THE ZONE OF TRANSITION

A Study of Lighting Changes in Relation to the Adaptation of the Eye




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Robert Fisher - Resident Fellow, Professor of Architecture

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ABSTRACT

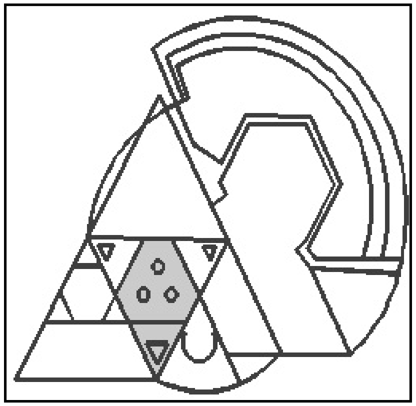


Fig. 1 Alumni Center first floor plan.

This study of the Ball State University Alumni Center focuses on the effect of light in transitional space. The journey from the conservatory through the hall up the main staircase to the second floor was examined to determine the effect of the changing lighting conditions on the visitor. We feel that while the measured amount of light changes significantly in the chosen transitional zone, the high contrast causes no visual discomfort for the visitor. This is because there is a significant difference between the way instruments gather data about light conditions and the way our eyes actually perceive the light.

In our research we have determined that other factors affect this transitional space, including: adaptation of the eyes, material reflectivity, field of view, and actual use of the spaces. By understanding the nature of this transitional zone we hope to be better able to design transitional spaces in the future.

Our research included several visits to the building in order to obtain the necessary data to prove our hypothesis. Initial visits were used to gather general illuminace readings in the transition zone. After our hypothesis was formed, several additional visits were made to collect more specific data including: additional spot illuminance readings, long term illuminance data, luminance measurements, and digital and 35mm photographs. With the collected data we constructed visual field maps, isolux graphs, and linear light level graphs. In analyzing the data we found that testing our hypothesis required more subjective than empirical analysis techniques.

Fig. 2
Standing in the conservatory looking east toward the main staircase.

Fig. 3
Approaching the main staircase looking east to connecting hallway.

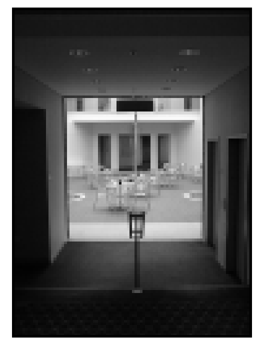


Fig. 4
Looking west to the consevatory from the connecting hallway.

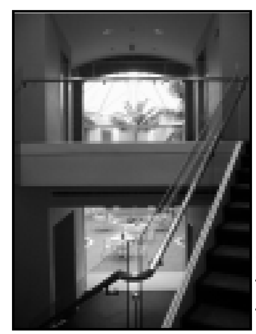


Fig. 5
Looking west to the conservatory from the 2nd landing on the main staircase.

INTRODUCTION

This case study of the Ball State University Alumni Center was conducted in connection with the Vital Signs program and the Ball State Center for Energy Research/Education/Service. The Ball State version of the Vital Signs program utilizes a cross section of the university student population in terms of discipline and class. With guidance from CERES directors and visiting experts, teams of students have set up hypotheses and processes of investigation concerning the lighting conditions of the Alumni Center.

The Alumni Center was completed in late 1997 and was designed by James Freed of the New York-based architecture firm, Pei, Cobb, Freed and Partners. The building serves as the northern gateway to the Ball State campus and is a destination point for visiting alumni of the university, accommodating personal visits and large banquets and cocktail parties. Every day, the building is occupied by a large staff of workers who connect Ball State University and its network of graduates.

The Alumni Center is two stories high and triangular in plan. At the center of the triangle is a large skylit conservatory which serves as the focal point of the building. This conservatory is the entrance and orientation space for the building, so that all who enter the building must pass through it. From the conservatory branch faculty, staff and administration conference rooms. Meeting and gallery spaces are located on the perimeter of the building plan.

The skylit conservatory receives extremely high levels of light. We were immediately aware of the high contrast between the daylit conservatory the darker surrounding spaces. We were concerned that the high contrast might create uncomfortable glare for the visitor; however, as we moved through the space we found there was no visual discomfort. Our case study is focused on understanding why the apparent high contrast does not cause visual discomfort in this case.

Fig. 6 Exterior view of the Ball State Alumni Center.

Fig. 7 - 8 Views into and out of main stair case inllustrating high contrast.

HYPOTHESIS

While moving from the conservatory through the main staircase of the Ball State Alumni Center, the visitor will rapidly experience high and low illumination and brightness levels, but will not experience any visual discomfort.

Fig. 9 Looking toward staircase from the conservatory.

Fig. 10 Looking closer into the staircase hall.

Fig. 11 Looking toward conservatory from stair hall.

Fig. 12 Looking toward conservatory from the second landing

RESEARCH METHODOLOGY

Protocols for field investigation are wide-ranging. Four levels of information gathering and analysis were undertaken; these include: **indicative**, **investigative**, **diagnostic**, and **comparitive**.

The **indicative** stage involves the preliminary visits to the center and general assessments of the space.

The **investigative** stage involves instantaneous measurements using the meters and more in-depth assessments of our space's transitions and contrasts.

The **diagnostic** stage involves longer-term measurements over a period of days to get a better understanding of the behavior of the light in our spaces.

The **comparative** stage involves looking at the data we have collected in the investigative and diagnostic stages and bringing it all together to support or refute our hypothesis.

Fig. 13 Insturments: Stowaway light logger and Sylvania light meter.

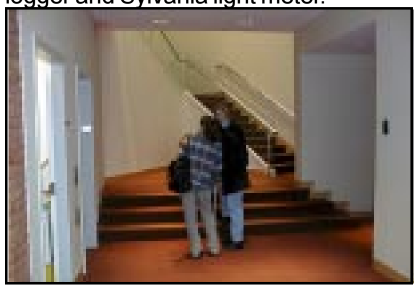


Fig. 14 The team sets up a Stowaway.

Fig. 15 The team discusses prodedure.

Fig. 16 The team takes illuminance measurements stooping down to ensure accurate readings.

INDICATIVE RESEARCH

During the first visit to the Alumni Center we recorded our initial impressions of the building (see Appendix A). In successive visits we walked through the transition space carefully observing lighting characteristics to develop our hypothesis. Once our hypothesis was formed, we began to formulate a plan for our investigation.

INVESTIGATIVE RESEARCH

1. A series of photographs were taken moving from the conservatory to the main staircase. These photographs were used to illustrate the visitor's movement through the transitional zone. The same photographs were later converted to grayscale images to diagram surface contrasts. This illustrates the situation discribed in our hypothesis; though the light levels are wide-ranging, the visual discomfort is minimal.

2. Slylvania Digital meters were used to get quick data concerning the illumination levels of the spaces. This method was used during several visits to the Alumni Center in order to roughly evaluate the different conditions that may occur on sunny and cloudy days. These data were used to obtain ranges in light levels and to compare conditions on a sunny day versus a cloudy day.

3. A list of surface materials in the transitional zone was created. The levels of luminance which reflect from surfaces in relation to a visitor's field of vision as they move through the spaces may have an effect on the perception of comfort. This data was used to obtain ranges of brightness within our space of study to help determine where there are high contrasts.

4. Larger scaled floor plans of the specific areas we observed and tested were created. The floor plans allowed us to take more meaningful, comprehensive field notes.

5. Accurate sections through the transitional space were drawn.

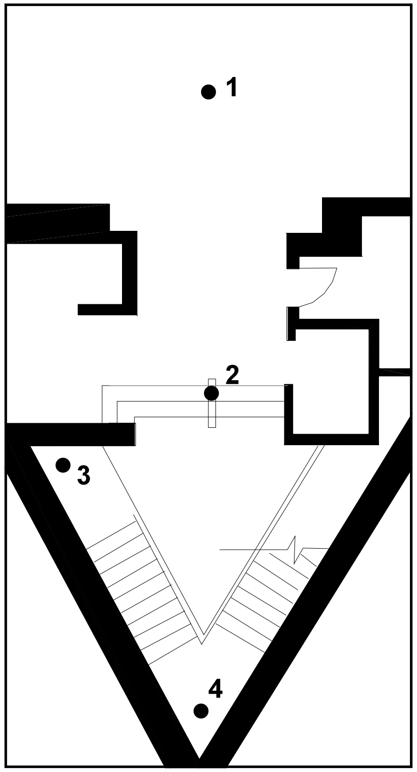


Fig. 17 Keyplan showing placement of the Stowaway light loggers.

Fig. 18 The team measuring out the grid on the floor to take readings.

Fig. 19 One Stowaway was secured in the railing in the hall preceding the stair.

Fig. 20 Stowaways were placed in the corners at the staircase landing.

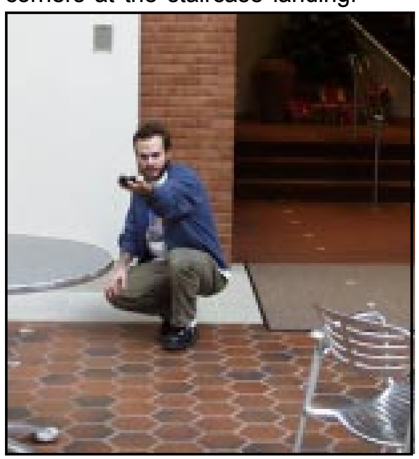


Fig. 21 Team member taking illuminance readings.

DIAGNOSTIC RESEARCH

The following procedures were implemented to test the hypothesis:

1. **Stowaway Light Logger Placement**
   Stowaway light loggers were placed in four locations in the transition zone. The four locations included: 1. A table in the conservatory, 2. The rail preceding the main staircase in the hall, 3. The first landing of the main staircase, and 4. The second landing (see Fig. 17). Data was obtained for both cloudy and sunny days over a period of five days each. After the data collection period, the Stowaway data was downloaded using BoxCar software and converted to Excel spreadsheet format. Based on the information found, **comparative line graphs** (see pg. 12 in findings) were created to compare data from sunny and cloudy days. This information helped us to understand the range of light levels the visitor might encounter. However, we felt this information did not really explain why visual discomfort does not occur.

2. **Comparative Illumination Readings on Path of Travel**
   Sylvania digital light meters were used to obtain illumination readings along specific paths of movement through the transitional zone. The readings were taken in 2' increments on both sunny and cloudy days to illustrate the series of light level changes the visitor experiences. The data was compiled into **line graphs superimposed on the building section** (see pg. 13 in findings) through the conservatory into the main staircase. Though the illuminance readings helped us to better understand light level changes, this did not prove our hypothesis; further data collection became necessary.

3. **Illumination Readings Over Entire Transitional Zone**
   We created a 2' grid to overlay the transitional zone in plan. Readings were taken with the same digital light meter at each grid point on a sunny day. The readings enabled us to develop an **isolux graph** (see pg 14 in findings). This information provided an understanding of the variety and distribution of the light levels in the transitional zone.

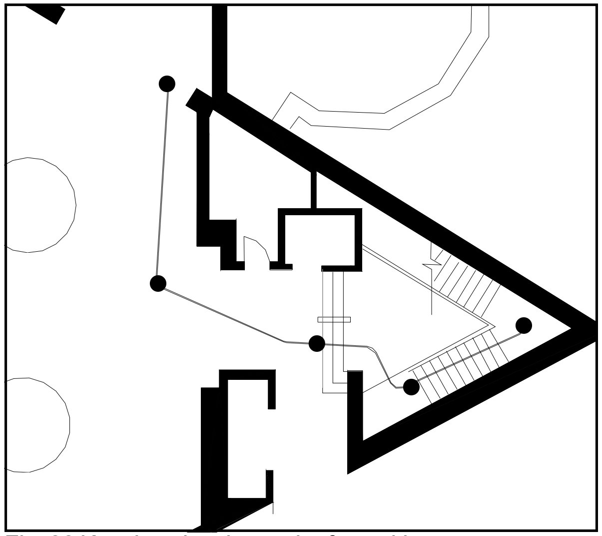


Fig. 22 Keyplan showing path of transition.

Fig. 23 Team member lays out string to measure and divide path of movement.

Fig. 24 Team member walks through the space simulating a framed view to get an idea how to set up the photos.

4. **Minolta Spot Luminance Meter and Digital Camera**
   Digital camera photographs were taken at several locations within the transition zone. The images were changed to grayscale images and then to 10 values of black and white using Photoshop, an image manipulation software. The value-adjusted images allowed us to emphasize, understand, and trace the boundaries of value changes. On a second visit to the Alumni Center, luminance readings were taken with the Minolta luminance meter for each area mapped on the tracing. On the same occasion a second set of digital photographs were taken to accurately plot readings on to **visual field maps** (see pg 17 and 19 in findings). This procedure was completed for two locations, the view into the main staircase from the conservatory and the view from the second landing of the main staircase toward the conservatory. This data allowed us to see where the greatest and least levels of contrast exist in the transition zone. Though high levels of contrast were documented, *further* investigation was needed to understand the lack of visual discomfort.

5. **Visual Field Sequence Evaluation**
   The purpose of this experiment was to analyze a series of views experienced by a building user as he or she passes through the transition spaces. The experiment was done on a sunny day in order to document the spaces at high levels of contrast when discomfort would most likely be felt by visitors. The first step in the experiment was to establish the path and duration of travel that occurs through the space. This was established through timed trial runs through the path. Using averages from the trial runs, a total travel time was established as well as points where speed of the traveller tended to increase or decrease due to turns or steps. These points were used as breaks in establishing split times for the total path travel time. Working from each split independently, points were marked in the path representing where the traveler would be on the path every six seconds. The next step was to take a series of images, on a sunny day, with a digital camera (set to auto exposure similar to the human eye) at each six second point of where the traveler might find him or herself looking as he or she moves through the path. This step was then repeated with

a manual 35 mm camera with its aperture set at the exposure appropriate to the stairwell light settings. This procedure with its constant exposure settings allowed photos within this set to be compared with one another, and for constant "base-line" information on brightness for comparison with the first set of auto exposure photos. The second set of images were exactly matched to the first by calling up the series of digital photos on the screen of the digital camera as a reference. The final step was to then compare each digital image to its manual camera photograph counterpart in the series. The purpose of the comparison is to gain a specific insight to actual light level changes relative to the users perception of the same space. The digital images, which are automatically adjusted to the prevailing lighting conditions by the camera, are typically representative of what a user would perceive the lighting conditions to be through the ability of the human eye to quickly adjust to changing amounts of light. This series of images are put against the base line of the manual camera images, which allow a constant aperture and exposure setting throughout the series. These manually controlled images graphically document the change in the amount of light that actually occurs. By then comparing the amounts of white, gray and black in each of paired digital and manual images, numeric and graphic comparisons can be derived to document why the drastic change in light levels may not be as obvious to the user.

COMPARATIVE

In the final stage of the study all the collected data was analyzed and compared to extract findings which would prove our hypothesis. Background research was necessary to provide a comparitive base for our findings and to add formulation of conclusions. The researched areas include: typical adaptation capabilities of the human eye, transition zones in architecture, and contrast ratios tolerated by specific areas of the human eye. Additional research was done by three team members as part of a history/theory component. This research was developed into three papers exploring different aspects of lighting: historical use of daylighting, the evolution of materials and their influence on daylighting, contemporary approaches to lighting (see appendices).

FINDINGS
COMPARITIVE LINE GRAPHS

Comparative Line Graphs were drawn to illustrate the difference in light levels during both sunny and cloudy days. The difference between the light levels on sunny days and cloudy days isn't the focus here. Instead, the important element of data is the similarities of both conditions in the levels of light drawn from the conservatory against their counterparts drawn in the hall and the stairway during the same logging time. The line graphs clearly illustrate, that whether a sunny or cloudy day, on average, the amount of light in the conservatory is still much greater than what is available in the other parts of the transitional space.

Fig. 25

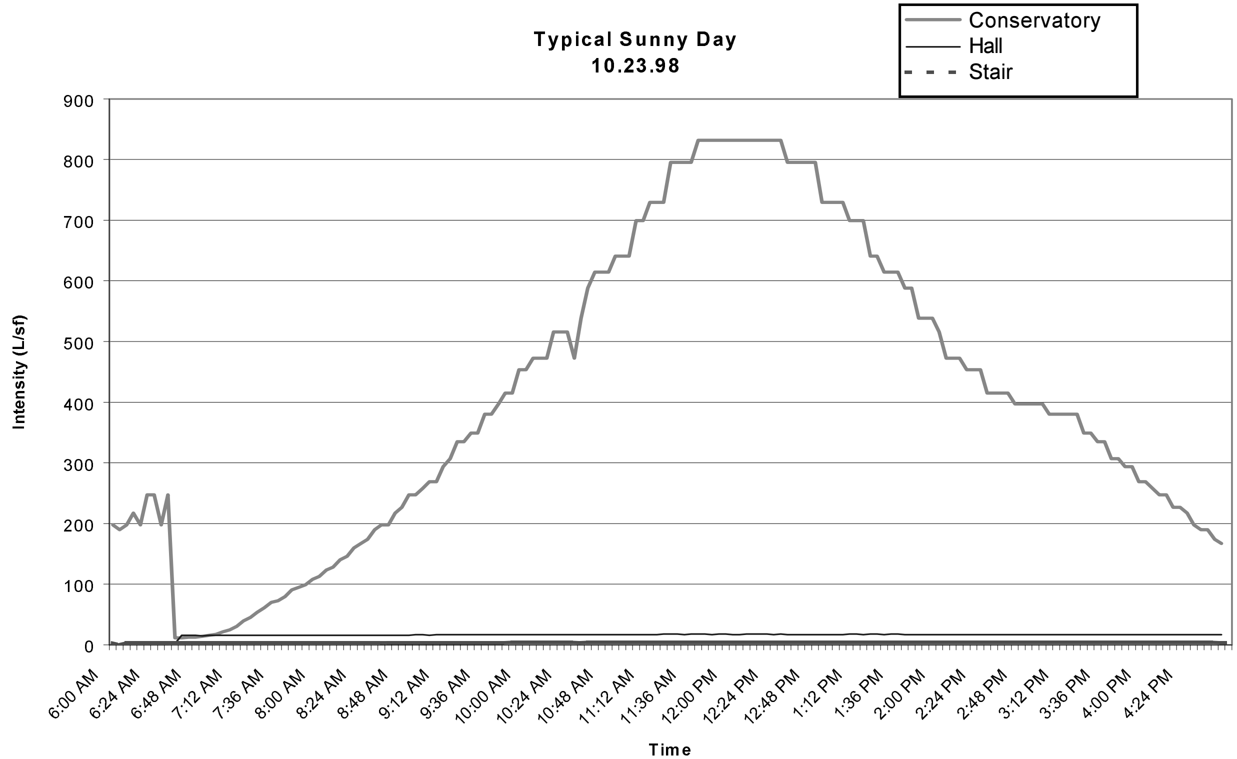
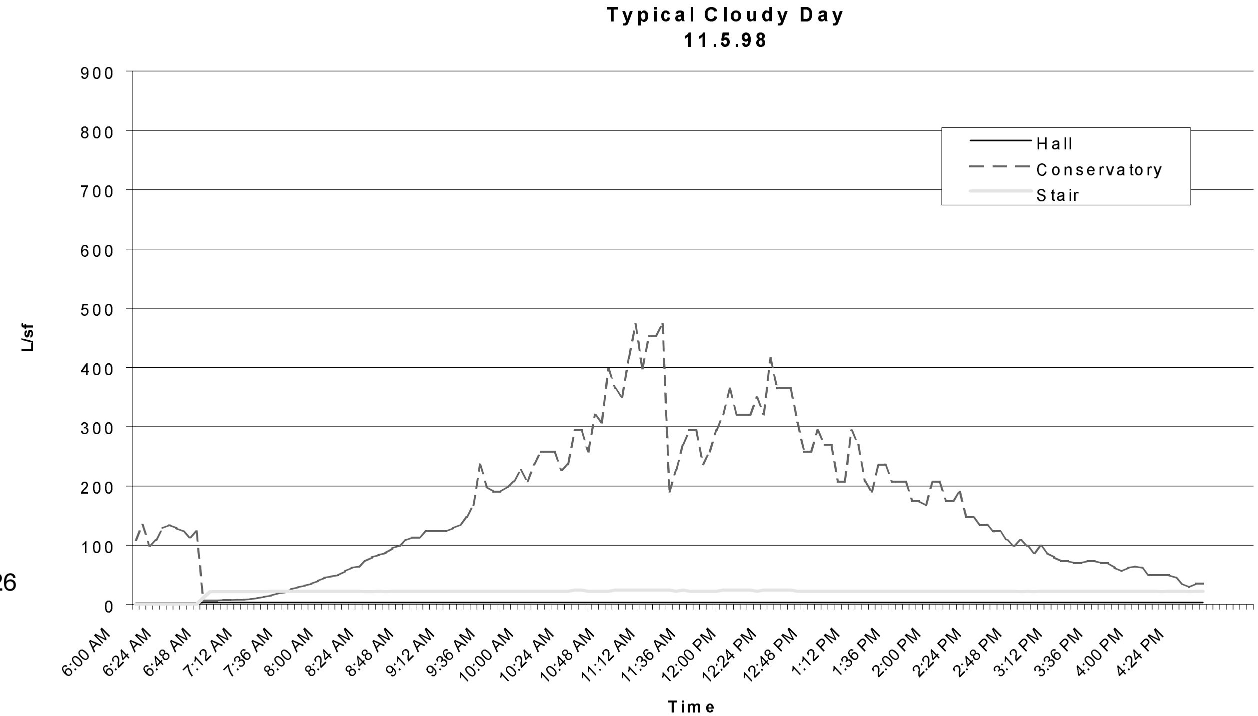


Fig. 26



SECTION LINE GRAPH

This graph was created form the information we obtained by doing comparative illuminance readings. We took a series of illuminance measurements in 2' increments on both a sunny and a cloudy day. The graphs showed that the highest levels of light occurred at the 37 foot mark with a reading of 580 fc. The lowest levels of light occurred at the one foot mark which a reading of 12 fc. By summarizing this graph in a cross section of spaces, we can see where the high and low levels of light occur. We can also see where the changes in light levels occur. The comparison between the sunny and cloudy day reading serve to be contradictory to the finding of the previous experiment. This may be explained by the average light levels that were accounted by the previous experiment and the instantaneous element of this experiment method. Here, the readings may have been recorded during a dark moment within the day.

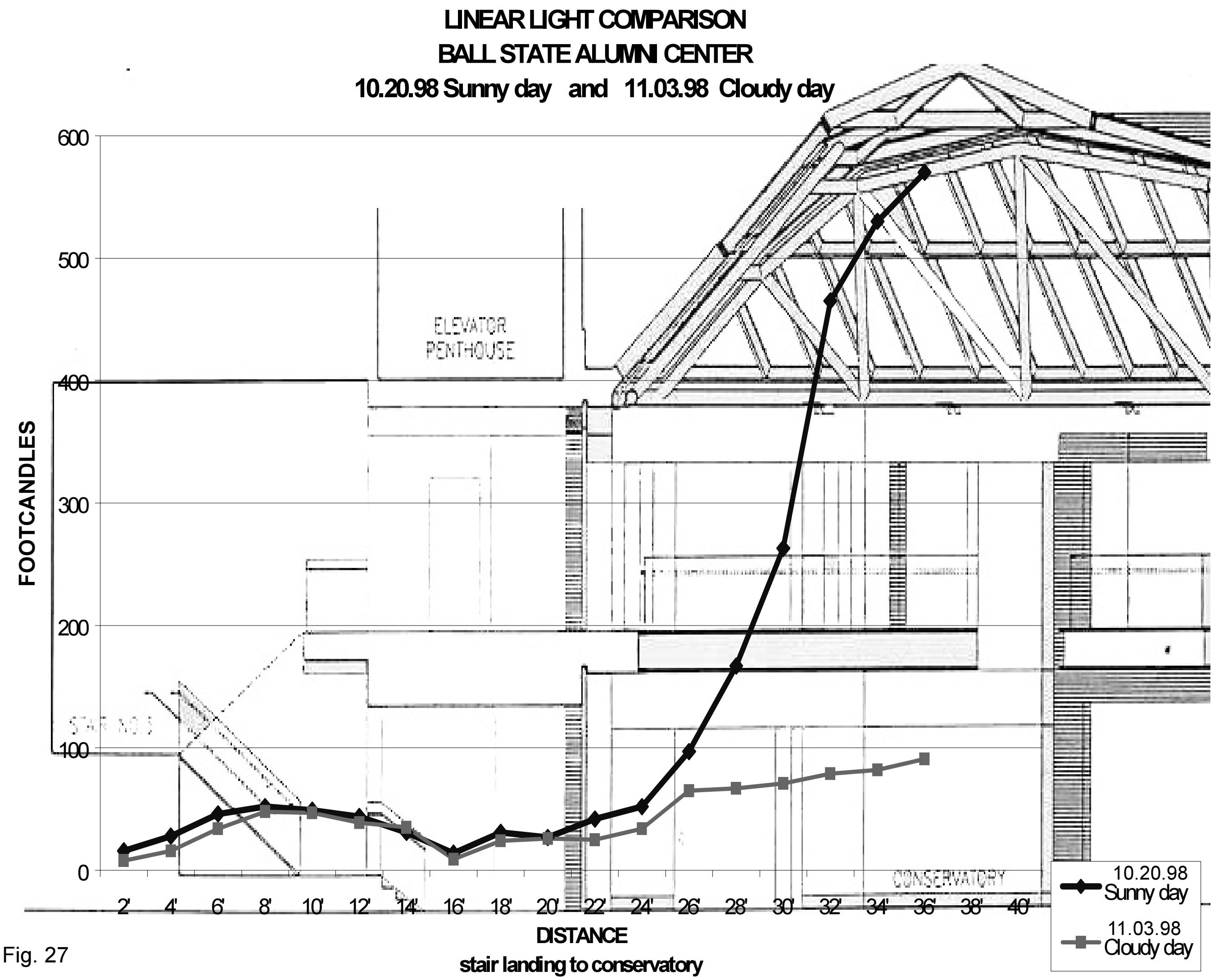


Fig. 27

ISOLUX GRAPH

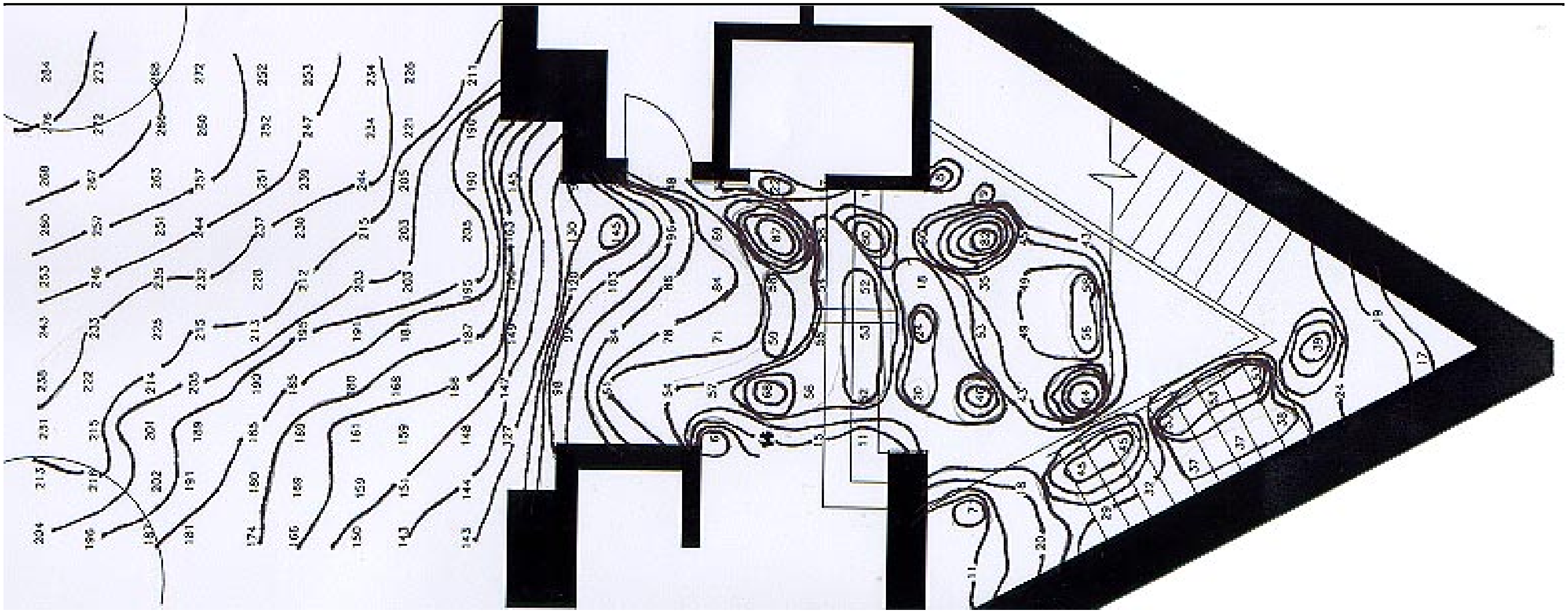


Fig. 28

This graph was created from the information we obtained by doing comparative illuminance readings. We took a series of illuminance measurements in 2’ increments on both a sunny and a cloudy day. The graphs showed that the highest levels of light occurred at the 37 foot mark with a reading of 580 fc. The lowest levels of light occurred at the one foot mark with a reading of 12 fc. By summarizing this graph in a cross section of spaces, we can see where the high and low levels of light occur. We can also see where the changes in light levels occur. The comparison between the sunny and cloudy day readings serve to be contradictory to the finding of the previous experiment. This may be explained by the average light levels that were accounted by the previous experiment and the instantaneous element of this experiment method. Here, the readings may have been recorded during a dark moment within the day.

VISUAL FIELD

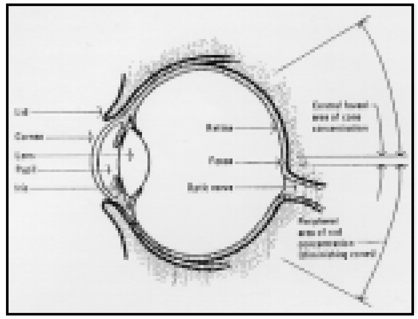


Fig. 30 Section of Human Eye (Flynn)

The functionality of the eye affects how we perceive spaces around us. There are generally three areas of vision: the central foveal vision, the near surround vision, and the far surround vision. The central foveal area of vision is the area of cone concentration, while the peripheral areas are the areas of rod concentration. We used a 35mm digital camera with a 36mm lens to take the photographs which follow. The digital camera lens allows a 61 degree angle field of view. By inserting the digital camera image into the field of view diagram (Fig. 32), we can determine where the photographed image lies within the visual field (Figure 31). The foveal vision lies within only 1 degree of the 180 degree field of view. The ability to distinguish fine detail is achieved when the ratio between the immediate background and the central task is from 1:1 to 4:1. The near surround vision lies within 30 degrees of the field of vision and allows for a contrast ratio of 10:1. While the far surround vision allows for 100:1 and accounts for the rest of the field of view. Figure 32 shows that nearly all of the image falls within the near surround area of vision where 10:1 ratios are acceptable.

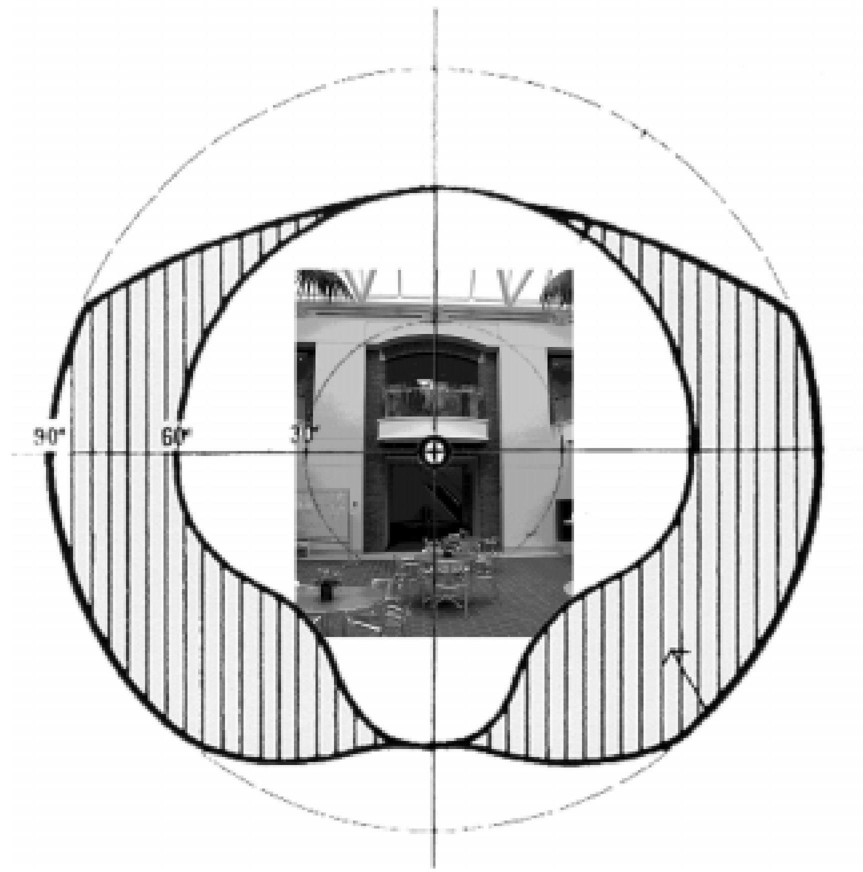


Fig. 32 Visual Field Diagram with Digital Photo (Flynn)

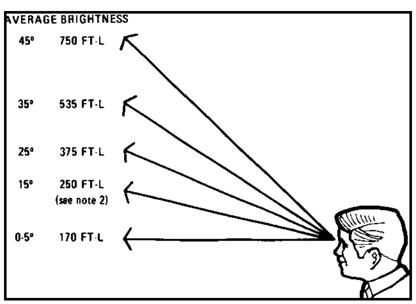


Fig. 29 (Flynn)

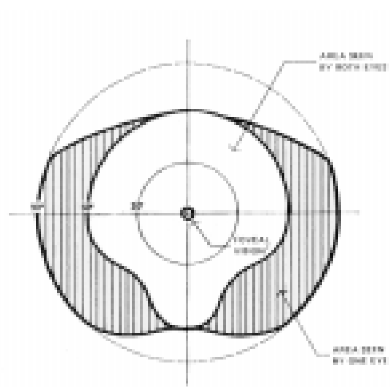


Fig. 31 Visual Field Diagram (Flynn)

Fig. 33A Digital Camera Photograph

Fig. 33B Greyscale Adjusted Digital Camera Photograph

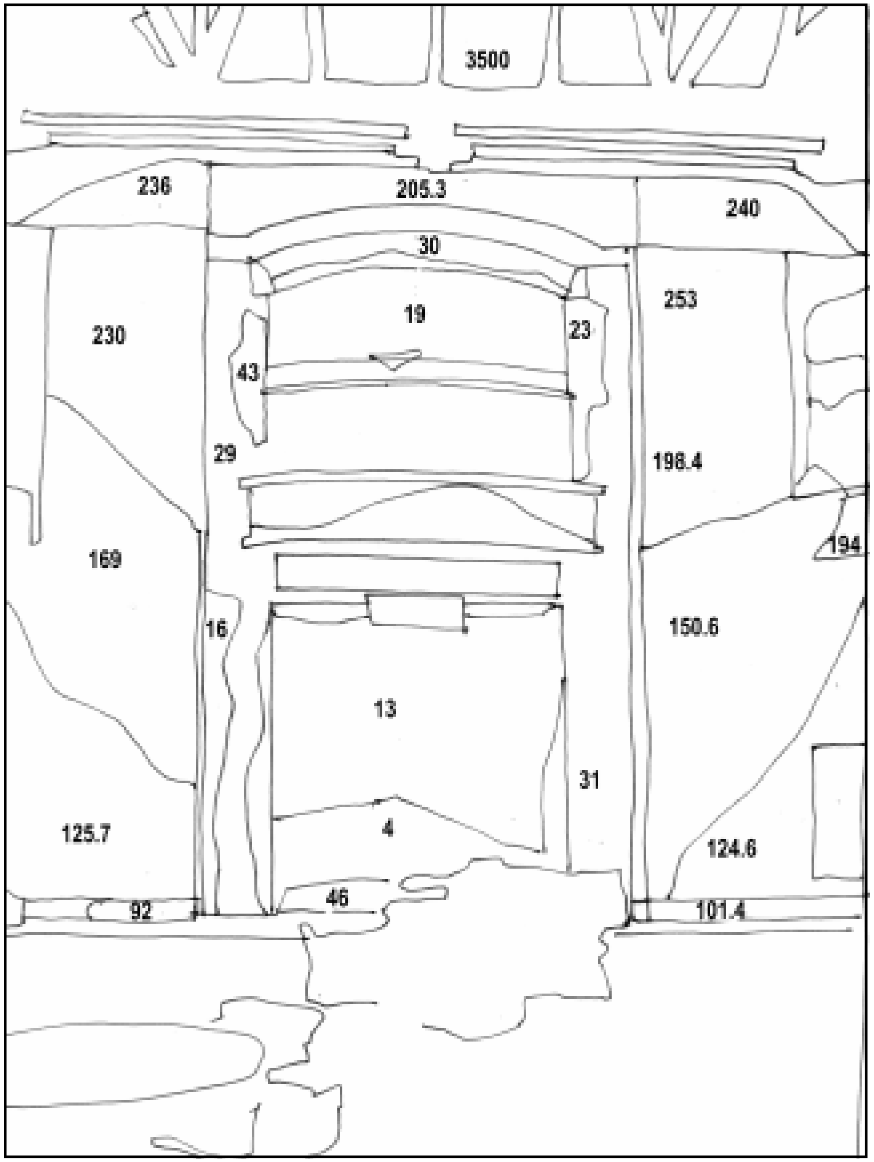


Fig. 33C Visual Field Map

GRAYSCALE IMAGES/ VISUAL FIELD MAPS

With the aid of Photoshop, we created grayscale images from digital camera photographs. The measurements taken with the luminance meter proved that the highest levels of luminance were measured in the conservatory near the skylit ceiling where the reading was 710 foot lamberts. The lowest levels occurred on the stair risers, where the reading was 0.7 foot lamberts.

The series of images to the left illustrate the levels of surface contrast that occur in a view from within the conservatory. Fig. 33A shows the image as it was taken by the digital camera. The use of the grayscaling (see Fig. 33B) starts to illustrate the variation of tones that occur on the surfaces by emphasizing instances of contrast. Fig. 33C isolates the gradation of tones by lines and then assigns these areas a numerical value. Through a quick analysis of the numbers presented here, large jumps in surface luminance occur in adjacent areas. These instances of high contrast could lead a user to experience some visual discomfort. What this image does not illustrate, however, is the fact that the human eye tends to move very quickly and has a tendency to avoid resting on any discomforting areas.

Fig. 34A Digital Camera Photograph

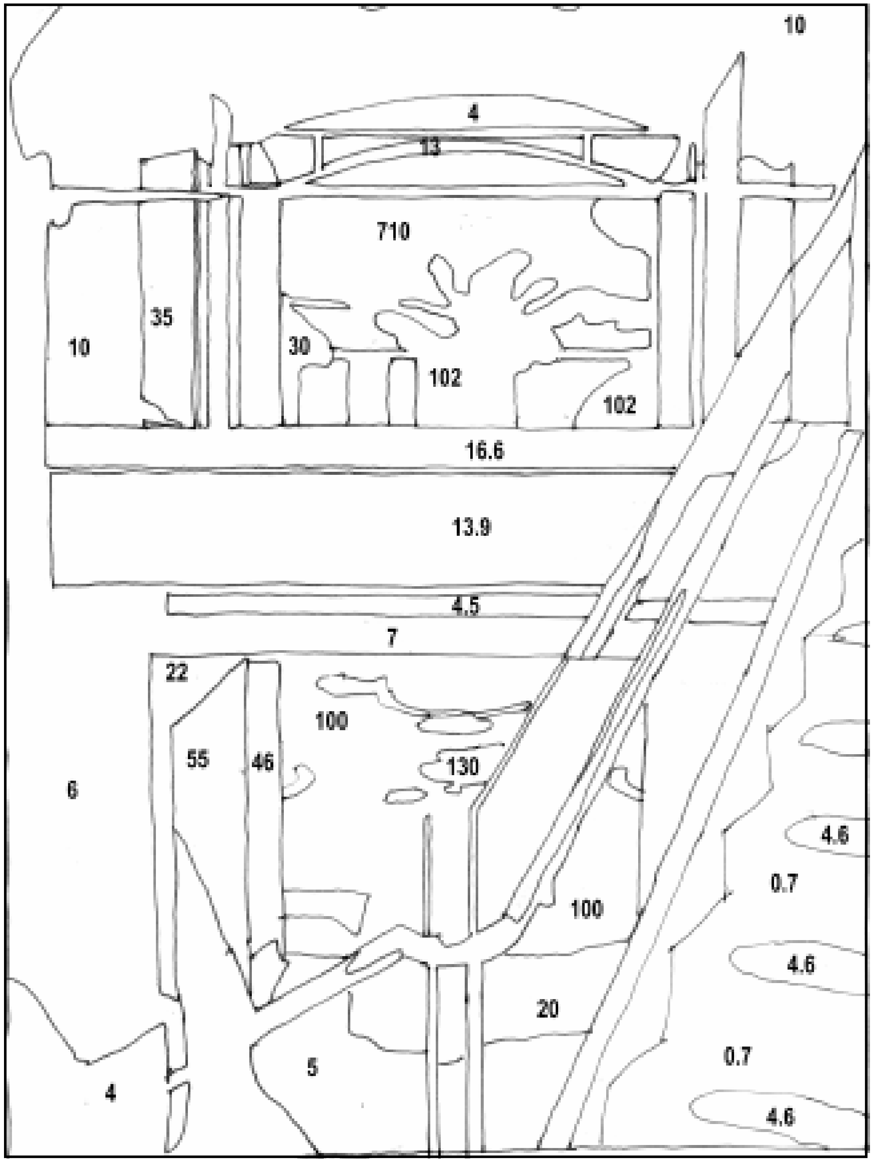


Fig. 34C Visual Field Map

GRAYSCALE IMAGES/ VISUAL FIELD MAPS

The series of images to the left illustrate the levels of surface contrast that occur in a view from within the conservatory. Fig. 34A shows the image as it was taken by the digital camera. The use of the grayscaling (see Fig. 34B) starts to illustrate the variation of tones that occur on the surfaces by emphasizing instances of contrast. Fig. 34C isolates the gradation of tones by lines and then assigns these areas a numerical value. Through a quick analysis of the numbers presented here, large jumps in surface luminance occur in adjacent areas. These instances of high contrast could lead a user to experience some visual discomfort. What this image does not illustrate, however, is the fact that the human eye tends to move very quickly and has a tendency to avoid resting on any discomforting areas. The only time when this may not be the case is when the user stops on the second landing to speak with another person who is back lit by the conservatory; otherwise the user's eyes have no reason to linger at this view, thus, no visual discomfort is felt.

VISUAL FIELD SEQUENCE EVALUATION

In order to establish the points where photographs would be taken several procedures were done. First, we timed ourselves walking through the transitional space ten times, allowing for different speeds of travel. To move through the space it takes an average time of 21.21 seconds. As we began to gain a feel for how people moved through the space, we were able to establish three points where there seemed to be some change in the rate of speed (see Fig. 35). After the points were established, we timed ourselves moving through each of the four series of spaces in order to relate the distance to time. In the first series (see Fig. 35, points A to B) it took an average of 5.71 seconds to travel the 23'8". In the second series (see Fig. 35 points B to C) it took an average of 3.28 seconds to travel the 16'8". In the third series (see Fig. 35 points C to D) it took an average of 4.52 seconds to travel 13'2". In the fourth and final series (see Fig. 35 points D to E) it took an average of 6.55 seconds to travel 17'10".

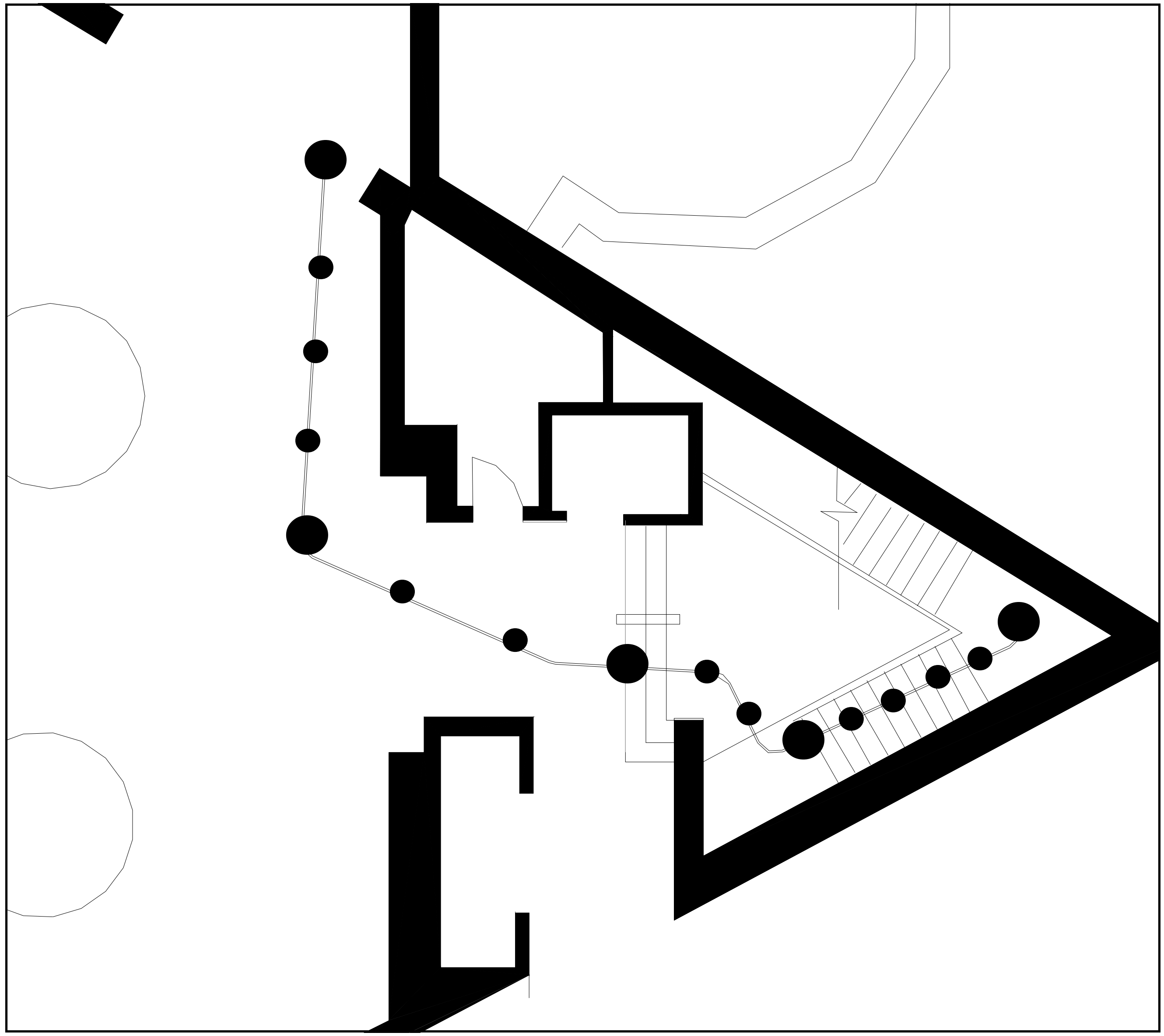


Fig. 35 Keyplan showing path of movement in the transition zone. Large dots refer to series beginning and end points, all dots indicate where photographs were taken.

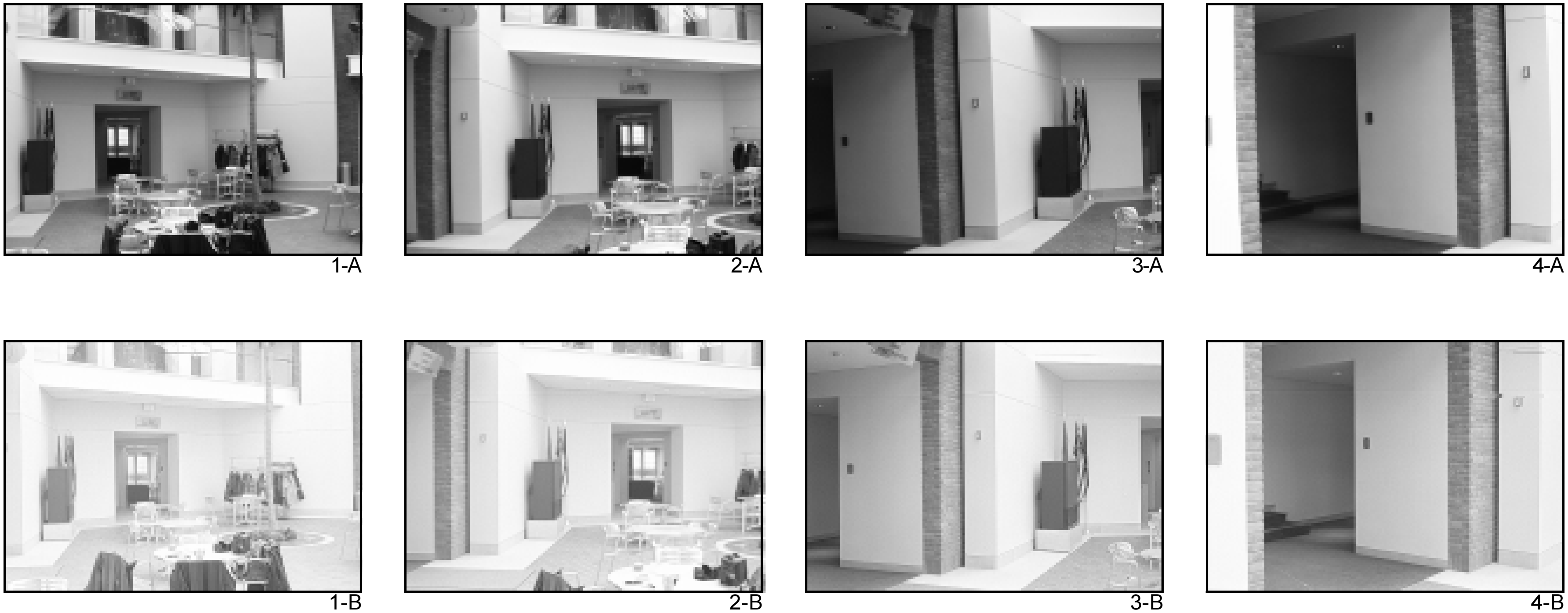


Fig. 36

In the series of images above, the top row of (images series A) were taken with a camera set to use automatic exposure. These images are more representative of what the human eye would perceive the brightness of the space to be. The bottom row of identical images (series B) were taken with a 35 mm manual camera with the shutter speed set to 1/6 seconds (established by the lighting in the stairwell) and the aperture at 6.7. These images represent a consistent baseline brightness.

Images 2-B through 5-B compared to figures 2-A through 5-A illustrate a gradual decrease of actual brightness as one moves from the conservatory area into the hallway.


5-A


6-A


7-A


8-A

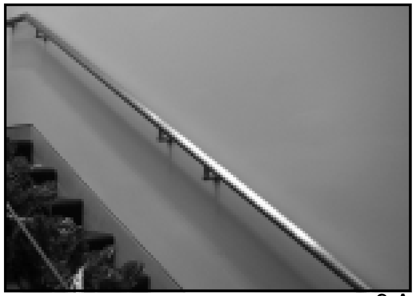

5-B


6-B


7-B


8-B

However, as one comes into the hallway, images 6-A and 6-B illustrate that the perceived levels of brightness are greater than the baseline level. This phenomenon continues until one reaches the stairwell of the Alumni Center. Images 9-A and 9-B illustrate extremely close levels of brightness between measured and perceived. The levels of brightness remain consistently close until the final two images, 16-A and 16-B.


9-A

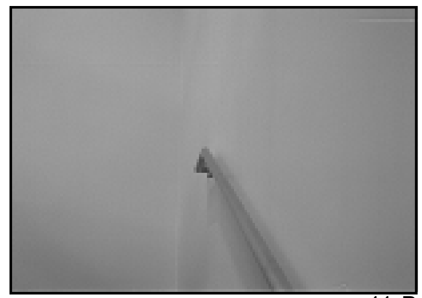

10-A


11-A


12-A


9-B


10-B

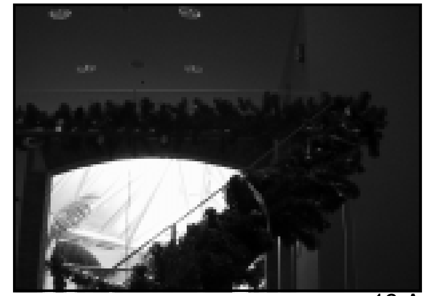

11-B


12-B

13-A

14-A

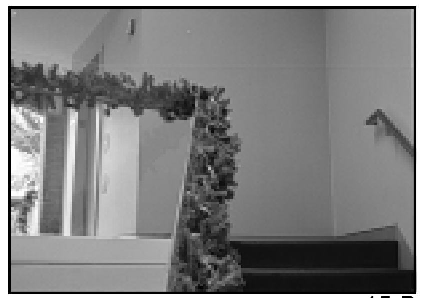
15-A



16-A

13-B

14-B



15-B

16-B

The final two corresponding images, 16A and 16B, depict the view of the conservatory from the stairwell. Image 16B illustrates that a baseline level of contrast exists in the actual levels of brightness. However, image 16A, which represents perceived levels of brightness, reveals a strong degree of contrast. The physical measurements of the space using scientific instruments in Series B, depict the images without the adaptation of the human eye to the field of view.

This comparison explains the glare that occurs from the view as discussed previously on page 17. Images 1-A and 1-B are the first two from the previous series. Together they illustrate the difference between perceived (top) and measured (bottom) levels of brightness.

Image 1-A clearly illustrates tonal difference within and between materials. Shades and shadow bring out where the walls change in direction and difference in tones clearly separate the wall from floor. A wide variety of shadows and tones also delineate objects and furniture within the space and clearly show depth.

Image 1-B is almost completely washed out. Only the three coats at the bottom provide any level of contrast to the image. Changes within the walls are difficult to find, and they instead appear as one smooth wall surface. The chairs and tables begin to blend into the background floor and walls and the image as a whole appears very flat, giving very little depiction of depth.

1-A

1-B

These two images, from the middle of comparison series, illustrate extremely similar levels of perceived (top) and actual (bottom) brightness. The image is seen as one is about ascend the stairs in the Alumni Center. Both images equally illustrate the handrail, as well as the shadow it casts on the wall below. The levels of gray in the wall surface and the darkness of the stairs at the bottom are similar in value.

9-A

9-B

CONCLUSION

This study has resulted in a deeper understanding of the complex issues which affect the way we perceive light. We have concluded at the completion of our research that there is no visual discomfort for the user as he or she moves through the specified transitional space. However, not all of our findings point to this conclusion. Our quantitative measurements do not completely prove our hypothesis.

In our initial studies of the transition space the Stowaway light loggers showed significant differences in luminance levels. Later, our visual field map studies pointed out instances of glare. The findings from these experiments alone would indicate that there *is* visual discomfort within the transitional space. However, we believed that the nature of the previous studies did not completely address the questions raised by the hypothesis. After we made this realization we began to explore the complexities of "visual discomfort". Our final study tried to take into account more of the factors which affect the *experience* of the user as they *move* through the transition.

While not scientific in nature, the final study started to address the factors of time, distance, and view. The documentation of the experience indicated what the user sees as they actually move through the space. In this study two series of images were documented. The first series attempted to mimic the way the human eye would perceive light; the second series however, established a "base-line" by which the first series could be judged. While the methods used to determine which photographs were taken had a scientific basis, the criteria used to compare the photographs were subjective. The comparisons revealed the abilities of the human eye to adapt. The study as a whole reinforced the idea that the evaluation of light within any transitional space is dependent on the movement of the user in that space. Time, distance, and changing views are factors of that movement.

Further studies would investigate each of the factors mentioned above more closely in order to establish a stronger scientific ground. These findiings could be used to arrive at an overall quantative evaluation of the transitional space.

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APPENDICES

PERSONAL NARRATIVES

Dustin Eggink:

"I find the organization of spaces in the Ball State Alumni Center to be successful. The conservatory proves to be an excellent axis point throughout the building in plan and in section. The methods in which the different spaces rotate about the conservatory is good, but is somewhat stagnant. The individual spaces of the building are, on average, successful as volumes. However, the finish materials and detailing of spaces, while of very high quality and craftsmanship, lack a sense of vitality that responds to the overall design. Instead, the detailing and finishes utilized at the Alumni Center seem to be at the higher end of the same upgrade package that has been applied to all the Ball State

Melisa Nielsen:

"The Alumni Center is a much more impressive and aesthetically pleasing building on its interior than on its exterior. The intense light radiating into the heart of the building (the conservatory) through the glass ceiling gives the occupants an immediate sense of light and open space upon entry into the building. It adds excitement and expresses some of the geometrical features of the building. The conservatory ceiling provides an opportunity for introducing additional light into the second floor inner office spaces-spaces that would not receive much light at all if the conservatory didn't exist, because they run along the building's core and not its outer perimeter. I was also impressed with the interior material combinations and finishes. The simple detailing adds a lot of excitement and the furnishings complete the equation. However, it is the conservatory which makes the building special because of the sheer amount of daylight that it introduces into the core of the building. In addition, the three types of glazing used in the ceiling provide added interest, especially when there are shadows and when the sun changes position in the sky as the day progresses."

Arwen Otwell:

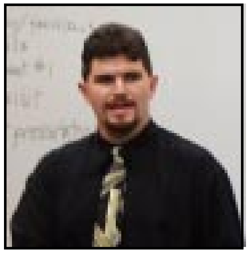
"As I walked through the building for the first time, I was impressed by the building as a whole. The palm trees were an unexpected surprise. There is a lot of glass in the building and I was amazed by the minimal amount of glare. Given the huge amount of light coming from the skylight, I was comfortable even with the metal reflecting light. The triangular shape of the building was sometimes confusing. I liked the mood and feel of the Alumni Library; it was very comfortable. The high ceiling in the ballroom gave an open feeling while the carpeting made it livable. The building looks very modern and angular, but not uncomfortable. I like the building and think it is one of the best on campus."

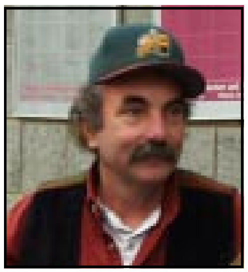
Kristy Rexing:

" During the guided tour on my first visit through the Alumni Center, I found myself intrigued by the deliberate detail of the spaces. From the intricate texture on the walls to the patterned flooring, the design drew the visitor into each room. The grand experience into the conservatory provided additional opportunity for enjoyment from the second level balconies. Although at the time I was unaware of the design concept, several issues were made apparent during the primary visit. The strong geometrical shape structured the plan, and determined the location of spaces. The triangular geometry of the building forced the unique experiences moving from one level to another. The admittance of daylight seemed quite prevalent in the conservatory, and spilled into the adjacent first floor spaces."

Sara Temple:

"In the Autumn of 1996 I followed the construction of the Alumni Center as part of a building technology class project; however, I had not been inside the completed building until just recently. I had always been curious about how the skylight would work in this building and was pleased to find it quite successful. Overall, I found the entire building to be well-executed. I was surprised to see how much attention was paid to the details. The light quality seemed very pleasing throughout the building. While I heard that there was some unhappiness about light levels in the work spaces due to exterior glare, it did not appear to be uncomfortable when I walked through the space. The conservatory light gave energy to the circulation spaces which surround it; however, the light did not read as well inside the offices or down the halls. I noticed right away that the brightness in the conservatory created some contrast with the openings into the adjacent spaces. The conservatory seemed barren and hollow."





VISITING GUEST SCHOLARS

Jeff Sailer:

We were not able to have an individual meeting with Jeff Sailer.

Alison Kwok:

Since this meeting was a very preliminary one, we didn't have a solid hypothesis for Alison to review. However, she had some good input concerning organization and breaking down the project.

Bruce Hagland:

Sara Temple was our only team member who was able to meet with Bruce; unfortunately the project had not moved along enough to have any significant questions. He and Sara talked about the idea of a "transition" space, noting the importance of entry as a strong "transition" space. This helped to see how our study of "transition" related to an extremely critical design issue of entry.

Joel Loveland:

Joel sat our group down and asked us each to write a brief statement concerning what our topic was. This encouraged discussion of the issues that our project is investigating as well as dialogue about the exact procedures that we plan to use to test our hypothesis. Joel agreed with us that a lot of the earlier data is supplemental information and not directly related to testing the hypothesis, but explained that it was okay. Though that information isn't exactly what we are looking for, he emphasized that it is very important as a part of the process that we are going through to obtained the desired information. Joel stressed that data gathering is part of the scientific process, but not to forget our subjective and intuitive analysis.

Marc Schiler:

After explaining our project and our process, Marc commended us for understanding that the perception of space depended on several factors, including: levels of luminance, time and climate, and rate of movement through a space. However, Marc also pointed out that we had not really considered the tasks which had to be performed in the space. He explained that while there may be no visual discomfort merely walking through the space, there might be discomfort if someone were to try and read while walking through. Marc also talked with us about different ways of documenting methodology and conclusions.