	95.24	18	23	5.00	-2.22
512	11	9	81.82	10	33	23.00	-1.65
513	15	14	93.33	16	23	7.00	-2.45
514	12	11	91.67	10	30	20.00	-1.78
515	18	18	100.00	15	29	14.00	2.83
516	17	16	94.12	14	27	13.00	-.40
517	12	0	.00	8	33	25.00	-3.46
518	16	15	93.75	4	37	33.00	.92
519	19	16	84.21	6	34	28.00	3.97
520	16	15	93.75	13	30	17.00	.88
521	29	27	93.10	6	35	29.00	5.53

ID	ARITHATT	ARITHCOR	ARITHACC	UNDMISS	UNDCORR	UNDERACC	PERFORM2
522	13	11	84.62	3	37	34.00	3.23
523	16	15	93.75	4	36	32.00	-.26
524	19	19	100.00	17	24	7.00	-.63
525	20	20	100.00	19	22	3.00	-.87
526	18	16	88.89	11	30	19.00	1.60
527	19	17	89.47	12	29	17.00	.59
528	16	16	100.00	13	32	19.00	.73
529	11	7	63.64	12	31	19.00	-2.23
530	19	11	57.89	15	37	22.00	1.55
531	16	15	93.75	18	26	8.00	-1.49
532	7	5	71.43	8	34	26.00	-3.12
533	13	12	92.31	18	26	8.00	-1.65
534	13	13	100.00	13	32	19.00	.60
535	14	11	78.57	8	35	27.00	3.24
536	12	8	66.67	7	37	30.00	-2.20
102	13	12	92.31	31	17	-14.00	-2.20
104	11	10	90.91	9	23	14.00	-1.23
113	8	5	62.50	14	28	14.00	-2.50
114	14	14	100.00	9	32	23.00	3.75
140	19	19	100.00	24	19	-5.00	2.17

ID	INCID1	INCID2	INCID3	INCID4	INCID5	INCID6	INCID7	INCID8	INCID9	INCID10	INCIDLRN	ATTEN
101	3	3	3	1	5	3	2	5	4	3	2	4
103	3	3	3	1	2	0	2	5	4	1	4	2
105	0	3	2	1	2	3	2	3	3	2	6	2
106	3	3	2	1	2	3	2	5	4	4	4	2
107	0	3	2	1	2	0	2	0	0	1	7	3
108	0	3	2	1	0	2	2	2	0	1	6	1
109	2	0	1	1	1	3	2	5	4	1	3	2
110	0	2	2	1	0	2	2	1	0	2	6	.
111	1	2	2	1	2	2	2	3	2	2	6	3
112	3	3	3	1	5	3	2	5	0	1	3	4
116	1	2	0	1	1	2	2	3	4	4	4	3
117	2	2	1	1	3	0	2	3	1	1	4	3
118	1	3	0	1	5	3	2	3	3	1	4	3
119	1	3	0	1	2	0	2	0	2	4	4	3
120	1	3	2	1	0	3	2	0	3	1	6	3
121	0	2	1	1	2	3	2	1	2	1	6	4
122	3	2	2	1	2	0	2	0	0	1	7	3
123	3	3	0	1	5	3	2	5	4	2	2	3
124	2	.	2	1	5	3	2	0	0	1	5	4
125	0	3	3	1	5	3	2	0	0	1	5	4
126	3	2	3	1	5	2	2	5	4	1	5	3
127	3	0	1	1	5	0	0	0	0	1	3	3
128	0	2	2	1	3	1	2	0	0	1	7	4
129	3	3	3	1	5	3	2	5	4	1	3	3
130	1	2	0	1	5	3	2	5	0	1	4	3
131	2	0	2	1	0	3	2	3	4	1	4	4
132	2	1	1	4	5	2	2	1	4	1	3	3
133	0	2	2	1	2	3	2	0	0	1	8	4
135	0	3	3	1	5	2	2	3	0	1	5	3
136	0	3	3	1	5	3	3	5	0	1	3	3
137	0	3	2	1	5	1	2	1	0	1	5	4
138	3	3	2	4	3	3	0	3	1	1	2	.
139	0	3	1	4	0	2	2	0	4	2	4	3
141	0	2	2	1	5	2	2	1	0	1	7	3

ID	INCID1	INCID2	INCID3	INCID4	INCID5	INCID6	INCID7	INCID8	INCID9	INCID10	INCIDLRN	ATTEN
143	1	2	2	1	3	0	0	2	0	1	4	3
144	3	3	2	1	5	3	0	5	4	4	2	4
201	2	3	2	1	5	3	1	0	4	1	4	4
202	1	3	2	1	2	2	2	0	4	4	6	4
204	2	0	0	1	5	0	2	5	2	1	3	3
205	3	3	3	1	0	0	2	1	4	1	3	4
206	0	2	0	1	1	3	2	0	0	1	6	4
208	2	3	1	1	0	1	2	3	1	2	2	4
209	2	3	1	3	3	3	2	5	4	2	1	3
210	3	3	3	1	0	3	2	0	0	1	4	3
211	1	3	2	1	0	2	2	2	3	1	6	2
212	0	3	2	1	5	2	2	5	3	4	6	3
214	1	3	2	1	2	3	2	0	0	1	6	2
215	3	3	3	1	5	3	2	5	4	1	3	4
216	3	2	2	1	0	2	2	0	0	1	7	3
217	1	3	1	1	1	2	2	0	4	1	5	4
218	1	0	0	1	5	2	2	5	0	1	4	4
219	0	2	3	1	0	2	2	1	4	1	6	3
220	1	3	2	1	2	0	2	0	3	1	7	3
221	0	2	0	1	1	2	2	2	1	1	6	3
222	3	2	2	1	5	3	0	3	4	1	4	4
223	3	2	2	1	5	0	2	0	1	1	6	2
224	1	3	3	1	2	2	2	3	0	1	5	4
225	0	3	2	1	5	2	2	0	4	1	7	3
226	3	3	2	1	5	2	2	0	0	1	6	4
227	2	3	3	1	1	3	2	3	3	1	4	3
228	0	3	2	1	5	3	2	5	4	1	5	4
231	0	2	2	1	3	3	2	1	1	1	6	3
232	0	3	3	4	5	3	2	5	4	1	3	3
233	3	2	3	1	5	2	2	5	4	1	5	3
234	3	3	0	1	5	3	3	5	4	1	2	3
235	3	2	2	1	5	0	2	3	4	4	4	3
236	3	2	2	1	5	0	2	5	3	1	6	2
237	2	3	1	1	3	2	2	2	0	1	4	4
238	3	2	0	1	5	3	2	1	2	1	4	3
239	1	2	2	1	1	2	2	0	3	1	8	4
240	0	3	0	1	1	0	3	0	0	1	4	3
241	3	3	2	1	0	1	2	0	2	4	4	3
301	2	2	3	1	5	3	3	5	4	1	3	4
302	0	3	2	1	2	3	2	1	1	2	5	4
303	0	3	2	1	5	0	0	0	2	1	5	2
304	0	3	1	1	0	3	3	0	3	1	5	3
305	0	3	2	1	2	3	0	0	1	1	6	4
306	2	3	2	1	2	2	2	0	0	1	7	3
307	3	2	2	1	5	1	0	3	0	3	3	3
308	2	2	2	1	2	1	2	0	3	1	8	3
310	0	0	2	1	0	2	2	0	2	2	6	4
311	0	3	1	1	5	3	2	0	4	1	5	4
313	0	3	2	1	5	3	2	5	4	1	5	3
314	2	0	1	1	5	3	2	0	0	1	4	3
315	0	3	2	1	0	1	2	0	0	1	6	4
316	2	3	3	1	5	3	0	1	4	2	1	3
317	0	3	3	1	1	3	2	2	4	1	4	4
318	1	1	0	1	5	3	2	1	2	2	2	3
319	0	3	2	1	2	2	2	0	0	1	8	3
320	0	2	2	1	2	1	2	1	2	2	6	3
321	3	0	3	1	5	2	2	5	4	1	4	.
322	0	3	2	1	2	0	2	0	4	1	7	3

ID	INCID1	INCID2	INCID3	INCID4	INCID5	INCID6	INCID7	INCID8	INCID9	INCID10	INCIDLRN	ATTEN
323	3	2	2	1	0	2	2	4	0	1	6	3
324	3	3	1	1	5	3	2	5	0	1	3	4
325	3	0	1	1	5	2	2	5	4	1	4	4
326	0	3	1	1	5	3	2	0	4	1	5	4
327	1	0	2	1	5	0	2	3	3	1	5	3
328	0	3	0	1	5	3	3	1	4	3	2	4
329	1	2	1	1	5	0	2	5	4	1	4	3
330	0	0	2	1	5	3	2	1	4	1	5	4
331	0	2	2	1	0	1	2	1	3	1	7	3
332	3	2	0	1	5	3	2	0	4	1	5	4
333	0	2	2	1	2	3	2	0	0	1	8	1
335	2	3	2	1	1	2	2	0	1	1	6	3
336	0	3	2	1	5	3	3	5	0	1	4	3
337	1	2	3	1	5	2	2	2	4	1	5	4
338	0	3	2	1	0	2	1	2	0	1	5	4
339	3	3	2	1	5	1	2	5	4	1	4	.
401	3	0	2	1	5	0	2	2	0	3	3	3
402	1	3	2	1	0	3	2	0	4	1	5	2
403	1	2	3	1	1	0	2	1	3	2	4	3
404	0	0	0	1	5	1	2	0	0	.	4	4
405	3	3	2	1	0	3	2	0	0	4	4	4
406	3	3	2	1	3	2	2	0	4	1	6	2
408	0	3	2	1	1	2	2	0	1	1	7	4
409	0	3	2	1	3	2	2	3	0	1	6	2
411	2	2	2	1	2	2	2	5	4	1	7	3
412	3	2	3	1	5	0	2	5	4	4	3	3
413	0	0	2	1	0	2	2	2	0	1	6	4
414	3	3	2	1	5	0	2	0	0	1	5	4
415	3	3	3	1	5	3	2	5	4	1	3	4
416	3	3	2	1	5	2	2	4	0	1	5	3
417	2	1	2	1	0	3	0	2	1	1	3	3
418	1	3	2	1	0	3	2	0	1	1	5	2
419	0	3	3	1	5	3	2	5	4	2	3	3
420	1	2	0	1	1	3	2	0	0	1	5	2
421	0	3	0	1	2	1	0	4	2	0	3	3
422	0	3	2	1	3	0	2	1	0	1	5	4
423	2	0	1	1	0	3	0	0	1	1	3	3
424	2	1	1	1	5	2	2	1	1	1	4	4
425	0	2	2	1	2	0	0	1	3	1	7	4
426	3	3	3	1	5	3	0	0	4	1	3	3
427	0	0	1	1	2	0	1	0	2	1	5	2
428	2	3	3	4	0	0	2	5	4	4	1	3
429	3	3	3	1	5	3	3	5	4	4	1	2
430	3	1	2	1	1	2	2	2	0	1	5	3
431	2	3	3	1	1	2	2	3	4	1	4	4
432	0	0	2	1	5	3	2	0	0	4	5	3
433	3	3	0	1	0	3	3	0	2	4	2	3
434	1	3	3	1	5	1	2	5	4	1	3	3
435	1	0	1	1	0	0	0	1	1	2	1	3
436	3	3	0	1	5	0	2	0	4	1	4	4
438	3	3	2	1	5	3	2	0	0	1	5	1
439	0	3	1	1	5	2	2	0	0	1	6	3
501	3	2	2	1	5	2	2	5	4	1	6	3
502	2	0	1	1	2	2	3	3	1	1	4	3
503	3	0	3	1	2	1	3	0	4	4	3	4
504	0	0	2	1	5	3	2	5	3	1	6	.
505	1	2	0	1	5	3	0	5	2	1	3	4
506	0	3	2	0	2	3	2	1	0	0	4	4

ID	INCID1	INCID2	INCID3	INCID4	INCID5	INCID6	INCID7	INCID8	INCID9	INCID10	INCIDLRN	ATTEN
507	3	2	3	1	5	3	2	5	4	1	4	4
508	1	3	0	1	5	0	2	0	2	1	4	4
509	3	3	1	1	5	1	2	1	0	2	2	3
510	1	3	3	4	5	3	2	5	4	4	1	2
511	3	2	0	1	2	0	0	0	0	2	4	4
512	0	3	3	1	5	5	2	2	4	3	3	2
513	3	3	2	1	1	0	2	0	2	1	5	4
514	0	0	1	4	3	3	2	0	0	1	4	1
515	0	3	2	1	1	2	2	0	3	1	8	4
516	1	2	2	1	2	0	2	5	5	1	6	3
517	3	0	2	1	1	3	2	1	3	1	5	4
518	0	3	0	1	5	2	0	0	0	1	5	4
519	3	3	2	1	5	2	2	5	0	1	5	3
520	0	3	1	1	2	2	2	0	3	1	8	3
521	2	3	2	1	5	2	2	3	0	1	5	3
522	0	3	2	1	1	1	2	3	0	1	5	3
523	0	3	3	1	0	2	2	5	3	1	6	3
524	1	2	0	1	3	3	2	4	0	1	4	2
525	2	3	0	1	0	0	2	1	0	1	3	4
526	0	3	0	1	5	2	2	1	0	1	5	3
527	3	3	3	3	5	3	2	5	4	4	1	4
528	2	2	1	1	2	2	2	0	3	2	7	3
529	0	3	2	1	2	3	2	5	0	1	6	3
530	1	3	2	1	5	3	2	5	0	1	4	3
531	3	3	3	1	5	2	2	5	4	1	4	3
532	0	3	0	1	2	2	2	0	2	2	6	3
533	3	3	3	4	5	3	2	0	4	1	3	4
534	0	3	2	1	5	2	2	4	0	1	6	2
535	0	3	1	1	1	3	0	1	3	1	4	4
536	3	3	3	1	5	3	2	5	0	1	3	1
102	3	2	2	3	0	3	2	0	4	1	5	1
104	3	3	2	1	5	2	2	5	4	1	5	4
113	1	3	3	1	3	2	2	2	2	1	4	3
114	3	2	0	1	2	3	2	1	0	4	4	4
140	3	0	2	1	5	1	2	1	0	1	4	4

ID	PLEAS1	PLEAS2	PLEAS3	PLEAS4	PLEAS5	PLEAS6	PLEASURE	AROUS1	AROUS2	AROUS3	AROUS4	AROUS5	AROUS6	AROUSAL	DOM1	DOM2	DOM3	DOM4	DOM5	DOM6	DOMIN
101	4	5	5	4	3	2	3.83	5	2	3	2	2	6	3.33	6	6	4	5	6	6	5.50
103	2	2	1	3	1	4	2.17	2	2	3	2	2	3	2.33	4	1	4	6	5	6	4.33
105	6	6	6	4	3	6	5.17	4	2	5	3	6	5	4.17	4	2	4	5	5	4	4.00
106	4	7	7	5	6	6	5.83	3	3	1	4	8	4	3.83	5	1	5	5	1	3	3.33
107	2	3	3	4	2	3	2.83	4	5	6	5	7	7	5.67	5	3	4	4	4	4	4.00
108	0	2	5	2	2	1	2.00	5	8	6	3	6	1	4.83	4	1	2	3	7	3	3.33
109	6	4	6	5	5	6	5.33	3	2	3	3	4	6	3.50	5	3	4	5	4	5	4.33
110	2	3	3	3	2	3	2.67	4	5	4	4	3	4	4.00	4	5	3	4	4	4	4.00
111	3	2	3	3	1	4	2.67	4	2	4	3	0	2	2.50	2	5	4	3	4	5	3.83
112	2	2	4	0	1	4	2.17	2	1	2	4	1	4	2.33	4	8	4	5	5	7	5.50
116	3	4	6	4	5	4	4.33	4	3	4	3	3	6	3.83	4	3	4	5	2	4	3.67
117	5	4	3	2	2	4	3.33	3	3	4	3	4	3	3.33	5	3	4	4	5	5	4.33
118	4	5	5	5	4	4	4.50	3	4	2	3	1	3	2.67	6	4	4	3	4	6	4.50

ID	PLEAS 1	PLEAS 2	PLEAS 3	PLEAS 4	PLEAS 5	PLEAS 6	PLEASURE	AROUS 1	AROUS 2	AROUS 3	AROUS 4	AROUS5	AROUS6	AROUSAL	DOM 1	DOM 2	DOM 3	DOM 4	DOM 5	DOM 6	DOMIN
119	2	3	4	3	3	2	2.83	2	5	5	3	3	5	3.83	4	4	4	3	4	5	4.00
120	4	8	8	0	4	4	4.67	0	0	0	8	0	1	1.50	6	8	0	5	2	4	4.17
121	5	6	6	3	3	5	4.67	3	1	3	2	4	6	3.17	3	6	2	5	5	5	4.33
122	2	1	3	4	2	3	2.50	4	3	3	3	0	6	3.17	3	4	3	4	3	4	3.50
123	3	7	1	3	5	5	4.00	7	4	7	3	8	4	5.50	1	7	1	5	7	6	4.50
124	3	5	5	2	3	3	3.50	2	3	3	2	1	5	2.67	4	4	5	5	2	3	3.83
125	4	5	4	4	3	4	4.00	3	2	3	3	2	3	2.67	4	5	4	4	2	5	4.00
126	4	5	5	2	4	3	3.83	3	2	3	3	4	3	3.00	6	6	4	6	5	6	5.50
127	2	2	2	5	4	2	2.83	3	5	3	2	3	2	3.00	5	4	3	4	6	5	4.50
128	3	3	3	1	1	5	2.67	5	2	4	1	6	2	3.33	6	6	4	4	1	4	4.17
129	5	5	5	4	4	5	4.67	3	3	4	3	3	4	3.33	6	5	5	5	6	5	5.33
130	0	5	6	2	3	0	2.67	4	4	3	0	2	2	2.50	3	6	7	4	4	4	4.67
131	3	4	4	4	3	3	3.50	4	3	4	3	2	3	3.17	3	5	4	3	2	2	3.17
132	3	4	5	3	3	3	3.50	4	4	3	4	5	5	4.17	3	5	4	4	4	5	4.17
133	4	4	4	4	3	0	3.17	5	4	3	4	0	8	4.00	7	6	4	4	0	1	3.67
135	4	2	3	4	3	2	3.00	3	2	4	3	7	6	4.17	5	5	4	4	2	3	3.83
136	4	6	6	5	7	7	5.83	3	2	6	6	6	4	4.50	6	7	4	4	5	3	4.83
137	4	3	3	4	1	2	2.83	1	2	2	3	0	2	1.67	3	1	4	2	2	3	2.50
138	4	4	5	5	6	3	4.50	5	6	6	6	7	7	6.17	6	6	4	6	6	6	5.67
139	2	2	1	1	2	2	1.67	2	1	2	1	1	3	1.67	4	7	4	4	3	5	4.50
141	2	1	1	1	2	3	1.67	4	2	5	3	3	4	3.50	3	6	2	4	5	5	4.17
143	4	5	4	4	4	5	4.33	3	2	2	2	3	3	2.50	3	3	4	3	2	5	3.33
144	3	3	5	3	3	3	3.33	3	2	5	3	5	5	3.83	2	3	3	3	5	4	3.33
201	5	5	5	4	5	3	4.50	4	2	5	1	2	2	2.67	4	4	5	4	5	5	4.50
202	4	6	5	3	5	2	4.17	4	3	4	3	1	3	3.00	4	4	4	4	3	4	3.83
204	2	2	2	1	2	1	1.67	4	2	4	1	4	4	3.17	2	5	3	5	2	4	3.50
205	3	3	4	3	5	4	3.67	2	2	2	3	1	2	2.00	0	4	6	4	4	2	3.33
206	0	4	5	3	0	0	2.00	2	0	4	4	0	8	3.00	4	4	4	4	0	4	3.33
208	1	1	4	2	3	2	2.17	4	2	4	2	2	3	2.83	3	3	4	4	4	5	3.83
209	2	2	2	2	2	3	2.17	3	3	4	3	2	5	3.33	3	4	5	3	3	2	3.33
210	6	5	5	3	5	5	4.83	2	2	3	2	3	2	2.33	4	7	4	6	6	6	5.50
211	4	4	5	4	5	4	4.33	3	2	5	3	5	4	3.67	5	5	3	5	5	5	4.67
212	1	4	1	3	2	5	2.67	5	6	4	4	0	7	4.33	3	4	4	4	2	2	3.17
214	4	4	4	4	5	6	4.50	3	1	5	4	6	4	3.83	8	8	4	7	4	8	6.50
215	2	2	3	2	3	2	2.33	3	1	3	1	1	1	1.67	1	3	1	5	2	7	3.17
216	2	2	5	2	3	5	3.17	3	3	5	3	7	5	4.33	3	2	3	3	5	5	3.50
217	2	1	2	3	2	2	2.00	3	3	4	3	5	6	4.00	1	4	3	2	3	3	2.67
218	0	2	2	2	2	2	1.67	3	2	4	2	0	7	3.00	4	4	2	4	2	4	3.33
219	2	2	1	3	2	4	2.33	4	7	4	3	2	8	4.67	5	6	4	5	5	4	4.83
220	4	1	1	4	0	0	1.67	2	3	2	0	0	4	1.83	4	8	4	7	4	6	5.50
221	4	5	6	4	5	0	4.00	4	6	5	3	2	8	4.67	5	5	3	4	4	3	4.00
222	4	5	4	4	6	7	5.00	5	3	5	3	7	6	4.83	5	6	4	6	5	5	5.17
223	3	3	3	3	6	4	3.67	3	2	3	2	7	3	3.33	4	2	4	3	6	6	4.17
224	2	3	5	3	4	2	3.17	4	4	3	2	2	4	3.17	4	3	4	4	3	4	3.67
225	2	2	4	3	4	4	3.17	2	1	3	4	0	2	2.00	4	8	2	5	5	8	5.33
226	5	5	4	2	4	3	3.83	1	3	4	3	6	4	3.50	4	4	4	4	4	4	4.00
227	4	3	0	2	2	0	1.83	2	1	4	1	3	6	2.83	2	3	3	4	4	3	3.17
228	2	1	4	2	2	2	2.17	3	2	3	3	2	3	2.67	2	3	2	2	2	2	2.17
231	1	2	1	4	1	2	1.83	3	4	4	5	5	4	4.17	6	7	2	5	4	6	5.00
232	4	5	7	4	5	4	4.83	7	7	5	5	5	5	5.67	5	4	4	5	4	5	4.50
233	2	5	1	1	4	2	2.50	1	1	3	2	0	3	1.67	4	4	4	3	4	5	4.00
234	1	1	2	1	1	0	1.00	1	1	2	2	0	3	1.50	4	1	3	4	3	3	3.00
235	1	2	1	4	4	2	2.33	2	1	3	2	1	2	1.83	7	7	3	3	6	7	5.50
236	6	5	7	4	5	5	5.33	7	1	7	1	5	4	4.17	8	8	4	4	5	7	6.00
237	1	2	2	2	3	3	2.17	3	2	2	2	1	2	2.00	4	2	4	2	4	3	3.17
238	3	3	3	4	2	3	3.00	4	5	3	3	5	4	4.00	4	5	4	3	3	4	3.83
239	2	5	4	4	2	4	3.50	0	6	7	3	2	7	4.17	5	8	4	7	7	7	6.33
240	3	5	6	2	6	4	4.33	3	5	4	4	2	5	3.83	3	4	2	3	3	2	2.83

ID	PLEAS1	PLEAS2	PLEAS3	PLEAS4	PLEAS5	PLEAS6	PLEASURE	AROUS1	AROUS2	AROUS3	AROUS4	AROUS5	AROUS6	AROUSAL	DOM1	DOM2	DOM3	DOM4	DOM5	DOM6	DOMIN
241	4	2	2	3	2	0	2.17	3	3	4	3	4	5	3.67	4	6	4	5	5	6	5.00
301	4	4	4	1	4	0	2.83	6	8	7	3	5	8	6.17	1	4	4	2	0	0	1.83
302	1	1	1	0	1	3	1.17	4	7	3	0	2	7	3.83	2	0	3	3	2	1	1.83
303	4	5	5	6	4	3	4.50	1	1	2	0	6	2	2.00	6	7	5	6	5	8	6.17
304	2	3	5	1	2	5	3.00	3	3	3	3	5	6	3.83	4	2	4	4	3	4	3.50
305	2	3	2	4	2	3	2.67	4	2	4	2	3	5	3.33	4	5	2	4	4	5	4.00
306	4	4	4	4	4	2	3.67	5	5	5	5	6	8	5.67	4	4	4	4	4	4	4.00
307	2	5	2	2	4	1	2.67	2	3	3	1	5	3	2.83	4	6	5	6	3	5	4.83
308	1	2	1	1	2	2	1.50	3	5	4	3	2	6	3.83	3	2	3	4	1	3	2.67
310	3	5	3	2	4	3	3.33	4	3	4	2	4	4	3.50	2	2	3	4	4	4	3.17
311	2	2	3	4	5	3	3.17	4	3	4	3	1	5	3.33	2	4	3	3	2	3	2.83
313	5	5	3	3	5	5	4.33	3	3	3	3	3	4	3.17	4	5	4	3	3	4	3.83
314	4	2	2	2	4	2	2.67	3	3	4	2	2	6	3.33	4	5	4	4	2	4	3.83
315	0	1	0	1	0	1	.50	3	3	4	1	1	5	2.83	1	2	2	3	3	3	2.33
316	4	2	5	6	6	2	4.17	1	7	6	6	6	8	5.67	7	6	4	6	5	6	5.67
317	2	1	2	2	4	2	2.17	4	0	5	1	5	5	3.33	6	6	4	6	6	6	5.67
318	2	3	5	3	3	3	3.17	3	2	3	3	3	3	2.83	5	6	4	3	3	4	4.17
319	1	2	2	2	3	2	2.00	3	3	4	2	5	4	3.50	6	5	3	4	3	5	4.33
320	3	4	5	5	4	5	4.33	2	3	3	3	6	5	3.67	4	6	5	6	4	5	5.00
321	2	2	3	4	2	1	2.33	2	4	5	5	5	6	4.50	7	6	4	4	4	6	5.17
322	1	1	2	1	1	2	1.33	3	2	3	1	0	2	1.83	4	3	3	2	4	3	3.17
323	4	7	6	5	3	4	4.83	3	1	3	1	0	1	1.50	4	3	4	3	1	4	3.17
324	3	3	4	4	5	5	4.00	3	3	3	3	3	4	3.17	6	7	5	6	6	7	6.17
325	1	2	2	1	2	0	1.33	5	5	3	1	0	3	2.83	4	4	4	3	5	4	4.00
326	2	2	2	1	4	3	2.33	4	1	5	2	5	3	3.33	4	2	3	3	3	4	3.17
327	1	4	3	5	2	2	2.83	5	6	6	6	6	6	5.83	3	3	5	5	5	4	4.17
328	2	4	4	2	5	3	3.33	4	5	5	3	4	4	4.17	4	2	3	3	3	4	3.17
329	5	7	2	2	5	6	4.50	3	5	5	2	5	6	4.33	4	6	2	4	5	4	4.17
330	2	2	2	2	2	3	2.17	4	5	4	3	2	3	3.50	3	5	3	2	3	2	3.00
331	2	3	1	1	3	1	1.83	4	6	6	6	5	6	5.50	7	1	2	6	7	0	3.83
332	2	4	4	3	3	1	2.83	5	2	5	3	5	5	4.17	4	4	4	4	3	4	3.83
333	1	3	2	3	2	3	2.33	4	6	7	1	4	7	4.83	4	4	1	5	5	7	4.33
335	1	2	1	0	2	4	1.67	5	6	4	4	4	6	4.83	0	3	4	3	0	3	2.17
336	3	3	4	4	2	3	3.17	3	4	5	5	5	3	4.17	4	6	3	4	5	.	4.40
337	3	4	4	4	1	3	3.17	3	3	4	3	0	5	3.00	4	4	5	3	3	4	3.83
338	2	2	5	4	5	3	3.50	4	2	2	5	4	5	3.67	3	4	5	6	5	4	4.50
339	4	5	5	3	5	2	4.00	5	2	5	3	5	3	3.83	6	4	3	5	5	5	4.67
401	4	3	6	6	3	3	4.17	2	2	3	4	6	3	3.33	7	7	4	7	5	7	6.17
402	3	3	2	4	2	4	3.00	4	4	4	4	4	4	4.00	6	5	3	3	3	5	4.17
403	4	3	5	4	4	4	4.00	2	2	3	2	2	1	2.00	6	7	5	5	1	7	5.17
404	3	2	3	3	3	3	2.83	4	2	2	2	2	3	2.50	5	5	3	4	4	5	4.33
405	1	4	4	2	2	4	2.83	2	1	3	1	1	3	1.83	2	3	3	2	4	4	3.00
406	4	2	3	2	4	4	3.17	2	6	4	4	7	4	4.50	4	4	3	4	4	4	3.83
408	3	4	4	3	6	6	4.33	2	5	7	6	8	6	5.67	6	6	5	5	5	7	5.67
409	3	5	5	4	4	4	4.17	4	2	3	3	7	3	3.67	4	4	3	4	2	5	3.67
411	3	3	3	3	3	3	3.00	4	3	4	3	3	5	3.67	4	4	4	4	3	4	3.83
412	2	3	6	2	3	4	3.33	4	2	4	4	3	3	3.33	5	5	4	2	4	5	4.17
413	0	0	1	0	0	0	.17	4	5	6	2	5	8	5.00	0	4	1	3	4	4	2.67
414	1	3	2	1	3	2	2.00	4	3	4	3	2	3	3.17	2	1	3	3	2	3	2.33
415	4	5	3	5	4	4	4.17	5	4	3	5	5	5	4.50	6	6	4	6	5	6	5.50
416	4	4	5	3	4	3	3.83	3	3	4	3	3	4	3.33	5	4	6	4	4	5	4.67
417	5	4	6	2	6	4	4.50	2	1	1	4	4	1	2.17	4	5	6	5	6	5	5.17
418	5	5	6	4	5	3	4.67	2	2	4	3	4	3	3.00	5	6	4	3	5	6	4.83
419	5	6	5	0	3	7	4.33	0	3	4	2	3	4	2.67	4	2	3	3	0	1	2.17
420	3	3	6	2	3	1	3.00	3	3	4	3	1	3	2.83	0	1	4	2	4	4	2.50
421	3	.	2	2	3	3	2.60	4	6	4	4	4	4	4.33	2	4	4	3	4	3	3.33
422	2	2	3	3	3	4	2.83	4	3	3	3	2	4	3.17	3	5	3	4	5	.	4.00
423	1	1	1	1	1	0	.83	4	1	4	2	0	7	3.00	4	4	4	4	4	4	4.00

ID	PLEAS1	PLEAS2	PLEAS3	PLEAS4	PLEAS5	PLEAS6	PLEASURE	AROUS1	AROUS2	AROUS3	AROUS4	AROUS5	AROUS6	AROUSAL	DOM1	DOM2	DOM3	DOM4	DOM5	DOM6	DOMIN
424	4	4	5	4	3	6	4.33	5	3	6	6	6	3	4.83	4	7	3	7	5	7	5.50
425	0	5	1	2	3	2	2.17	1	0	4	0	8	0	2.17	4	3	4	4	3	5	3.83
426	1	5	6	4	4	3	3.83	4	3	4	3	0	3	2.83	4	4	4	3	4	5	4.00
427	1	2	1	2	1	3	1.67	2	2	3	2	3	3	2.50	3	3	3	3	4	4	3.33
428	5	6	7	4	5	2	4.83	6	4	6	6	6	6	5.67	5	6	4	5	4	6	5.00
429	4	5	6	3	5	3	4.33	4	3	3	4	2	3	3.17	4	4	4	4	4	5	4.17
430	4	5	4	4	3	4	4.00	5	6	2	8	6	6	5.50	2	6	5	5	5	6	4.83
431	4	4	6	3	5	4	4.33	2	2	2	3	2	3	2.33	5	5	4	5	3	3	4.17
432	1	2	4	2	3	4	2.67	1	4	7	4	7	4	4.50	4	4	4	4	4	4	4.00
433	1	4	4	4	4	4	3.50	3	2	3	3	4	3	3.00	4	4	4	4	5	6	4.50
434	3	3	2	3	2	2	2.50	2	2	3	3	1	2	2.17	4	4	4	4	6	4	4.33
435	2	3	3	2	2	5	2.83	5	3	4	7	6	3	4.67	4	2	3	3	3	3	3.00
436	2	3	3	2	2	2	2.33	4	3	4	3	2	5	3.50	4	2	4	4	2	3	3.17
438	4	2	3	4	3	3	3.17	5	6	4	4	5	6	5.00	5	6	3	6	5	5	5.00
439	4	4	6	2	2	4	3.67	6	2	3	1	6	7	4.17	7	3	3	2	1	3	3.17
501	4	4	5	4	3	4	4 00	3	1	2	3	0	3	2.00	4	5	4	5	5	5	4.67
502	4	4	4	4	4	4	4.00	2	1	1	2	4	1	1.83	4	.	4	4	4	4	4.00
503	3	2	2	2	1	1	1.83	2	6	4	2	1	6	3.50	2	2	2	2	1	2	1.83
504	3	4	5	4	5	2	3.83	6	6	6	3	7	7	5.83	5	5	4	5	5	5	4.83
505	2	2	2	0	1	4	1.83	3	4	4	4	0	8	3.83	4	1	4	4	0	1	2.33
506	4	4	2	2	2	2	2.67	4	4	6	3	4	7	4.67	4	4	4	6	4	4	4.33
507	2	1	2	4	3	3	2.50	2	3	3	4	2	3	2.83	3	6	2	3	3	5	3.67
508	2	5	4	3	2	4	3.33	2	2	3	2	2	2	2.17	6	6	4	6	5	6	5.50
509	2	3	3	4	2	3	2.83	3	2	6	2	8	3	4.00	4	3	4	4	4	6	4.17
510	4	4	4	4	3	4	3.83	3	3	5	4	7	4	4.33	4	4	4	4	4	4	4.00
511	2	3	2	4	3	1	2.50	3	2	2	2	8	7	4.00	1	6	6	5	2	7	4.50
512	3	2	2	2	4	2	2.50	4	2	6	2	5	4	3.83	4	7	4	2	4	7	4.67
513	3	3	2	5	3	1	2.83	4	1	3	4	6	8	4.33	5	6	4	4	6	.	5.00
514	4	4	4	4	4	0	3.33	1	3	7	2	8	3	4.00	4	5	4	4	3	4	4.00
515	3	2	2	2	1	3	2.17	2	1	3	1	3	7	2.83	2	3	2	6	7	5	4.17
516	1	2	4	1	1	4	2.17	4	2	5	2	6	1	3.33	5	3	2	2	6	2	3.33
517	2	3	5	1	3	3	2.83	2	2	3	3	4	3	2.83	5	6	5	6	2	6	5.00
518	5	6	6	5	4	3	4.83	1	2	3	2	6	6	3.33	7	1	5	7	2	5	4.50
519	5	3	6	3	5	7	4.83	7	7	7	6	7	7	6.83	4	6	3	5	3	6	4.50
520	1	1	1	3	1	4	1.83	0	0	2	1	3	1	1.17	3	1	8	7	3	5	4.50
521	2	3	3	3	5	6	3.67	3	2	1	4	3	3	2.67	4	3	4	2	0	3	2.67
522	2	2	5	2	1	1	2.17	2	2	4	3	5	6	3.67	4	5	3	2	4	4	3.67
523	4	4	5	4	5	3	4.17	5	3	5	3	5	5	4.33	4	3	4	3	4	4	3.67
524	5	5	5	3	6	6	5.00	4	3	4	5	5	4	4.17	3	2	6	5	3	4	3.83
525	4	4	7	6	6	4	5.17	3	0	5	0	3	3	2.33	4	0	4	4	4	5	3.50
526	2	3	2	1	5	6	3.17	6	7	6	4	3	6	5.33	4	7	3	7	6	8	5.83
527	0	0	2	0	1	3	1.00	3	3	2	0	1	3	2.00	2	2	2	1	2	3	2.00
528	2	2	2	0	4	4	2.33	4	4	5	4	4	2	3.83	4	6	1	4	4	5	4.00
529	4	4	5	4	4	4	4.17	4	3	2	4	5	4	3.67	3	3	4	4	5	6	4.17
530	4	5	2	3	3	5	3.67	1	2	3	2	7	5	3.33	6	5	7	5	4	5	5.33
531	3	2	2	2	1	4	2.33	3	1	4	1	6	4	3.17	4	3	5	2	6	6	4.33
532	5	5	5	5	4	4	4.67	3	4	3	3	6	3	3.67	5	5	4	4	4	5	4.50
533	3	5	4	3	4	4	3.83	5	4	7	5	7	3	5.17	5	3	5	3	3	.	3.80
534	5	6	5	3	5	4	4.67	1	2	2	1	4	2	2.00	5	2	3	3	5	4	3.67
535	2	2	1	4	1	1	1.83	5	2	3	2	2	2	2.67	4	4	4	2	3	3	3.33
536	6	8	8	5	5	4	6.00	3	2	3	3	4	2	2.83	4	3	4	4	4	4	3.83
102	3	7	7	6	5	7	5.83	1	3	6	7	7	4	4.67	0	2	4	5	4	4	3.17
104	3	4	7	4	4	3	4.17	7	4	2	4	5	8	5.00	4	0	3	5	6	4	3.67
113	2	3	3	2	2	1	2.17	3	5	4	3	5	5	4.17	5	3	6	3	4	5	4.33
114	1	1	1	4	2	1	1.67	4	4	3	3	0	4	3.00	4	6	3	3	4	3	3.83
140	3	4	8	2	6	1	4.00	4	0	6	1	2	1	2.33	5	3	4	5	2	2	3.50

ID	AWAYSET	WORKLOC	SCHOOL	PUBSET	HOMEINF	HMTRINF	HMOUTINF	AWAYINF	AWTRINF	AWOUTINF	PUBSTINF	COMMINF	AVESPINF	HOMEIMP	HMTRIMP	HMOUTIMP	AWAYIMP	AWTRIMP	AWOUTIMP	PUBSTIMP	COMMIMP	AVESPIMP
101	1	.	0	3	0	4	4	4	4	4	4	4	3.50	1	2	2	2	3	3	4	1	2.25
103	1	.	0	2	1	3	4	4	4	4	4	4	3.50	1	1	2	2	2	2	3	2	1.88
105	1	.	0	3	2	1	2	1	2	4	4	4	2.50	0	1	0	2	2	1	2	2	1.25
106	1	4	0	3	1	0	4	4	4	4	3	1	2.63	0	0	3	4	4	4	0	0	1.88
107	1	.	1	3	2	3	2	4	2	2	2	4	2.63	1	2	1	2	2	2	2	2	1.75
108	1	.	1	3	3	4	4	4	4	4	0	1	3.00	1	1	2	1	1	0	0	1	.88
109	1	.	0	0	4	2	4	3	4	4	4	4	3.63	3	2	4	1	4	4	4	2	3.00
110	1	.	0	0	2	4	4	4	4	4	4	4	3.75	1	2	2	2	3	3	1	1	1.88
111	1	.	0	3	2	2	3	3	4	4	3	3	3.00	0	1	2	2	2	2	1	2	1.50
112	1	.	1	3	3	2	4	4	3	4	3	4	3.38	0	0	2	3	2	3	2	2	1.75
116	1	.	0	4	0	2	4	4	4	4	3	3	3.00	0	2	1	2	4	3	4	2	2.25
117	1	.	0	0	2	2	3	3	2	2	3	3	2.50	1	2	3	2	3	1	2	3	2.13
118	1	.	1	3	3	4	4	4	4	4	3	4	3.75	1	2	1	2	3	2	3	1	.88
119	1	.	0	2	2	3	2	4	3	4	4	4	3.25	0	1	2	2	2	2	2	2	1.63
120	1	.	3	3	3	4	4	4	4	4	4	2	3.63	1	4	2	3	3	3	3	3	2.75
121	1	.	0	3	2	0	0	0	0	1	0	3	.75	1	3	3	3	4	3	0	4	2.63
122	1	.	0	3	2	3	4	4	3	4	4	3	3.38	0	2	3	3	3	4	2	1	2.25
123	1	1	0	3	1	2	2	2	2	2	1	4	2.00	1	3	2	1	3	1	0	1	1.50
124	0	0	.	3	0	2	3	3	3	4	4	4	2.88	1	3	3	2	2	3	4	3	2.63
125	1	.	0	2	2	0	4	4	2	4	3	2	2.63	0	0	2	2	2	3	2	2	1.63
126	1	.	0	0	1	2	4	2	2	4	4	3	2.75	2	2	3	3	3	3	3	4	2.88
127	1	.	2	0	2	2	4	4	4	4	4	4	3.50	1	1	3	3	2	2	3	2	2.13
128	1	.	3	2	1	2	2	4	4	4	4	4	3.13	1	1	3	3	3	3	4	3	2.63
129	1	.	0	4	3	4	4	4	4	4	4	4	3.88	2	3	3	2	2	4	2	3	2.63
130	1	.	0	3	2	0	3	4	4	3	3	4	2.88	2	1	2	2	3	3	1	4	2.25
131	1	.	0	2	2	3	4	2	2	2	2	2	2.38	1	1	3	0	2	2	1	1	1.38
132	1	.	0	3	0	4	4	3	4	4	4	4	3.38	1	2	4	3	4	4	3	2	2.88
133	1	.	0	3	0	0	4	4	4	4	2	4	2.75	2	1	2	2	2	2	2	1	1.75
135	1	.	0	2	2	2	4	4	4	4	4	4	3.50	1	1	2	3	2	3	2	3	2.13
136	1	.	0	4	1	4	4	3	4	1	3	2	2.75	2	1	3	3	4	2	2	1	2.25
137	1	.	0	3	2	4	4	4	4	4	1	4	3.38	1	2	1	3	3	2	1	3	2.00
138	1	.	0	3	2	4	4	4	4	4	4	4	3.75	1	1	2	2	3	3	2	1	1.88
139	1	.	0	0	3	2	2	4	4	4	4	4	3.38	2	2	1	2	2	2	2	3	2.00
141	1	.	0	2	2	1	3	4	2	4	4	3	2.88	1	0	3	3	1	3	3	1	1.88
143	1	.	2	3	3	3	4	4	3	4	4	3	3.50	2	2	3	2	1	3	2	2	2.13
144	1	.	2	0	3	2	2	3	4	4	3	3	3.00	1	1	1	2	4	4	3	2	2.25
201	1	.	0	3	0	3	4	4	2	4	3	2	2.75	0	2	2	2	1	2	2	1	1.50
202	1	.	0	3	2	2	4	2	4	4	2	2	2.75	1	2	3	3	3	3	1	1	2.13
204	1	.	2	2	4	4	4	4	4	4	4	3	3.88	2	1	3	2	4	4	2	3	2.63
205	1	.	0	0	3	2	4	4	4	4	3	2	3.25	1	1	1	2	1	1	2	1	1.25
206	1	.	0	0	2	4	2	2	2	2	2	2	2.25	2	3	3	1	3	3	2	1	2.25
208	0	0	.	3	2	2	3	2	3	2	3	4	2.63	1	1	2	1	2	2	2	2	1.63
209	1	.	0	4	2	2	3	3	3	.	1	2	2.29	1	0	1	2	2	3	1	0	1.25
210	1	0	1	2	1	4	4	3	4	4	4	4	3.50	2	2	3	2	2	3	3	2	2.38
211	0	.	0	3	2	2	4	4	4	4	4	3	3.38	0	1	4	3	2	4	4	2	2.50
212	1	.	0	0	2	2	2	4	4	0	2	2	2.25	2	2	2	3	2	2	1	1	1.88
214	1	.	0	0	4	4	4	4	4	4	4	4	4.00	2	3	1	2	3	2	3	3	2.38
215	1	.	0	0	2	2	4	4	3	4	4	4	3.38	0	1	3	3	2	4	3	2	2.25
216	1	.	0	3	2	1	3	4	2	3	2	4	2.63	1	1	2	1	3	2	1	1	1.50
217	1	.	0	0	2	.	4	2	4	4	4	3	3.13	0	0	2	0	0	0	4	2	1.00
218	1	.	0	4	2	2	2	4	4	4	4	4	3.25	1	1	1	2	2	2	2	2	1.63
219	1	.	1	3	2	2	4	4	4	4	4	2	3.25	1	2	3	3	3	3	3	2	2.50
220	1	.	0	0	2	4	4	4	4	4	4	4	3.75	1	2	2	2	2	2	2	1	1.75
221	1	.	0	0	1	4	2	4	2	4	4	4	3.13	1	3	3	3	2	4	4	2	2.75
222	1	.	0	0	2	2	3	4	4	4	4	3	3.25	1	2	1	3	3	3	3	1	2.13
223	1	1	0	2	3	2	4	4	4	4	4	3	3.50	1	2	1	3	3	4	4	4	2.75

ID	AWAYSET	WORKLOC	SCHOOL	PUBSET	HOMEINF	HMTRINF	HMOUTINF	AWAYINF	AWTRINF	AWOUTINF	PUBSTINF	COMMINF	AVESPINF	HOMEIMP	HMTRIMP	HMOUTIMP	AWAYIMP	AWTRIMP	AWOUTIMP	PUBSTIMP	COMMIMP	AVESPIMP
224	1	.	0	0	2	2	4	4	4	4	4	4	3.50	1	3	4	3	3	4	3	4	3.13
225	1	.	0	3	0	1	4	4	4	4	4	4	3.13	1	1	2	1	1	4	2	2	1.75
226	1	.	0	3	2	2	3	4	4	4	2	4	3.13	1	1	1	2	2	2	3	2	1.75
227	1	4	0	3	2	2	2	1	2	2	2	1	1.75	2	1	3	1	2	1	1	0	1.38
228	1	.	0	1	3	3	4	4	4	4	4	4	3.75	2	3	4	4	4	4	4	4	3.63
231	1	.	0	3	3	3	4	4	4	4	4	3	3.63	2	2	3	4	3	4	4	1	2.88
232	1	.	0	3	2	3	3	4	4	4	4	4	3.50	1	2	3	2	2	2	4	2	2.25
233	1	.	1	0	3	1	1	4	4	3	4	4	3.00	2	1	3	3	1	3	4	3	2.50
234	1	.	0	0	2	4	4	4	4	4	4	3	3.63	2	2	3	3	3	3	3	3	2.75
235	1	.	0	4	2	2	4	2	3	3	4	2	2.75	2	2	4	2	3	4	2	2	2.63
236	1	.	1	3	2	2	2	1	2	2	2	3	2.00	1	1	3	1	1	3	1	2	1.63
237	1	.	0	2	0	1	4	4	4	4	3	3	2.88	2	1	2	3	3	3	3	3	2.50
238	1	.	0	0	0	2	4	2	4	4	4	3	2.88	0	2	3	2	3	4	3	2	2.38
239	1	.	1	4	2	2	4	4	2	4	4	4	3.25	1	1	3	2	4	4	1	2	2.25
240	1	.	0	1	3	3	2	4	4	4	4	4	3.50	0	0	4	3	4	4	3	4	2.75
241	0	1	3	3	0	2	4	3	4	4	3	4	3.00	0	1	3	2	4	4	4	4	2.75
301	1	.	0	2	3	3	4	4	4	4	4	3	3.63	2	1	4	2	3	4	1	2	2.38
302	1	.	0	0	3	4	3	4	4	4	4	4	3.75	1	2	2	3	3	3	4	3	2.63
303	1	.	0	3	1	4	3	2	4	3	0	2	2.38	1	2	2	1	1	1	3	1	1.50
304	1	.	0	0	1	4	4	4	4	4	4	4	3.63	2	1	2	4	2	3	3	3	2.50
305	1	.	0	3	3	3	4	4	3	4	4	3	3.50	3	2	3	2	2	4	4	2	2.75
306	1	.	2	3	2	4	4	3	4	3	3	3	3.25	1	1	2	1	3	3	1	1	1.63
307	1	.	0	3	2	4	4	4	4	4	4	4	3.75	0	2	2	2	3	4	3	4	2.50
308	1	.	0	2	1	1	4	2	2	4	2	3	2.38	0	1	1	1	1	2	1	1	1.00
310	1	.	0	3	2	2	1	2	2	2	1	2	1.75	2	1	2	2	2	1	2	1	1.63
311	1	.	0	3	2	4	2	4	4	4	2	2	3.00	1	1	1	2	3	3	0	0	1.38
313	1	.	0	0	2	3	4	4	4	4	3	4	3.50	0	1	3	2	3	4	2	3	2.25
314	1	.	0	3	2	2	3	4	2	.	.	.	2.60	1	1	2	2	1	.	.	.	1.40
315	1	.	0	3	3	3	4	4	4	4	4	4	3.75	1	1	2	1	1	4	4	1	1.88
316	1	.	0	2	2	4	4	2	4	4	4	4	3.50	1	1	3	1	1	3	3	3	2.00
317	1	.	0	3	3	4	4	3	4	4	4	4	3.75	2	2	3	2	3	3	2	3	2.50
318	0	4	.	4	1	2	2	4	4	4	2	4	2.88	1	1	2	2	2	3	2	2	1.88
319	1	.	0	0	2	4	4	4	4	4	4	4	3.75	0	2	3	3	3	4	3	3	2.63
320	1	.	0	4	1	3	4	4	2	2	4	4	3.00	0	4	3	4	2	2	1	4	2.50
321	1	.	1	3	3	3	1	4	4	4	4	4	3.38	2	2	1	3	3	3	4	4	2.75
322	1	.	0	0	0	3	3	4	4	4	4	4	3.25	0	1	1	0	2	2	2	1	1.13
323	1	.	0	3	2	2	2	4	2	2	3	4	2.63	0	0	1	2	1	1	1	4	1.25
324	1	.	1	3	3	4	4	4	4	4	4	4	3.88	1	1	2	1	2	2	2	2	1.63
325	1	.	2	3	3	4	4	3	4	4	3	4	3.63	2	3	3	3	4	3	2	2	2.75
326	1	.	0	3	2	2	4	4	4	4	4	3	3.38	1	2	3	3	3	4	3	1	2.50
327	1	.	3	0	2	3	2	1	2	4	3	3	2.50	2	2	3	3	2	1	0	1	1.75
328	1	.	0	0	2	3	4	3	3	4	4	4	3.38	1	3	4	3	2	4	4	3	3.00
329	1	.	0	3	1	2	4	4	4	4	3	4	3.25	1	2	3	3	3	3	3	1	2.38
330	1	.	0	0	2	3	2	4	4	4	4	3	3.25	1	2	2	3	3	3	3	2	2.38
331	1	.	0	0	2	4	4	2	2	3	3	3	2.88	0	2	0	3	1	0	1	1	1.00
332	1	.	2	2	2	4	4	4	4	4	4	4	3.75	2	1	1	1	2	2	3	2	1.75
333	1	.	0	3	0	3	3	4	3	4	1	4	2.75	1	1	3	2	2	2	3	3	2.13
335	1	.	0	2	2	2	4	3	3	4	3	2	2.88	1	1	2	2	2	2	2	1	1.63
336	1	.	1	3	1	2	3	3	3	3	3	3	2.63	1	2	2	3	3	3	3	2	2.38
337	1	.	0	4	2	2	4	3	4	4	4	4	3.38	1	1	3	3	4	3	3	2	2.50
338	1	.	0	2	2	2	0	1	0	1	3	0	1.13	2	2	3	2	3	3	2	2	2.38
339	1	.	0	3	1	2	3	4	3	4	1	4	2.75	1	2	2	1	1	1	2	1	1.38
401	1	.	0	3	3	2	2	2	2	2	3	2	2.25	2	2	1	3	2	3	1	2	2.00
402	1	.	0	3	0	0	4	4	3	4	4	4	2.88	1	2	4	2	2	4	4	4	2.88
403	1	.	0	4	3	4	4	4	4	4	4	4	3.88	2	3	3	4	3	3	3	[illegible]	3.00
404	.	1	2	2	3	2	3	3	3	4	3	2	2.88	1	1	3	2	3	3	2	1	2.00

ID	AWAYSET	WORKLOC	SCHOOL	PUBSET	HOMEINF	HMTRINF	HMOUTINF	AWAYINF	AWTRINF	AWOUTINF	PUBSTINF	COMMINF	AVESPINF	HOMEIMP	HMTRIMP	HMOUTIMP	AWAYIMP	AWTRIMP	AWOUTIMP	PUBSTIMP	COMMIMP	AVESPIMP
405	1	.	0	3	1	3	3	4	4	4	4	4	3.38	0	1	1	2	2	2	2	2	1.50
406	1	.	0	2	2	3	4	3	2	2	2	2	2.50	0	2	1	1	2	2	1	1	1.25
408	1	.	2	0	3	3	3	4	4	3	4	4	3.50	1	0	1	2	2	2	2	2	1.50
409	1	.	0	3	2	0	4	4	4	4	4	4	3.25	2	1	3	4	3	3	3	2	2.63
411	1	.	0	3	2	4	4	4	4	4	3	4	3.63	2	3	3	3	3	3	3	3	2.88
412	0	4	.	3	3	4	4	4	4	4	3	3	[illegible]	1	2	2	4	4	4	1	2	2.50
413	1	.	0	0	2	0	3	4	4	4	4	2	2.88	0	0	2	3	4	4	2	1	2.00
414	1	.	0	0	1	2	4	4	4	4	4	4	3.38	1	1	2	2	2	2	3	2	1.88
415	1	.	0	3	1	4	4	4	4	4	3	3	3.38	1	1	2	3	3	4	2	2	2.25
416	1	.	0	3	4	4	4	4	4	4	4	4	4.00	2	3	3	2	2	4	3	2	2.63
417	1	.	0	4	2	3	4	4	3	3	4	3	3.25	[illegible]	2	3	3	2	3	4	2	2.63
418	1	.	0	3	4	4	4	4	4	4	3	4	3.88	1	2	2	3	2	2	2	3	2.13
419	1	.	0	.	0	2	3	3	4	3	0	4	2.38	4	1	2	3	2	3	4	1	2.50
420	1	0	1	1	0	4	4	2	4	4	4	4	3.25	0	4	4	3	4	4	2	2	2.88
421	1	.	0	0	1	1	2	.	3	3	3	2	2.14	1	1	2	4	4	4	2	2	2.50
422	1	.	0	0	1	4	4	4	4	4	4	4	3.63	0	2	3	3	3	3	4	4	2.75
423	1	.	0	1	2	2	4	4	4	4	4	4	3.50	1	2	2	1	2	2	1	1	1.50
424	1	.	0	3	4	4	4	4	4	4	2	1	3.38	1	3	2	1	2	3	3	4	2.38
425	1	.	0	3	3	4	4	4	4	4	3	3	3.63	2	3	3	3	3	3	2	2	2.63
426	1	.	0	3	2	2	4	4	4	4	4	4	3.50	2	2	3	3	3	3	3	3	2.75
427	1	.	0	0	3	2	2	4	2	4	4	4	3.13	1	2	1	3	2	2	3	3	2.13
428	1	.	0	3	2	3	3	4	4	4	4	3	3.38	1	1	1	2	2	2	3	3	1.88
429	1	.	0	0	1	2	2	2	4	3	3	4	2.63	1	1	1	2	3	3	3	3	2.13
430	1	.	0	3	2	4	4	4	4	4	4	4	3.75	0	3	3	3	3	3	4	3	2.75
431	1	.	2	3	2	4	3	3	4	4	3	4	3.38	1	2	1	2	2	2	2	2	1.75
432	1	.	0	4	1	0	2	2	2	4	4	2	2.13	1	0	2	2	2	4	4	2	2.13
433	1	.	0	2	2	2	3	4	4	4	3	4	3.25	1	1	3	1	2	2	2	2	1.75
434	1	.	0	0	2	2	2	2	2	2	2	2	2.00	0	2	3	3	3	3	3	2	2.38
435	1	.	0	2	2	3	2	2	3	2	2	3	2.38	2	2	1	1	2	1	3	2	1.75
436	1	.	0	1	2	2	2	3	2	3	4	3	2.63	1	1	1	3	2	3	3	3	2.13
438	1	.	0	0	2	3	3	4	4	4	4	4	3.50	1	2	2	2	2	3	2	2	2.00
439	1	.	0	0	0	0	2	2	4	4	4	3	2.38	0	0	2	1	2	2	2	1	1.25
501	1	.	0	2	4	4	4	4	4	4	4	3	3.88	2	1	3	2	2	4	1	2	2.13
502	1	.	1	3	2	1	0	0	0	0	2	0	.63	1	1	0	0	0	0	2	0	.50
503	1	.	1	3	1	2	1	3	3	3	2	2	2.13	2	2	2	3	3	1	3	2	2.25
504	1	.	2	0	0	4	4	4	4	4	4	4	3.50	0	2	3	2	3	2	2	2	2.00
505	1	.	1	2	1	1	4	3	3	.	.	.	2.40	0	0	2	2	1	.	.	.	1.00
506	1	.	0	3	2	2	2	2	2	2	2	2	2.00	2	2	2	2	2	2	2	2	2.00
507	1	.	0	3	3	2	2	2	2	2	3	3	2.38	2	2	2	1	2	3	2	2	2.00
508	1	.	0	3	2	4	4	4	4	4	4	4	3.75	0	3	3	2	2	2	4	1	2.13
509	1	.	2	3	2	3	4	4	4	4	4	3	3.50	1	2	3	3	2	3	3	2	2.38
510	1	.	2	3	1	0	4	4	4	4	4	3	3.00	0	1	3	4	3	4	4	2	2.63
511	1	.	0	3	1	2	2	4	4	4	4	4	3.13	1	2	4	4	1	4	4	3	2.88
512	1	1	0	2	2	3	3	2	4	4	4	3	3.13	1	1	1	0	1	1	1	1	.88
513	1	.	0	3	2	2	4	4	4	3	4	4	3.38	1	1	1	1	1	2	1	2	1.25
514	1	.	0	3	4	3	4	4	4	4	4	3	3.75	0	0	1	1	2	2	2	1	1.13
515	1	.	0	4	3	4	4	4	4	4	4	.	3.86	2	3	2	2	3	2	2	.	2.29
516	1	.	0	0	1	2	2	3	3	4	3	3	2.63	1	2	2	2	3	4	2	2	2.25
517	1	.	0	3	3	2	4	4	4	4	1	3	3.13	3	3	2	3	3	3	1	1	2.38
518	1	.	0	0	1	1	4	3	3	4	4	3	2.88	0	0	2	3	2	4	4	2	2.13
519	0	0	.	3	1	2	4	4	4	4	3	4	3.25	0	1	2	1	3	2	1	3	1.63
520	1	.	0	3	3	2	4	4	3	4	4	4	3.50	1	1	1	3	1	3	2	1	1.63
521	1	.	2	3	1	2	4	1	4	4	4	4	3.00	1	2	4	1	3	4	4	4	2.88
522	1	.	0	4	1	2	4	2	2	2	2	2	2.13	0	0	1	1	1	1	0	2	.75
523	1	.	0	3	2	2	4	4	4	4	4	3	3.38	2	3	3	2	2	3	2	1	2.25
524	1	.	1	3	1	2	2	4	4	4	1	1	2.38	0	2	2	4	3	4	2	1	2.25

ID	AWAYSET	WORKLOC	SCHOOL	PUBSET	HOMEINF	HMTRINF	HMOUTINF	AWAYINF	AWTRINF	AWOUTINF	PUBSTINF	COMMINF	AVESPINF	HOMEIMP	HMTRIMP	HMOUTIMP	AWAYIMP	AWTRIMP	AWOUTIMP	PUBSTIMP	COMMIMP	AVESPIMP
525	1	.	0	4	2	2	4	4	4	4	4	4	3.50	0	0	2	2	2	2	3	3	1.75
526	1	.	0	3	2	3	4	4	3	4	4	3	3.38	0	1	1	3	2	4	3	2	2.00
527	1	.	0	2	0	0	2	4	4	4	4	4	2.75	1	2	3	3	3	3	3	3	2.63
528	1	.	0	2	2	2	2	4	4	3	4	4	3.13	1	1	2	2	2	1	2	1	1.50
529	1	.	0	0	0	3	4	4	4	4	4	4	3.38	0	3	3	2	2	3	4	4	2.63
530	1	.	0	0	2	1	4	4	3	3	4	3	3.00	0	0	3	2	2	2	3	1	1.63
531	1	1	3	3	3	1	2	3	3	3	3	4	2.75	1	1	0	3	4	4	[illegible]	3	2.38
532	1	.	0	3	2	4	4	4	4	4	4	4	3.75	1	2	3	3	3	3	3	2	2.50
533	1	.	0	3	3	4	4	4	1	2	2	4	3.00	1	4	4	4	1	0	2	4	2.50
534	1	.	0	3	2	3	4	4	4	4	2	4	3.38	1	1	1	2	3	4	1	2	1.88
535	1	.	0	2	0	2	3	4	2	4	3	3	2.63	0	2	2	1	2	3	2	4	2.00
536	1	4	0	3	0	2	1	0	1	2	4	2	1.50	1	2	2	0	2	2	2	2	1.63
102	1	4	2	2	2	3	4	4	4	4	4	3	3.50	3	3	3	3	3	3	3	3	3.00
104	1	.	0	1	0	1	4	4	4	4	4	4	3.13	0	2	3	3	3	3	3	3	2.50
113	1	.	0	1	0	3	4	3	4	4	3	3	3.00	0	0	2	1	2	2	1	2	1.25
114	1	.	0	4	2	2	4	4	4	4	4	4	3.50	1	2	3	3	3	3	3	3	2.63
140	1	.	3	2	2	3	0	4	0	3	3	3	2.25	0	1	1	3	1	1	1	1	1.13

ID	DIFFPUZ	DIFFUND	DIFFAR	DIFFEATH	DIFFTASK	HGUESS	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
101	3	1	1	4	3	0	1	4	1	4	0	1	3	0	3	1
103	2	0	3	2	2	0	2	4	3	3	2	0	3	3	1	1
105	4	0	2	3	3	1	1	4	1	3	0	0	4	4	3	1
106	4	1	2	3	3	3	1	4	4	4	0	0	4	3	0	0
107	4	0	1	3	2	1	3	4	1	3	1	3	4	4	3	1
108	4	0	3	3	1	0	3	4	1	1	3	0	4	3	0	3
109	3	3	3	4	3	0	3	4	0	3	4	.	3	3	.	3
110	4	1	2	3	3	1	1	2	1	2	1	3	3	3	4	3
111	3	0	3	3	3	0	2	4	0	3	1	4	3	3	4	4
112	3	0	0	4	2	3	1	4	3	3	3	0	4	4	0	0
116	4	2	2	1	3	0	4	4	3	3	3	3	4	.	4	4
117	3	1	1	2	2	2	2	3	2	3	2	3	3	3	4	3
118	4	2	2	3	2	0	1	4	3	2	1	0	3	3	2	2
119	3	1	1	3	2	0	2	3	3	3	2	.	3	3	.	0
120	3	0	1	4	3	0	2	3	4	4	2	1	2	4	3	0
121	3	1	3	3	3	1	3	3	3	3	3	3	4	.	3	3
122	1	0	3	2	1	3	1	4	3	1	1	1	4	3	3	2
123	4	3	3	3	3	0	3	4	1	3	3	4	4	4	0	0
124	3	1	0	2	2	2	1	3	4	3	3	1	3	3	4	4
125	4	3	2	3	2	1	1	4	3	2	1		4	3	3	3
126	3	2	3	4	3	2	3	4	3	1	3	3	.	3	3	3
127	4	0	1	3	2	3	3	4	4	3	4	4	4	3	4	3
128	3	0	3	1	2	0	3	4	3	3	3	0	3	4	3	3
129	1	0	4	4	3	1	3	1	2	3	3	1	3	2	1	0
130	2	4	2	4	3	0	1	3	2	1	0	0	2	1	0	0
131	3	0	4	3	3	0	3	4	3	4	2	3	4	4	4	2
132	2	0	2	3	2	0	3	4	1	3	3	3	3	4	4	3
133	1	1	0	0	1	2	4	4	3	3	2	0	3	3	0	1
135	1	2	3	4	2	3	3	3	4	3	1	3	3	2	3	0
136	3	0	3	3	2	0	1	4	1	3	2	3	3	3	4	1
137	2	1	2	3	2	0	2	2	4	3	3	2	4	2	2	3
138	3	1	3	4	.	1	3	4	3	3	3	3	3	3	3	3
139	4	2	2	1	3	0	1	4	2	2	3	1	3	2	3	1
141	2	1	3	3	2	2	3	4	3	3	4	2	4	4	3	4

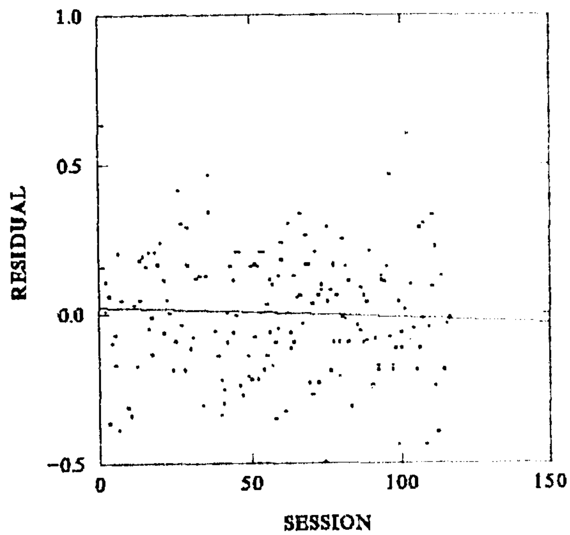
ID	DIFFPUZ	DIFFUND	DIFFAR	DIFFEATH	DIFFTASK	HGUESS	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
143	4	1	3	3	3	1	1	2	1	3	1	1	3	.	0	0
144	1	3	3	2	1	0	1	4	4	3	1	1	3	4	4	3
201	1	0	2	3	2	0	4	3	1	3	4	2	3	4	4	4
202	3	0	2	4	3	0	2	4	3	3	3	3	3	4	3	0
204	2	0	3	3	3	[illegible]	3	4	3	4	3	3	4	4	4	4
205	3	1	1	4	3	2	3	4	1	4	4	4	3	4	4	4
206	3	0	2	3	2	2	3	4	3	2	3	3	4	3	4	3
208	4	3	3	4	3	2	2	4	3	3	0	3	3	3	3	1
209	3	4	2	3	3	2	2	4	3	4	1	4	4	4	4	4
210	3	3	4	3	2	0	1	4	3	.	0	4	.	3	4	4
211	3	1	2	3	2	3	4	4	4	3	3	4	4	3	4	3
212	2	1	1	4	2	0	3	3	4	0	4	4	2	0	4	4
214	4	1	2	3	2	2	1	3	2	3	2	.	4	.	.	1
215	3	0	0	4	2	1	1	3	3	1	1	4	2	3	4	4
216	3	1	3	4	3	0	4	4	1	3	3	4	3	3	4	4
217	3	1	1	4	4	0	3	4	4	2	3	4	4	1	4	3
218	2	1	4	4	3	1	2	3	3	2	3	4	3	1	4	3
219	2	0	2	3	2	0	3	4	3	1	3	4	2	3	4	3
220	1	0	4	3	2	0	4	4	3	3	4	1	4	4	1	4
221	3	1	1	4	3	0	3	3	4	2	1	4	3	2	4	1
222	3	1	3	3	3	0	1	4	4	3	1	3	4	.	3	3
223	3	0	3	2	2	0	2	4	4	2	3	3	3	1	2	2
224	1	0	1	3	1	0	3	1	3	2	2	3	2	2	3	1
225	3	2	1	2	1	1	0	3	3	3	0	3	4	3	4	3
226	4	0	0	4	3	0	3	4	1	1	3	3	3	4	3	4
227	3	0	2	3	1	0	2	4	3	3	3	3	3	4	4	4
228	3	3	4	4	3	0	3	4	2	2	3	4	2	1	4	4
231	3	0	1	3	2	0	1	3	4	4	1	3	1	2	3	1
232	3	2	2	3	2	0	2	4	1	3	3	4	2	2	4	3
233	4	1	3	3	3	0	3	4	2	3	2	4	2	2	4	3
234	1	1	3	4	1	1	3	4	3	3	4	3	4	3	3	4
235	3	1	1	3	2	0	3	4	3	3	3	4	3	4	4	0
236	3	3	3	4	2	0	3	4	3	3	3	0	.	.	.	.
237	1	3	4	3	2	2	3	2	4	0	1	.	3	3	.	0
238	2	1	2	3	2	2	2	3	3	2	2	1	3	3	1	2
239	[illegible]	2	3	3	2	1	1	4	4	3	1	4	4	3	4	4
240	2	1	4	4	2	0	0	4	3	4	1	3	4	3	[illegible]	[illegible]
241	4	0	4	2	3	1	4	3	3	2	3	3	.	.	4	4
301	3	1	3	3	3	0	3	3	3	1	.	.	2	1	4	1
302	4	0	0	3	2	0	0	4	4	3	0	0	4	3	0	0
303	3	1	1	4	1	0	3	1	3	3	3	0	3	3	0	3
304	3	2	3	4	3	0	2	4	4	2	2	0	.	3	0	4
305	3	1	2	3	3	0	4	3	3	3	3	0	3	3	1	0
306	3	1	3	3	2	2	1	4	1	3	1	0	4	4	0	0
307	0	1	3	4	2	2	2	4	3	3	2	0	3	3	0	0
308	3	2	4	3	2	1	3	4	3	3	2	1	4	3	.	1
310	3	3	2	4	3	0	2	4	[illegible]	3	1	0	3	3	0	0
311	1	0	2	4	1	0	4	4	3	4	3	1	4	4	1	1
313	3	0	1	3	3	2	1	4	1	3	1	0	4	4	3	0
314	0	0	1	1	1	0	3	4	1	3	3	0	3	3	0	1
315	2	1	0	3	2	1	4	4	3	3	3	0	4	3	0	3
316	4	0	1	4	2	0	2	4	1	1	0	0	4	3	0	0
317	3	0	3	3	3	0	3	4	4	3	1	0	3	3	1	0
318	3	0	0	4	2	2	1	4	1	3	1	0	3	4	0	0
319	3	0	3	3	3	0	4	4	3	3	4	3	4	3	.	1
320	3	0	2	3	2	2	2	4	4	4	1	2	4	3	4	0
321	3	0	2	3	2	0	2	4	3	3	3	0	4	3	0	1
322	3	2	3	3	3	0	3	4	3	2	2	1	4	1	1	1
323	4	0	0	3	3	0	3	4	3	3	3	3	3	1	3	3
324	3	0	3	3	2	1	0	4	4	3	1	0	3	3	0	1
325	3	3	2	3	2	0	3	2	3	3	1	0	3	3	0	0
326	0	1	2	3	1	0	2	1	4	3	2	0	1	1	1	1

ID	DIFFPUZ	DIFFUND	DIFFAR	DIFFEATH	DIFFTASK	HGUESS	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
327	3	0	0	3	2	0	4	4	3	2	3	0	4	3	0	0
328	1	0	2	3	2	0	2	3	2	3	2	4	4	3	2	3
329	2	1	3	3	2	0	3	4	1	2	3	0	4	4	0	1
330	3	0	1	4	1	3	3	4	4	1	1	3	3	2	1	1
331	2	0	3	2	2	2	2	4	3	3	3	0	4	4	0	1
332	3	1	1	3	2	1	4	4	3	3	3	3	4	4	1	0
333	3	1	2	3	2	0	2	4	1	3	2	0	4	3	1	0
335	2	3	3	3	3	0	3	4	1	1	3	1	3	4	0	0
336	2	1	3	2	.	0	2	3	1	2	2	1	3	3	0	1
337	4	3	3	4	3	1	3	4	3	3	3	0	3	.	1	1
338	3	1	3	4	2	0	2	3	2	3	1	0	4	3	0	3
339	3	1	1	4	3	2	3	4	3	3	3	1	3	3	3	1
401	3	1	1	2	2	1	3	4	4	3	2	3	3	4	4	3
402	3	1	3	3	2	1	3	4	2	3	2	3	3	3	4	3
403	4	0	3	3	3	2	4	4	0	4	4	1	3	4	3	4
404	1	2	2	3	2	2	3	4	3	3	4	2	3	3	2	3
405	3	0	1	4	2	0	4	4	1	1	3	.	3	.	.	0
406	2	0	2	4	2	2	3	4	2	3	2	4	3	2	4	3
408	1	1	3	4	2	2	2	4	3	4	0	4	3	2	4	4
409	1	0	4	4	3	2	2	3	4	3	0	2	2	3	2	0
411	3	1	3	3	3	0	2	2	3	2	3	1	3	2	1	1
412	3	0	4	3	3	0	3	4	1	3	3	3	3	4	3	1
413	3	0	3	4	3	0	3	4	3	2	4	0	3	3	0	3
414	1	2	2	3	2	1	0	4	4	3	0	3	4	3	3	0
415	3	2	1	4	3	2	1	3	1	3	1	4	4	3	3	3
416	4	2	3	4	3	2	3	4	1	3	2	.	4	3	.	.
417	3	1	1	4	2	0	1	4	3	3	0	0	3	3	1	0
418	3	3	3	4	3	1	3	4	3	3	2	2	3	4	3	2
419	3	0	2	3	2	2	3	4	3	4	3	0	4	4	0	3
420	3	2	2	3	3	2	3	4	2	3	1	1	4	4	.	1
421	3	0	3	2	3	0	4	4	4	3	4	3	4	1	1	1
422	1	1	2	3	2	1	3	4	4	1	3	0	4	3	0	1
423	3	0	0	2	1	2	2	3	4	3	2	4	3	3	3	2
424	3	1	2	3	3	0	1	4	1	4	3	3	4	3	.	2
425	3	1	2	4	2	0	1	3	4	2	.	.	0	3	.	1
426	1	1	3	3	2	0	1	3	3	3	2	0	1	1	0	3
427	1	0	2	3	2	2	1	4	3	3	3	3	4	4	3	3
428	2	1	2	3	2	0	3	3	1	3	3	2	3	2	3	3
429	2	2	2	3	2	0	3	3	3	2	3	.	4	3	.	0
430	3	1	4	4	3	0	1	3	1	2	2	1	3	3	1	1
431	3	1	1	4	2	1	3	4	3	2	2	0	4	4	3	2
432	1	1	4	3	2	1	4	4	3	3	3	1	3	3	2	2
433	4	1	3	3	3	2	2	0	0	1	2	1	1	0	.	0
434	2	1	1	2	2	1	1	3	2	3	1	3	3	3	3	3
435	4	1	4	3	3	0	3	3	4	3	4	0	3	3	0	0
436	2	3	4	3	3	0	4	4	3	3	3	3	3	3	3	3
438	4	1	1	4	3	0	3	4	3	3	1	0	4	3	0	0
439	3	2	3	3	3	0	3	4	1	0	4	3	2	4	3	2
501	2	0	2	2	1	0	3	3	1	3	2	1	3	1	1	2
502	1	0	2	4	1	0	2	3	3	3	2	1	2	2	0	0
503	2	1	1	4	2	2	1	3	3	1	1	4	3	3	1	1
504	2	1	2	4	2	0	4	4	0	3	3	0	3	4	0	0
505	3	0	2	3	3	3	4	4	3	3	2	.	3	3	.	0
506	1	1	3	3	2	0	3	4	0	3	3	0	3	.	0	1
507	3	1	3	2	2	0	3	4	1	4	3	2	4	4	4	1
508	4	1	0	3	2	1	1	4	1	3	1	1	4	4	1	0
509	3	2	2	4	3	3	3	3	3	1	3	0	4	3	0	1
510	4	3	3	3	3	0	3	4	3	3	1	1	4	3	1	0
511	4	2	0	3	3	0	0	2	4	3	1	1	3	4	4	0
512	4	1	2	4	3	0	1	4	4	3	1	0	2	3	3	0
513	3	0	1	4	2	2	1	4	1	4	1	1	3	4	1	0
514	4	0	1	3	3	0	1	4	4	4	0	0	4	4	0	0

ID	DIFFPUZ	DIFFUND	DIFFAR	DIFFEATH	DIFFTASK	HGUESS	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
515	3	0	3	3	2	1	3	4	3	3	0	0	3	4	0	0
516	3	1	1	3	2	2	3	4	4	3	3	2	4	4	.	3
517	3	0	2	4	3	0	4	4	3	1	2	0	2	3	0	1
518	3	0	3	4	3	0	3	1	4	3	3	0	2	2	1	0
519	3	0	3	3	2	1	0	4	1	4	0	0	3	3	1	0
520	3	1	0	4	1	0	1	4	3	3	1	1	3	4	1	1
521	1	0	1	4	3	0	3	4	3	1	1	1	3	2	1	3
522	1	2	3	3	2	3	1	4	3	4	0	0	4	4	0	0
523	4	0	0	4	3	0	1	3	2	1	1	2	3	.	1	0
524	3	1	0	2	.	0	2	4	3	3	3	1	3	3	2	3
525	4	1	0	3	2	0	4	4	3	3	4	.	4	4	.	1
526	0	0	1	3	1	0	3	4	3	4	1	1	4	3	.	0
527	2	0	0	4	1	0	4	4	3	4	3	0	2	4	2	4
528	3	1	3	3	3	0	1	4	3	3	3	0	3	3	0	1
529	2	0	3	4	2	0	2	4	2	4	1	0	4	3	1	0
530	1	1	3	4	3	0	3	3	2	3	3	0	3	.	0	0
531	3	1	3	3	3	0	3	4	3	3	3	0	3	2	0	0
532	4	1	3	4	3	0	1	3	3	3	3	1	3	2	1	0
533	3	1	2	4	3	0	3	3	4	3	2	1	3	3	1	3
534	3	1	3	3	3	0	.	3	3	1	.	0	1	.	0	0
535	4	0	3	3	2	0	3	4	4	3	3	1	3	4	2	2
536	4	0	2	3	3	0	3	3	1	1	3	0	3	3	1	0
102	3	4	2	4	3	0	2	4	4	1	1	3	2	3	3	3
104	1	.	0	4	1	0	0	2	2	3	0	3	4	.	3	0
113	3	1	2	3	3	1	3	4	1	3	3	3	4	4	4	3
114	1	1	4	4	3	0	3	4	2	4	1	4	4	4	4	4
140	4	3	1	4	4	2	3	3	4	1	3	4	3	3	4	4

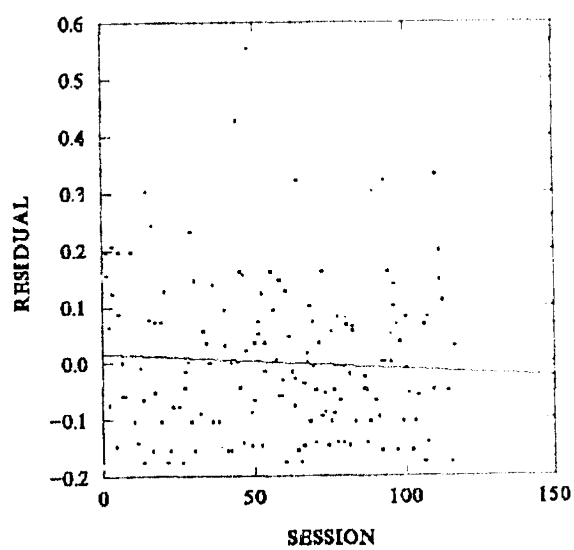
Appendix N
Scatterplots of Residuals by Session

Scatterplot of log(10)CreaTime residuals by Session



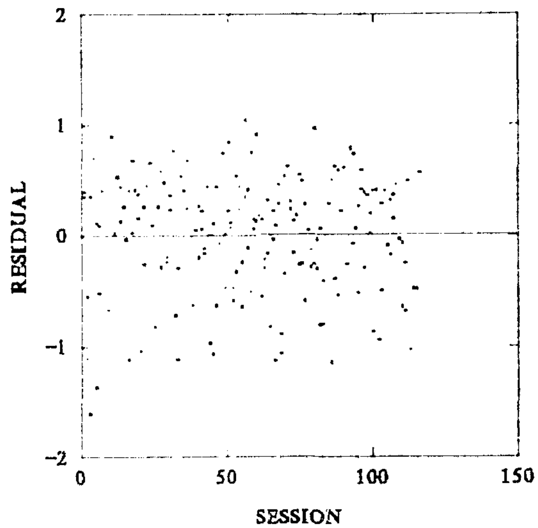
r = -.06, n.s.

Scatterplot of log(10)PuzTime residuals by Session



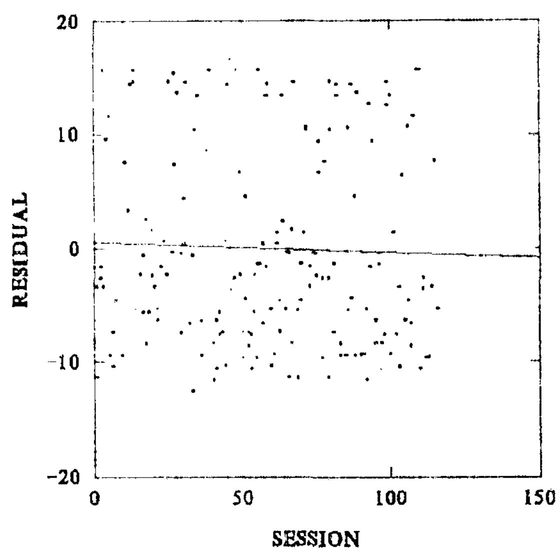
r = -.07, n.s.

Scatterplot of Self-Efficacy residuals by Session



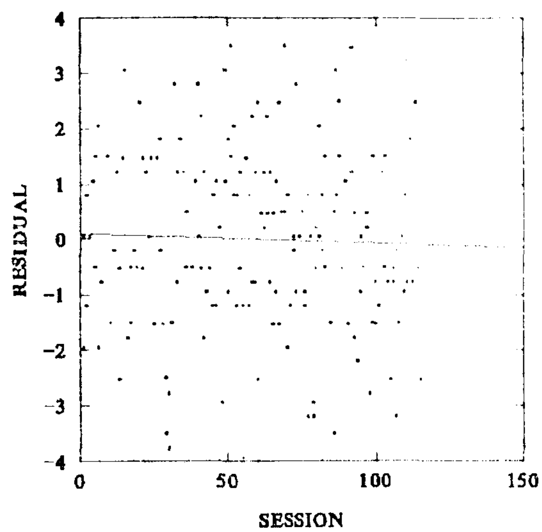
r = .01, n.s.

Scatterplot of Motivation residuals by Session



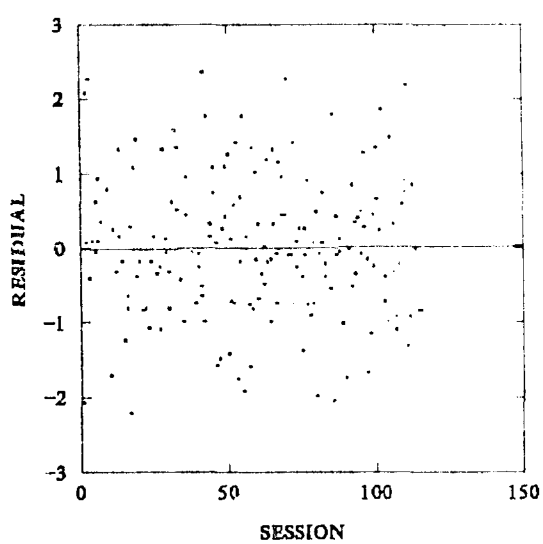
r = -.03, n.s.

Scatterplot of Attention residuals by Session



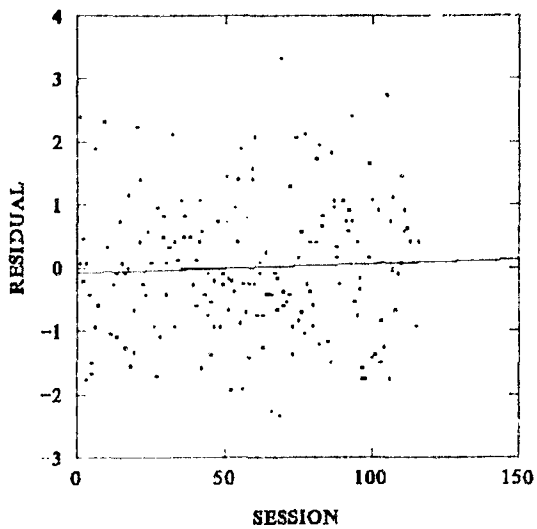
r = -.03, n.s.

Scatterplot of Dominance residuals by Session



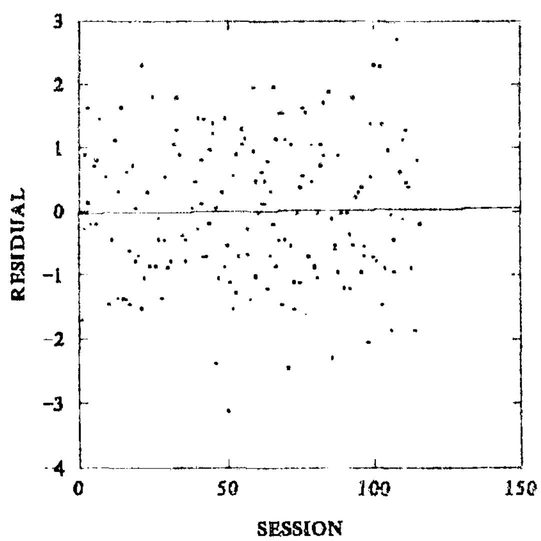
r = .01, n.s

Scatterplot of Arousal residuals by Session



$r = .04$, n.s.

Scatterplot of Pleasure residuals by Session



$r = .02$, n.s.

Appendix O

Path Analysis

Introduction

The application of covariance structure modelling to the analysis of psychological data is increasingly frequent (Breckler, 1990). These techniques, of which path analysis is a special case, use standard multivariate methods to estimate a structural model of the relationships believed to exist between variables. One common reason for the use of covariance structure modelling is to permit causal inferences to be drawn even with data that normally would not lend themselves to such inferences (Kenny, 1979).

Certain assumptions are common to all applications of covariance structure modelling, such as the assumption of linear, additive, and causal relations between variables in a model. The use of at least interval-level measurement is also assumed, although many researchers routinely violate this assumption (Asher, 1983). Standard assumptions also include the homoscedasticity of residuals and low multicollinearity between the variables (Nygreen, 1971).

Path analysis is distinguished from other types of covariance structure modelling by the assumption that the direction of causal flow is unidirectional and by restrictions placed on the residuals. The latter assumptions are that the residuals are not correlated between themselves, nor with the variables in the system (Kerlinger & Pedhazur, 1973). This implies that the system includes all the relevant variables, such that dependent variables are linear combinations of independent or other dependent variables, plus a residual. As Asher (1983) observed, this is an unrealistic assumption; it is doubtful that measurement error is ever zero.

The principal benefit of path analysis is its ability to distinguish between the direct and indirect effects of X on Y (Asher, 1983). The researcher who plans to use path analysis first generates a model of the relationships between the variables. The model begins as a visual representation of the relationships between the variables. Arrows linking the variables indicate the direction of causal flow. Each arrow represents a direct relationship. Any relationship between two variables that passes through an intermediate variable is an indirect relationship.

There are certain restrictions as to the type of relationship permitted for variables depending on their place in the model. Variables assumed to be determined by causes outside the model are called exogenous variables; these may be correlated. Undirected relationships between exogenous variables are frequently indicated by a two-headed arrow. Variables caused by other variables in the model are called endogenous variables. Undirected relationships between endogenous variables are not permitted.

Models should be based on theoretical or logical grounds. One drawback to covariance structure modelling in general is the ease of misuse; modification of models to fit the data may appear to provide a neat solution, but such models rarely replicate (Breckler, 1990; Kenny, 1979). The strength of modelling is the ability to test theoretical predictions.

In path analysis, the model is represented mathematically as a series of multiple regression equations. Each dependent variable is represented as the linear sum of the weighted variables hypothesized to contribute to it. (The construction of models will be illustrated below with the two models tested for the present study.) The weights applied to each variable are called path coefficients when the variables are expressed in standardized form.

If the model includes every logically possible unidirectional path between the variables, then the number of correlations equals the number of parameters (path coefficients) to be estimated. This is a necessary (although not always a sufficient; Kenny, 1979) condition for the model to be just-identified. For a just-identified model there is one and only one solution, and it is possible to exactly reproduce the bivariate correlations between the variables given the estimates of the path coefficients.

If the model includes more parameters than correlations, it is probably under-identified. In this case there can be no solution; an infinite number of values could be given to satisfy the equations (Kenny, 1979).

Researchers in any field seek parsimonious explanations of phenomena; the simpler model that can account for events is accepted over one that is more complex. Thus, it is common for certain paths between variables in a model to be constrained (on the basis of theoretical predictions) to be zero. When there are more correlations than parameters to be estimated, the model is probably over-identified (Kenny, 1979). For an over-identified model there is more than one possible estimate for each parameter. A unique solution is impossible without further restrictions on the model; in the case of path analysis with recursive models, these are provided by the usual assumptions that the residual terms are uncorrelated with each other or with other variables in the model (Asher, 1983).

The goal of path analysis is to provide estimates of the path coefficients that allow one to decompose the bivariate correlations into the direct and indirect effects of one variable on another. The rules for such decomposition are illustrated below.

The measure of the success of a model is the extent to which such reproduced correlations match the original, observed correlations. It is a matter of some debate as to which of the various indices of fit is most useful (e.g., Steiger, 1989). The ideal would be an over-identified model derived from theory, that very closely reproduces the observed correlations. Several measures of goodness-of-fit are discussed below.

Models of the Proposed Relationships

Diagrammatic representation. Two models were proposed, both on the basis of theory, for relationship between personal control, performance, and mood (p.34). (Performance speed was not included because of missing data. Deletion of those cases would have left unintended correlations between the exogenous variables.) One model involved attention as a possible mediator of the relationship between preference and performance. The other model suggested that personal control improves self-efficacy, which in turn influences motivation; improved motivation lead to improved performance. The models, diagrammed below, were the basis for the construction of sets of structural equations.

For the sake of clarity, only the observed variables are indicated in the models. The exogenous variables are uncorrelated in this case because they are orthogonal manipulated variables. The endogenous variables all have associated residual terms, denoted below by $R_{<VARIABLE NAME>}$. These residuals are, of course, uncorrelated with each other or with other variables in the model.

Structural equations. The structural equations corresponding to each model are presented in Table 1. The equations presented are for standardized variables; in this case, the path

Figure 9
Attention model of the personal control-performance/mood relationship

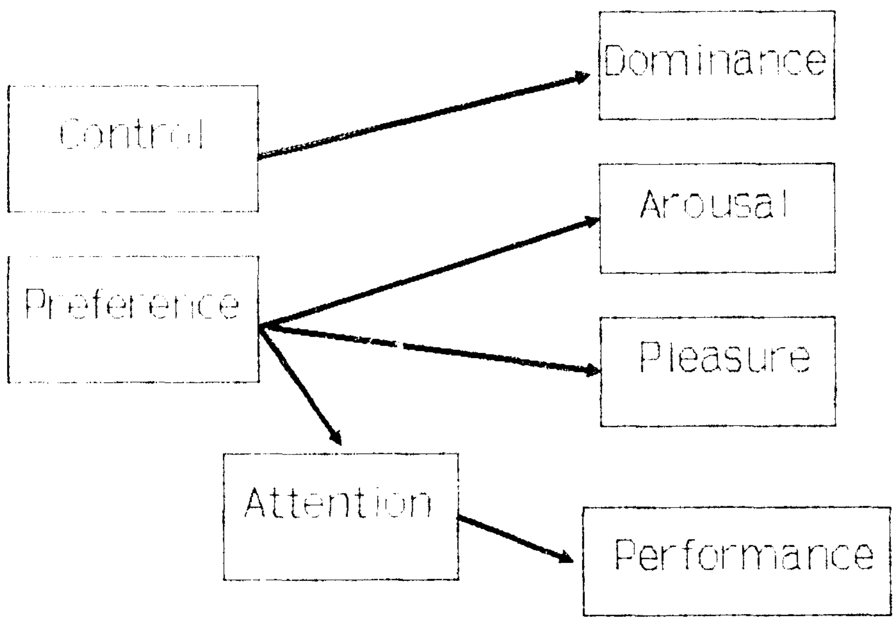
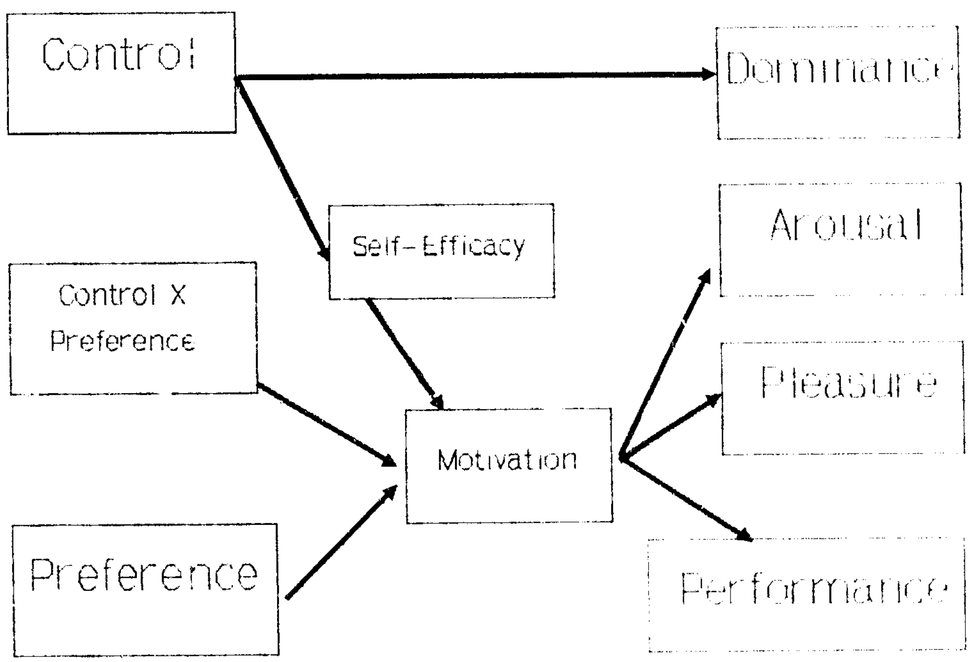


Figure 10
Motivation model of the personal control-performance/mood relationship



coefficients are ordinary least squares standardized regression coefficients. The path coefficients are denoted by square brackets enclosing parameter numbers labelled A for the attention model and M for the motivation model. The equations are simply the regression equations for each endogenous variable regressed on the variables believed to cause it.

Decomposition of correlations. In a recursive model, the correlation between any two variables can be expressed as a sum of simple and compound paths; a compound path can be expressed as the product of the simple paths that comprise it. Asher (1983) gave these three rules for the tracing of paths:

> 1. No path may pass through the same variable more than once.
>
> 2. No path may go backward on (against the direction of) an arrow after the path has gone forward on a different arrow.
>
> 3. No path may pass through a double-headed curved arrow (representing an unanalyzed correlation between exogenous variables) more than once in any single path. (pp. 33-34).

Asher recommended that in decomposing a correlation using these rules, one proceed by imagining trying to move from one variable to another while obeying the rules. Applying these rules to the correlation between Control and Dominance (in either model), one can see that the path coefficient is equivalent to the bivariate correlation when a path consists of a single arrow from a cause to a dependent variable.

A more complex example is the decomposition of the correlation between Control and Performance in the Motivation model. This compound path is equal to the product of the coefficients of the simple paths:

$$r_{\text{CONTROL-PERFORMANCE}} = [M2]*[M5]*[M8]$$

That is, the correlation between Control and Performance is equal to the product of the path coefficients for the relationship between Control and Self-Efficacy, Self-Efficacy and Motivation, and Motivation and Performance. Similarly, the correlation between Dominance and Performance in the Motivation model is equivalent to:

$$r_{\text{DOMINANCE PERFORMANCE}} = [M1]*[M2]*[M5]*[M8]$$

Table 1

Structural Equations for Attention and Motivation Models

I. Attention Model

DOMIN = [A1] CONTROL + [A6] R_{DOMIN}

AROUSAL = [A2] PREF + [A7] $R_{AROUSAL}$

PLEASURE = [A3] PREF + [A8] $R_{PLEASURE}$

ATTEN = [A4] PREF + [A10] R_{ATTEN}

PERFORMANCE = [A5] ATTEN + [A9] $R_{PERFORMANCE}$

II. Motivation Model

DOMIN = [M1] CONTROL + [M9] R_{DOMIN}

S/EFF = [M2] CONTROL + [M16] $R_{S/EFF}$

MOTIV = [M3] PREF + [M4] CONTxPREF + [M5] S/EFF +

[M17] R_{MOTIV}

AROUSAL = [M6] MOTIV + [M10] $R_{AROUSAL}$

PLEASURE = [M7] MOTIV + [M11] $R_{PLEASURE}$

PERFORMANCE = [M8] MOTIV + [M12] $R_{PERFORMANCE}$

The decomposition of the bivariate correlations for the Attention model is given in Table 2. For the Motivation model, the correlation decomposition is given in Table 3. In both cases, correlations between the exogenous variables, as stated above, are known to equal zero.

Results

The two models were tested using the EzPATH module (Steiger, 1989) for the SYSTAT statistical package (Wilkinson, 1988). The input correlation matrices were calculated using the 144 subjects in the four Control X Preference conditions of the study. Control and Preference were dummy-coded with values of -1 and 1 (Denied and Given, respectively). The Control and Preference codes were multiplied to create a dummy-coded variable for the Control X Preference interaction term (Kenny, 1979) for use in the Motivation model.

The path coefficients for the two models are presented in Table 4. Each path coefficient was significance tested using an approximate z score calculated by dividing the coefficient by the square root of its standard error. None of the path coefficients in either model achieved significance at even the $p < .05$ level. (When multiple tests are conducted it is customary to adopt a more stringent criterion for significance in order to compensate for familywise error rates; in the present case, the point is moot.) By that criterion, we can have little confidence in the fit of the model. However, it can be the case that an entire model fits the data even when some path coefficients are not statistically significant (Asher, 1983).

The obtained and reproduced correlation matrices were examined next. For the Attention model, these are presented in Tables 5 and 6, respectively. The correlation matrices for the Motivation model are presented in Tables 7 and 8.

A model that fits the data well should very nearly reproduce the observed correlation matrix. Kerlinger and Pedhazur (1973) suggested that the discrepancy between the observed and reproduced correlations should be no greater than .05. In the Attention model, nine correlations meet that criterion; however, six of these are cases where the observed correlation itself is less than .05 and the reproduced correlation is 0.00. The three correlations that do meet the criterion are all cases of simple paths from one variable to another.

In the Motivation model, the same situation holds. Of the 36 correlations in the matrix, 14

Table 2

Decomposition of Correlations for Attention Model

	CONT	PREF	ATT	DOM	AR	PL	PERF
CONT	-	0	0	A1	0	0	0
PREF		-	A4	0	A2	A3	A4*A5
ATT			-	0	A4*A2	A4*A3	A5
DOM				-	0	0	0
AR					-	A2*A3	A2*A4*A5
PL						-	A3*A4*A5
PERF							-

Note. CONT = Control. PREF = Preference. ATT = Attention. DOM = Dominance. AR = Arousal. PL = Pleasure. PERF = Performance. Correlations equal to zero reflect relationships without paths. Path coefficients refer to labels in Table 1.

Table 3

Decomposition of Correlations for Motivation Model

	CONT	PREF	CxP	SE	MO
CONT	-	0	0	M2	M2*M5
PREF		-	0	M3*M5	M3
CxP			-	M4*M5	M4
SE				-	M5
MO					-

	DOM	AR	PL	PERF
CONT	M1	M2*M5*M6	M2*M5*M7	M2*M5*M8
PREF	M1*M2* M3*M5	M3*M6	M3*M7	M3*M8
CxP	M1*M2* M4*M5	M4*M6	M4*M7	M4*M8
SE	M1*M2	M5*M6	M5*M7	M5*M8
MO	M1*M2* M5	M6	M7	M8
DOM	-	M1*M2* M5*M6	M1*M2* M5*M7	M1*M2* M5*M8
AR		-	M6*M7	M6*M8
PL			-	M7*M8
PERF				-

Note. CONT = Control. PREF = Preference. CxP = Control X Preference interaction term. SE = Self-Efficacy. MO = Motivation. DOM = Dominance. AR = Arousal. PL = Pleasure. PERF = Performance. Path coefficients refer to labels in Table 1.

Table 4

Solutions to Structural Equations for Attention and Motivation Models

I. Attention Model

DOMIN = [.085] CONTROL + [.996] R_{DOMIN}

AROUSAL = [-.09] PREF + [.996] $R_{AROUSAL}$

PLEASURE = [-.017] PREF + [1.00] $R_{PLEASURE}$

ATTEN = [-.077] PREF + [.997] R_{ATTEN}

PERFORMANCE = [.151] ATTEN + [.997] $R_{PERFORMANCE}$

II. Motivation Model

DOMIN = [.085] CONTROL + [.996] R_{DOMIN}

S/EFF = [-.057] CONTROL + [.998] $R_{S/EFF}$

MOTIV = [.069] PREF + [-.011] CONTxPREF + [.18] S/EFF + [.981] R_{MOTIV}

AROUSAL = [-.188] MOTIV + [.982] $R_{AROUSAL}$

PLEASURE = [.053] MOTIV + [.999] $R_{PLEASURE}$

PERFORMANCE = [-.06] MOTIV + [.998] $R_{PERFORMANCE}$

All path coefficients for independent variables $p > .05$.

Table 5

Obtained Correlations for Attention Model

	CONT	PREF	ATT	DOM	AR	PL	PERF
CONT	1	0	.03	.09	-.15	.10	-.24
PREF		1	-.08	.04	-.09	-.02	.07
ATT			1	-.08	.05	-.18	.15
DOM				1	.08	.42	-.04
AR					1	.15	-.05
PL						1	-.02
PERF							1

Note. CONT = Control. PREF = Preference. ATT = Attention (low scores indicate greater attention). DOM = Dominance. AR = Arousal. PL = Pleasure. PERF = Performance.

Table 6

Reproduced Correlations for Attention Model

	CONT	PREF	ATT	DOM	AR	PL	PERF
CONT	1	0	.00	.09	.00	.00	.00
PREF		1	-.08	.00	-.09	-.02	-.01
ATT			1	.00	.01	.00	.15
DOM				1	.00	.00	.00
AR					1	.00	.00
PL						1	.00
PERF							1

Note. CONT = Control. PREF = Preference. ATT = Attention (low scores indicate greater attention). DOM = Dominance. AR = Arousal. PL = Pleasure. PERF = Performance.

Table 7

Obtained Correlations for Motivation Model

	CONT	PREF	CxP	SE	MO
CONT	1	0	0	-.06	.06
PREF		1	0	.01	.07
CxP			1	.06	.00
SE				1	.18
MO					1

	DOM	AR	PL	PERF
CONT	.09	-.15	.10	-.24
PREF	.04	-.09	-.02	.07
CxP	-.05	.01	-.20	.05
SE	-.44	-.06	-.39	.02
MO	.04	-.19	.05	-.06
DOM	1	.08	.42	-.04
AR		1	.15	-.05
PL			1	-.02
PERF				1

Note. CONT = Control. PREF = Preference. CxP = Control X Preference interaction term. SE = Self-Efficacy. MO = Motivation. DOM = Dominance. AR = Arousal. PL = Pleasure. PERF = Performance.

Table 8

Reproduced Correlations for Motivation Model

	CONT	PREF	CxP	SE	MO
CONT	1	0	0	-.06	-.01
PREF		1	0	.00	.07
CxP			1	.00	-.01
SE				1	.18
MO					1

	DOM	AR	PL	PERF
CONT	.09	.00	.00	.00
PREF	.00	-.01	.00	.00
CxP	.00	.00	.00	.00
SE	.00	-.03	.01	-.01
MO	.00	-.19	.05	-.06
DOM	1	.00	.00	.00
AR		1	-.01	.01
PL			1	.00
PERF				1

Note. CONT = Control. PREF = Preference. CxP = Control X Preference interaction term. SE = Self-Efficacy. MO = Motivation. DOM = Dominance. AR = Arousal. PL = Pleasure. PERF = Performance.

have discrepancies less than .05. Almost all of these are cases in which the observed correlation itself is .05 or less, and the reproduced correlation is 0.00. The model failed to reproduce the stronger relationships.

The EzPATH output includes a chi-square test of equality between the matrices. As a general rule, such tests must be interpreted with caution because a failure to reject the null hypothesis leads to acceptance of the structural model. Thus, if power is sufficiently low, the structural model may be falsely supported. However, in the case of both the Attention and Motivation models, the chi-square value is sufficiently large to reject the null hypothesis that the observed and reproduced correlation matrices are equal. For the Attention model, chi-square with $df=15$ is 53.92, $p<.000$. For the Motivation model, chi-square ($df=25$) = 98.95, $p<.000$. By this criterion also, neither model fits the data well.

Other indices of goodness of fit produced by EzPATH also indicate that that models fit poorly. For example, Steiger (1989) suggested the adjusted root mean square standardized residual should be less than .10 if a model fits reasonably well, and less than .05 for excellent fit. For the Attention model, the value of this statistic is .13. For the Motivation model the value of this statistic is .15.

Finally, it is clear that neither model accounts for a substantial proportion of the variance in the dependent variables. The percentage of variance accounted for in a dependent variable is given by the formula:

$$\% \text{ Var}(Y) = (1 - r_{Y/R<y>}{}^{2}) * 100$$

The correlation between a variable and its residual error is given by the path coefficient for that relationship. Using this formula, the percentages of variance in the mood measures and the intellecual performance measure were calculated, and these are presented in Table 9. Neither path analytic model comes close to accounting for the same proportion of the variance (4.62%) explained in the analysis of variance model.

Modified Attention model. The Attention model had never before been tested. Its basis was a speculation by Butler and Biner (1987), who suggested that preferences for lighting are formed on the basis of experience. Those forms of lighting that allow greater attentional focus

Table 9

Percentage of Variance Accounted for by each Model

	Model	
DV	Attention	Motivation
Dominance	0.80 %	0.80
Arousal	0.80	3.60
Pleasure	0.00	0.20
Performance	2.20	0.40

on the desired task will be the most preferred. The thinking behind the construction of the original model was that any effect of control on mood would be negligible. Previous research had operationalized control by offering choices; one could obtain one's preference while exercising control. Any effect of control on arousal or pleasure, it was thought, was a function of obtaining one's preference, not of having control. Therefore, the paths between Control and Arousal and between Control and Pleasure were set to zero in the original model.

A modified model was tested in which these two paths were added to the original model. The paths were expected to be smaller in magnitude than the paths through Preference, but it was hoped that this new model would fit the data better than the original.

The results did not support the modified Attention model. The discrepancies between the original and reproduced correlations were again greater than .05 in most cases. The chi-square test was significant [chi-square (df = 13) = 49.5, p<.000]. The adjusted root mean square residual was .14.

Discussion

Neither of the theoretically-derived models adequately represents the data. There are two possible explanations for this outcome. Either the models are badly misspecified; or, the quality of the data is inadequate. Both are likely to have played a role in this case.

Any violation of the assumptions of multivariate normality, reliability, and independence of error terms would jeopardize the fit of a model to the data. The measurement of attention is known to be unreliable (Cronbach's alpha for the incidental learning test was 0.37). The motivation measure was bimodally distributed. The self-efficacy scale showed so little variability that it was unlikely to correlate highly with any variable. These problems are of particular importance when maximum likelihood estimates of parameters are used (Breckler, 1990), as in this instance.

Commonly, when one model fails to fit the data, researchers will modify the model to improve the fit. There is inherent danger in such modification in that it is tempting to tinker with the model on the basis of the data, then to use that model to explain the same data (Breckler, 1990; Kenny, 1979). Model specification justified on the basis of changes in one's understanding of the underlying theory may be permissible; however, if that understanding emerges from the data the new model should be cross-validated. Breckler (1990) recommended dividing the original sample into two parts, one for derivation and one for cross-validation.

Further modifications were not attempted in the present case because the outcome of the manipulation check analyses suggested that the original theories used to derive the models were themselves incomplete. The manipulation of Preference led to a sense of perceived control. There appears to be a typology of control, with each type having a different effect. Models that adequately explain the relationships between control, performance, and mood will need to take into account the complexity of the control construct.

Path analysis and other, less restrictive, forms of covariance structure modelling hold promise as tools for testing theories about multivariate relationships. No other technique, for example, can test predictions about mediating variables or chains of causation. However, covariance structure modelling techniques cannot derive meaning if the variables are neither reliable nor valid, nor without strong theoretical predictions to test.

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