AN INVESTIGATION ON THE AREAS AND LOCATIONS OF SUNLIGHT PATCHES IN PATIENT ROOMS

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ABSTRACT

AN INVESTIGATION ON THE AREAS AND LOCATIONS OF SUNLIGHT PATCHES IN PATIENT ROOMS

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Explored in this study were the patterns of direct sunlight received by differently-oriented patient rooms in healthcare facilities. Desktop Radiance 1.02® software was used to simulate conditions in a typical double patient room. The area and locations of sunlight patches on room surfaces were considered as analog indicators for the investigation.

The setting was defined as Ankara, Turkey. Seven orientations and 3 positions of standard-size window openings were studied in different combinations at solstices and equinoxes, from sunrise to sunset on an hourly basis for comparison. Data compiled were statistically analyzed and results for various combinations of orientation and opening position recorded. All these showed that there was no difference in the total amount of direct sunlight received between rooms with different orientations but there was, with different opening positions. Orientation created a difference in the amount of direct sunlight when the room surfaces were studied separately. Rooms with right and left-shifted openings received direct sunlight mostly on walls while those with centered openings received direct sunlight mostly on floor surfaces. Results suggested there were sufficient grounds for further investigation focusing on decisions related to the design of patient rooms, such as layout (*e.g.,* the location of beds) and to choice of surfacing materials, colors and textures.

Keywords: Sunlight, Health, Hospitals, Patient Rooms, Orientation, Opening Position.

ÖZ

HASTA ODALARINA DÜSEN GÜNES ISIGI LEKELERININ ALANLARI VE YERLERI ÜZERINE BIR ÇALISMA

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Bu tez saglik yapilarinda farkli yönlenmis hasta odalarinin aldigi direkt günes isigi miktarlarlarini arastirmaktadir. Iki kisilik tip hasta odasi ortamini görsellestirmek amaciyla Desktop Radiance 1.02 simülasyon programi kullanilmistir. Oda yüzeylerine düsen günes lekelerinin alanlari ve yerleri çalismanin es göstergeleri olarak kabul edilmistir.

Çalisma için belirlenen mekan Ankara, Türkiye olarak seçilmistir. Yedi farkli yön ve standard ölçülerde 3 farkli açiklik tipi, mümkün olan her kombinasyonda, ekinoks (ilkbahar noktasi/sonbahar noktasi) ve yaz/kis gündönümlerinde, günesin dogusundan batisina kadar saat basi alinan perspektif görüntüleriyle çalisilmistir. Elde edilen verinin istatistik analizi yapilmis; farkli yön ve açiklik tiplerinin çesitli kombinasyonlari kaydedilmistir. Sonuçta, hasta odalarina düsen toplam günes isigi miktarlarindaki degisimin farkli yönlemeden degil, farkli açiklik tiplerinden kaynaklandigi saptanmistir. Ancak farkli yönlenmenin, oda

yüzeyleri tek tek ele alindiginda farklilik yarattigi da gözlenmistir. Açikliklari sag ve solda olan odalarda günesisigi çogunlukla duvar yüzeylerine, açikligin ortada oldugu odalarda ise yer yüzeylerine düsmektedir. Bu çalisma, çikan sonuçlara ek olarak, hasta odalarinin tasarimi ve planlanmasinda, malzeme, renk ve yüzey dokularinin seçimi konularinda yürütülebilecek gelecek çalismalara da taban olusturmaktadir.

Anahtar Sözcükler: Günesisigi, Saglik, Hastaneler, Hasta Odalari, Yönlenme, Açiklik Tipleri

To My Family

and

Myndos (Gümüslük)

"Kenti yapan mimar degil isiktir; mavi gök ve denizdir."

Cevat Sakir Kabaagaçli

(Halikarnas Balikçisi)

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CHAPTER 1

INTRODUCTION

In this chapter are first presented the argument for, and the objectives of the study. It continues with the section titled ‘Procedure’, where a succinct account of the basic steps followed in its conduct is outlined, and concludes with a preview of what is embodied in subsequent chapters, under the section titled, ‘Disposition’.

1.1. Argument

Throughout history, the sun has been worshipped by mankind. It has been the major source of light and heat in spaces. Its benefits have been recognized, praised, prayed for, and the potential problems of its presence adapted to (Moore, 1991; 3).

The admission of sunlight to a building is generally regarded as an amenity especially in temperate and northern latitudes. From time to time enquiries and surveys have been conducted to study the needs of people for sunlight in the buildings where they live and work. Attempts have been made to obtain evidence of its physiological and psychological effects with a view towards drawing up prescriptions for sunlight penetration in occupied buildings and these attempts still continue. According to Walsh (1961; 165) and Hopkinson, Petherbridge and Longmore, (1966; 485), who refer to the report of The Lighting of Buildings in London (The Committee of the Building Research Board of the Department of Scientific and Industrial Research), the most convincing argument for the provision of adequate sunlight in buildings is simply the evident desire of their inhabitants to have it.

Today, as a result of recent researches –relevant aspects of which will be discussed in the forthcoming chapters– that have shown the effects of sunlight on people, admission of sunlight in buildings became a subject beyond satisfying a desire, but also a health-related issue.

Since it is neither desirable nor healthy to have sunlight everywhere, all the time, Hopkinson, Petherbridge and Longmore, (1966; 485) and Walsh (1961; 165) mention two distinct technologies for sunlighting; namely, its admission into buildings to meet the expressed requirements of occupants –either for certain times of the year or certain times of the day–; and its exclusion from a building –or at least from some parts of it– when and from where it is not wanted.

There are a number of issues to be addressed when dealing with the admission of sunlight into patient rooms, as stated by Guzowski (2000; 293-294). These require great care and attention especially where patients are bound to beds and have very little control over their environment. According to this author, along with intransigent matters that need resolution at the very onset –such as room orientation, room dimensions, room surface characteristics, and position and size of window–, they include transigent ones –such as time of year and time of day– that need temporal resolution.

It is a matter of record that, in Turkey, the aspects briefly noted above are rarely given their due; not just where healthcare facilities are concerned, but also for buildings at large. Neither Municipal by-laws of Ankara (2004; 65), nor Turkish Building Standards (2002; 25) as yet incorporate specific stipulations on the admission or exclusion of sunlight for buildings.

In view of its benefits in terms of both occupant hygiene and well-being, using sunlight in healthcare facilities, especially in patient rooms was the major concern of this study. Special issues that were considered and methods used to this end are discussed in the following chapters.

1.2. Objectives

Taking into account that sunlight patches on the surfaces of an interior are analog indicators of the presence of sunlight and act as sources not only of reflected light to thereby affect overall illumination levels, but also of glare (Egan and Olgyay, 2002; 92-94), the amount (areas) and the patterns (locations) of these patches were defined as the prime concern of the study. Based on this outlook, specific objectives of the study were:

a) to determine the relationship between orientation and opening position (room types) - if there is any- in terms of its effect on the amount and pattern of direct sunlight received in patient rooms;

b) to test the viability of using areas and locations of sunlight patches on room surfaces - in consideration of their reciprocal relationship to the temporal movement of the sun- as analog indicators for defining potential illumination characteristics; and

c) to thereby arrive at a reasonable basis from which resolving the intransigent –as time of year and time of day– and transgient design issues –as room orientation, room dimensions, room surface characteristics, and position and size of window– of patient rooms would become possible.

1.3. Procedure

The study was designed to define the amount and the patterns of direct sunlight received by patient rooms as simulated by a computer program. The setting was defined to be Ankara, Turkey. The orientations and the types of patient room (determined by three different opening positions) were the variables to be studied and evaluated in different combinations.

Three different types of double patient room (designated T1, T2 and T3, respectively for referral hereafter), facing 3 cardinal (south, east, west) and 4 ordinal (northeast, northwest, southeast and southwest) points of the compass (north was excluded due to the latitude), were studied at the winter and summer solstices (21 December - 21 June) and the vernal and autumnal equinoxes (21 March - 21 September).

The amount of direct sunlight in the patient room was measured by a multi-stage procedure. The first stage of the procedure involved the production of perspective views of the patient rooms to capture the constantly moving sunlight patches over hourly intervals. A computer simulation program, Desktop Radiance 1.02–designed by the Lawrence Berkley Institute, was used to produce the perspectives. In the next stage, these perspective images, showing locations and sizes of sunlight patches, were transferred to AutoCAD 2000 and the area of each such sunlight patch calculated. Therefrom, the results of the area calculations were statistically analyzed to determine significant combinations of orientation and opening type, if any.

1.4. Disposition

Including introduction and the conclusion, this thesis consists of five chapters.

The Introduction gives the argument and objectives of the study together with a brief overview of its general procedure.

The second chapter consists of a concise literature review which mainly focuses on the relationship between sunlight, medicine and architecture. Discussions related to sunlight in healthcare environments, especially in patient rooms, are supplemented by discussions on the psychological and physiological effects of sunlight on Man.

Chapter 3 overviews the study material and method. In the former are described the positions of openings (room types) and orientations in patient rooms. In the latter are then described the simulations, the computer program used, area calculations for the sunlight patches on the surfaces of patient rooms and the tests of hypotheses.

In chapter 4 are given results of the study, with brief discussions on their significance in terms of different room types (opening positions), orientations, and dates.

The last chapter, the Conclusion, interprets the findings and presents four proposals in order to guide hospital designers on decisions related to the positions of opening positions, the orientation of patient rooms and the relationship of these two. Possible future approaches and developments that can be founded upon this thesis and related areas for future research are also noted.

CHAPTER 2

LITERATURE REVIEW

This chapter provides a basis for the study conducted with a total of twenty one references being covered. These have been ordered such as to present the relationship of sunlight, medicine and architecture, and sunlight in healthcare environments, especially in patient rooms. It is believed that these constitute adequate grounds on which the study could be based.

2.1. Sunlight, Medicine and Architecture

In this section is presented the historical background of sunlight in architecture, and its effects on human health. The significance of sunlight in architecture is confirmed through discussions on the physiological and psychological aspects of sunlight in detail. The use of sunlight in healthcare environments is also discussed.

2.1.1. Historical Background

Light is essential to life on earth. Directly or indirectly, most species are dependent on the radiance of the sun since sunlight provides energy for photosynthesis and the perpetuation of the food chain. It also produces sensory stimulation and provides signals that regulate growth, development and homeostasis apart from maintaining a viable ambient temperature as mentioned by Brainard, Hanifin, Hannon, Gibson, French and Rollag, (1996; 380-397).

Sunlight has been used as therapy for thousands of years. In the following paragraphs, Hobday (1999; 37-53) illuminates the historical background of sunlight use, from the ancient world to present time.

The author mentions that the sun-gods and goddesses of the ancient world were worshipped as deities of medicine and were believed to perform miracles of healing while bringing enlightenment and truth. The ancient Greeks refer sun bathing to heal many diseases, while the Romans used to believe in the healing powers of sun rays and benefited from it as a kind of preventive medicine. However, as stated by the author (1999; 83-110), with the fall of Rome and the rise of Christianity, sunlight therapy fell from favor and the knowledge on the healing powers of the sun disappeared from the collective consciousness of Europe for over a thousand years.

Vitruvius, as referred to by the author (1999; 129-148), believed that knowledge of medicine was essential for an architect to be able to select healthy sites for cities and for, buildings in the cities and careful design of public buildings such as theatres and temples to prevent illness, and street planning could help cure chronic sicknesses such as tuberculosis. Vitrivius described how the solar architecture of dwellings should be adapted to suit different climates of the Roman Empire:

> “One type of house seems appropriate to build in Egypt, another in Spain…one still different in Rome, and so on with lands and countries of other characteristics. This is because one part of the earth is directly under the sun’s course, another is far away from it, while another lies midway between these two… it is obvious that designs for houses ought similarly to conform to nature of the country and to diversities of climate.”
>
> Vitruvius ‘On Arhitecture’

The idea that those buildings which admit sunlight are healthier than those which exclude it is a very ancient one. It is even pointed out with a proverb, ‘Where the sun does not go, the doctor does’.

The author (1999; 129-148) notes that sunlight was valued for its anti-bacterial effect, as a defense against disease, and for its promotion of cleanliness, as it enabled the occupants to see dirt and dust. According to the same author, architects were encouraged to allow sunlight into their buildings, which emphasized health and hygiene and became what was known as modern architecture. Many of the leading architects were involved in sanatorium designs The late 20th Century witnessed the decline of many infectious diseases and the advent of hygienic concerns with the invention of antibiotics, and health, supported with the admission of sunlight to indoor environments. However, as the author (1999; 129-148) mentions, the sunlit, well-ventilated spaces which were popular at the beginnings of the 20th century, were replaced by artificial lighting and ventilation systems until the 1970's, when solar architecture was reintroduced in for the purposes of energy conservation rather than health.

At the present time, as the author mentions (1999; 37-53), hazards rather than the benefits of the sunlight are being discussed, since people have forgotten how to attune themselves to natural cycles as our ancestors once did. Nevertheless, as mentioned by the author, the fulfillment of physiological and psychological needs; being strengthened by the stimulus of change, and weakened by monotony, are all depend on the greatest agent of change in our lives, the sun.

2.1.2. Psychological Aspects of Sunlight

Guzowski (2000; 293- 294) mentions the vast amount of references in literature on the capacity of the sun in lifting the spirits. However, until quite recently, very little was known about the actual effects of sunlight on human health; how and why it works has yet not been completely answered. According to the author, humans have a psychological need for light which is integrally related to and influenced by the physiological mechanisms of the body. As stated by Hobday

(1999; 17-36), though sunlight may, paradoxically enough to cause cancer, it has the potential to play a key role in preventing and healing a number of serious degenerative and infectious diseases.

As documented by Hobday (1999; 17-36), light controls the moods and regulating sleep patterns, body temperature, digestion and sex drive by the hormones being secreted. Another author, Leslie (2003; 381-385), refers to a recent work at The Lighting Research Center in Renssealaer Institute in Troy, NY; indicating the suppression of melatonin hormone that regulates the internal clock of the body or its circadian rhythm, is influenced by exposure to light levels typical of daylight which are above normal electric levels in buildings. Zilber (2005; 1-2) clarifies the link between light deprivation and depressive illness by referring to a study of a multi-disciplinary research team at the National Institute of Mental Health and a researcher at Bell Laboratories in 1980. According to the author, it was discovered that visible light, its presence or its lack, can affect our mood through neuro-physiology, based on cognitive perception and, possibly sub-conscious perceptions.

Guzowski (2000; 293-294), Egan and Olgyay (2002; 45) who all define Seasonal Affective Disorder (SAD), as a seasonal recurrence of depression that is frequently associated with fall and winter months, also state that decreased light levels, shorter days in these months and geographical location (higher latitudes) are factors contributing to this illness. Hobday (1999; 17-36) refers to recent studies showing that SAD patients have an abnormality in the hypothalamus, which bright light can reverse. According to this author, when light levels fall, serotonin production also falls and melatonin production increases; and since bright light rectifies serotonin levels, sunlight and light therapy are proven to be effective in the treatment of SAD.

According to Terman, Fairhaust, Perlman, Levitt and McCluney, (1986; 438-443) many modern living and working environments, where natural daily illumination patterns are either absent, inadequate or modified lead to harmful effects on health, mood, sleep and productivity. Both Hobday (1999; 17-36) and Guzowski (2000; 293- 294)–who referring to Dr Brainard for pointing out the conflicts between the amount of light to satisfy the biological needs of humans and the recommended light levels for certain tasks–believed that the amount of light needed for a given is being much less than what the body needs for its physiological function, is actually equal to biological darkness which contribute to reduced performance and depression. Both authors believe that it is a challenge for designers to meet both functional and biological needs, although there is very little encouragement.

2.1.3. Physiological Aspects of Sunlight

Lam (1986; 23) states that a number of physiological mechanisms in man respond either directly or indirectly to sunlight and its artificial equivalents. The author adds that most of these responses are indirect ones, relying either on the transmission of light by photoreceptors in the eye to neural signals, which in turn affect bodily functions, or transmission from the skin.

Biological Rhythms - Circadian Rhythms

As stated by Guzowski (2000; 293- 294), apart from permitting sight, light also regulates body rhythms. According to Hobday (1999; 17-36), Vinall (1997; 141) and Egan and Olgyay (2002; 45), it is the daily cycle of light and dark which acts as the external time keeper that regulates important hormonal and biochemical processes of the body and keeps this system running smoothly. Guzowski (2000; 293-294) mentions the presence of over 3000 references on the effect of light on human chrono-biology, i.e., the investigation of biological rhythms or time-related cycles. The author also itemizes some important cycles, such as the circadian rhythm, or the human sleep-wake cycle; Infradian rhythms, hibernation, migration, menstruation, and reproductive cycles; Ultradian rhythm, 90 minutes sleep cycles and hormone rhythms; and Tidal rhythms, behaviour of organisms, genetic activity, hormone releases, which are all influenced by environmental factors such as sunlight, noise and other stimulants and depressants. Hobday (1999; 17-36), Zilber (2005; 2) and Egan and Olgyay (2002; 45) all mention de-synchronizing of these physiologic cycles in the absence of time cues from the sun, manifest by light and dark.

Dermal Effects: Tanning, Sunburn, Skin Cancer, and Vitamin D

The most widely-recognized benefit of the sunlight, as stated by Hobday, (1999; 17-36), is the activation of vitamin D production by exposing skin to the sun's ultraviolet rays, as tanning. Egan and Olgyay (2002; 44-46) and Guzowski (2000; 293- 294) mention the significance of Vitamin D, as its role in the absorption of calcium is essential for the growth and maintenance of teeth and bones, the activity of immune system and for many other metabolic functions. According to Hobday (1999; 17-36) limited exposure to summer sunlight usually results in high levels of cholesterol and vitamin D deficiency, which then cause rickets and osteoporosis.

According to Hobday (1999; 17-36), who refers to medical literature published in Eastern Europe, exposure to sunlight increases oxygen in the blood and the amount of growth hormone in the blood stream while strengthening the immune system by increasing white blood cell counts in the blood stream.

Egan and Olgyay (2002; 44-46) mention the importance of attuning oneself to benefit from sunlight by considering the hazards as well, since sunburn causes skin thickening, skin wrinkling and other irregularities, even skin cancers if it is intensely repeated.

Germicidal Aspects

Egan and Olgyay (2002; 44-46) stated that ultraviolet radiation is very effective in killing bacteria, molds, yeasts and viruses and its efficiency depends on wavelength, specific susceptibility of the organism, duration of exposure, and amount of radiant flux. Authors pointed out Alvar Aalto's tuberculosis sanatorium in Paimo, Finland, which is naturally disinfecting with its south-oriented porches allowing patients to bask and benefit from the germicidal rays of the sun.

Among several studies focusing on the germicidal aspects of sunlight, Hobday (1999; 83-110) points out the one by Dr. Downes and Blunt, which was done in the late 18^{th} Century and showed that sunlight was a lethal agent, even through glass. Another study by Koch, a physicist and bacteriologist, showed that sunlight was lethal to bacteria causing tuberculosis.

Although the use of sunlight remains effective, as stated by Egan and Olgyay, (2002; 44-46), modern applications such as the use of germicidal lamps placed either in ductwork to provide disinfected air is more likely in recent years.

2.2. Sunlight in Healthcare Environments

This section covers what sources have noted about the characteristics of healing environments and about sunlight as a component of healing. The effective use of sunlight in healthcare environments and in patient rooms is also covered.

2.2.1. Fundamentals of Healing Environments

As pointed out by Schweitzer, Gilpin and Frampton (2004; S-71-S-83), since the beginning of history, people have sought havens that were not only safe, but also supportive of both the treatment and the healing of illness or injury; where natural or supernatural forces can become a vital part of recuperative process. The same authors state that the components of an environment that optimizes physical, mental and spiritual healing for the individual needs of patients come up from a variety of backgrounds and cultures, and with vastly different beliefs and attitudes about illness and health.

Wayne and Chez (2004; S-1-S-6) define healing as the process of recovery, repair and return to wholeness, while Linton (1992; 121) states that healing involves the mental, emotional and spiritual aspects of being a human and the sources primarily from within but also from outside the patient. Healing, according to Guzowski (2000; 291-292), is a continuing process of connection, or reconnection, that people bring into their lives and is deeper and more far reaching than curing, though both are closely related. Capra, who was quoted by the author, stated that human health is integrally related to the environment;

> "… our experience of feeling healthy involves the feeling of physical, psychological and spiritual integrity, a sense of balance among the various components of the organism and between the organism and its environment"

The physical environment, as stated by Malkin (1992; 10-43), is often viewed as a stressor linked with disease processes and its potential to enhance therapeutic goals has been grossly underemphasized. Schweitzer, Gilpin and Frampton (2004; S-71-S-83) note that even in the 19th Century Nightingale had recognized the negative effects of hospitals and had pointed out important design clues regarding crowding, light admission and ventilation. The same author then note that without due consideration to the physical and psychological well-being of the patients modern hospitals become noisy, cluttered institutional environments with primary emphasis on diagnosing, curing, and treating.

Wayne and Chez named environments, that the social, psychological, spiritual, physical and behavioral components of healthcare are oriented toward support and stimulation of healing and the achievement of wholeness as, Optimal Healing Environments (OHE) in which light – both natural and artificial light – was mentioned to be a significant component. Schweitzer, et al. (2004; S-71 - S-83) also specified physical parameters that were found to have an impact on health influencing the behavior, actions and interactions of patients. Light (natural and artificial), personal space, the sensory environment (sound/noise, temperature), environmental complexity, fresh air and ventilation, color, viewing nature, experiencing nature, arts, esthetics and entertainment, was mentioned to be a positive distraction. Another scholar, Malkin (1992; 10-43) defined these parameters as air quality, thermal comfort, noise control, light, privacy and views of nature.

As stated by Linton (1992; p. 121), hospitals therefore need to recognize and consciously work with the mind/body/spirit connections, apart from constituting a model of curing with the latest technologies. According to Jonas and Chez (2004; S-1-S-6), healing can be made easy through the development of proper attitude and intentions in both providers and recipients, the use of personal self-care practices, and the creation of healing relationships. The authors claim that, the new vision of medicine will integrate diverse approaches from around the world for the enhancement of well-being and the treatment of chronic illness. Malkin (1992, 10-43), adds that the new front line for healthcare design will be the creation of healing environments which are likely to unite body and mind with modern technology and quotes Schuchman and Wikes (1992; 10-43),

> "Currently in medicine everything is technology, testing and procedures. Instead of listening with their ears, doctors spend too much time with their stethoscopes"

Linton (1992; 121-122) goes on to state that the eternal quest of humankind seems to be the search for self, for peace of mind and for peace of heart. Healing seems to occur when people get back on the path in this particular quest.

2.2.2. Sunlight in Healthcare Environments

According to Vinall (1997; 141), while sunlight and daylight were used in the healthcare environments both for the functional and for health issues until the middle of 1800's, this aspect eventually become neglected towards the end of

1900’s. As a result, the natural rhythms of sunlight and daylight or the natural biological rhythms of patients were forgotten or hardly considered in healthcare designs thereafter.

Hobday (1999; 129-148) notes that for a long time, only few medical administrators including Florence Nightingale were supporting high levels of natural light in hospitals. They believed that sunlight and fresh air had paramount importance in providing a healthy environment for the ailing, and they were responsible for some of the first sunlit hospital wards. According to Nightingale–as referred to by the same author–hospital buildings were central to the healing process as places where the ailing would be restored to health as quickly and effectively as possible under the supervision of medical staff. Further, that she was an advocate of ‘pavilion plan’ hospitals which were single-storey ward blocks placed parallel to each other and had extensive glazing on both sides, allowing them to be cross-ventilated and illuminated by sufficient sunlight to stop hospital infections. According to the author, Nightingale stipulated a number of conditions to be satisfied for the creation of a healing environment, noting that they could only be satisfied by a competent architect:

> “No ward is in any sense a good ward in which the sick are not at all times supplied with pure air, light and a due temperature. These are the results to be obtained from hospital architecture and not external design or appearance. Again, no one of these elements need be sacrificed in seeking to obtain the other. Anyone who feels himself in difficulty in realizing all three may rest satisfied that hospital architecture is not his vocation.”

On the other hand Schweitzer, et al. (2004; S-71-S-83) point out that in recent years, healthcare design has begun to include aesthetic aspects with an effort to support health and healing processes by reducing stress and anxiety and by increasing patient satisfaction. Marrberry (1997; 166-179) refers to Horton–who defines light as an element of environmental design that has an impact on health–to mention the decisive physiological and psychological effects of solar radiation on occupants of all ages especially on the ailing who require a prolonged stay indoors and sanitary properties of it.

The orientation of the building on the site, in relation with the floor plans and openings, were claimed to be the key decisions for the controlled admission of plenty of sunlight and daylight for all patient rooms and for public spaces in hospitals, by the author. Marrberry (1997; 166-179) reminds that lighting needs of patients, of medical personnel, of visitors and of maintenance workers might usually be contradictory, so that it must be handled accordingly.

2.2.3. Sunlight in Patient Rooms

The light/dark cycle is mentioned as the major entraining factor for humans and mammals by Vinall (1997; 141), unfortunately mealtime, social activity, sleep/wake cycle and light/dark cycle are all affected and stress occurs when an individual enters hospital for a treatment. Thus, besides the stressful aspects of being hospitalized, the patient also has to contend with the unneeded stress resulting from his/her environmental cues, cues that maintain normal rhythmicity.

Vinall (1997; 141) states that light synchronizes most of the biological systems of the body and is of central importance in the rest/activity rhythm where the neurotransmitters, serotonin and melatonin are believed to involved. According to the author, serotonin production peaks in the mid-afternoon and bottoms out during the night while melatonin, acting as a sedative, an analgesic and as a anxiolytic, has just the opposite rhythm and its production is very sensitive to light, to stressors such as immobilization, to cold, to noise and to novel settings– all of which a patient faces in hospital environments.

The combination of increased light during the wake period and decreased light during the sleep period in the hospital environment is suggested by (Heschong, 1999) to enhance sleep quality and speed recovery, since insufficient light exposure has been shown to be the cause of fragmented sleep. The author also mentions the results of studies on nursing home patients and hospitalized and healthy youths, proving that increased daytime light exposure, measured by duration and intensity, has an impact on night-time sleep quality.

Vinall (1997; 141) states that the lght levels in a typical patient room usually range from 50 to 750 and rarely over 1000 lux, which is often too low during the normal wake period if compared with levels that are as high as 100.000 lux at noon–on a bright sunny day–and too high during the sleep period, when viewed in the context of what is needed for a healthy healing environment. In such a condition, the author states that patients would experience sleep disturbances caused by dysfunctional circadian rhythms, depressive states, persistent fatigue, a low functioning immune system, and an increased recovery time following treatment, especially surgery.

Opinions about sunlight are divided. According to Longmore and Neumann who were cited by Dalke, Littlefair, Loe and Camgoz (2003; 60), 91% of patients thought having sunlight in patient rooms was a pleasure but 62% of staff thought it was nuisance. As stated by Hobday (1999; 30-35), patients like sunlight since it gives warmth and is seen as having a therapeutic effect.

Among a number of studies on the significance of sunlight in healing, the one conducted in the obstetric ward of a tropical hospital was pointed out by Schweitzer, et al. (2004; S-71-S-83), recorded a significant increase in the rate of neonatal jaundice from 0.5 % to 17 % when the amount of sunlight entering into a ward was decreased by the installation of exterior sun shading devices.

Another experiment mentioned by Beauchemin and Hays (1996; 49-51), conducted at the psychiatric inpatient ward of Mackenzie Health Sciences Centre in Canada, where half of the patients were placed in bright and sunny rooms and the other half in dull rooms. It was recorded that the lengths of stay of depressed patients in sunny rooms were on average 16.9 days, compared to 19.5 days for those in dull rooms, since the former group of patients were in advertently getting light therapy and the latter not.

Apart from the natural cycles experienced by the human body and psychology, and the preferences related to the presence of sunlight in patient rooms, visual comfort of the patient is another crucial issue. The penetration of sunlight into a room and its arriving to patients eyes, either directly or indirectly (reflections from the surfaces of the room), also creates “visual noise”, glare, and must be controlled (Egan and Olgyay, 2002; 10).

CHAPTER 3

MATERIALS AND METHODOLOGY

The two aspects of the study cited in the chapter title above are presented here as discrete sections. The first covers succinct descriptions of the subject material–including criteria used in its selection–and a detailed iteration of specific data derived therefrom. The second, then, gives an account of the operational procedures used for deriving the data in question as well as for its compilation and subsequent analysis.

The section on material is comprised of three subsections explaining physical characteristics; namely patient rooms, openings and orientation; while that on method, of three, which are sampling procedure, data compilation, and data evaluation, presented in this order.

3.1. MATERIAL

The research was conducted as simulation modeling. Patient rooms with three different opening types, namely right-shifted, centered and left-shifted openings; were oriented towards seven different orientations excluding north only.

3.1.1. Patient Rooms

The location of the facility, housing the patient rooms was defined as Ankara, Turkey; more specifically, 39° 55' north latitude and 32° 50' east longitude (http://www.timeanddate.com, 2005). A room intended to accommodate two patient beds with a floor area of approximately 27 m^2 and an aspect ratio of roughly 1:1.2 was chosen as the study medium (Figure 3.1). The choice was made in accordance with norms suggested by Turkish (TSE – TS12813, 2002), and American Standards (De Chiara and Callender, 1990; 469). Only basic configurational parameters of the room were used in the simulation. Neither the functional organization of the room (entrance hall, bathroom and bed positions) nor the layout of furnishings was included as these were considered aspects of peripheral to the investigation.

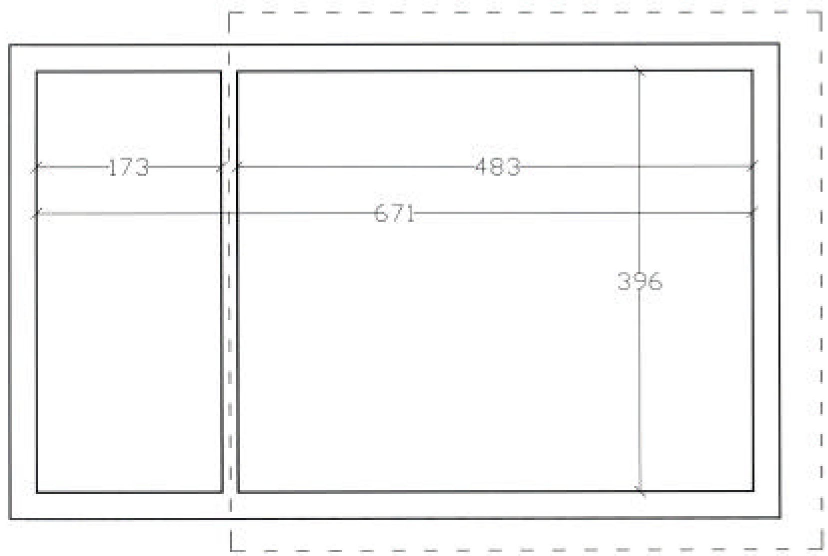


Figure 3.1: Plan of the patient room.

3.1.2. Openings

Three different positions of openings were used for the simulation study. Among several classifications mentioned in the literature, a composite configuration was found to remarkably coincide with those most commonly used for healthcare buildings in Turkey (eds. Kizilay and Coskunoglu, 1997). This composite configuration was derived from the classifications of both Ching (1996; 185-187) –who defines them as Openings Between Planes, Openings At Corners and Openings Within Planes (Figure 3.2)–and from Egan and Olgyay (2002; 110-

111)–who define them as Upper Section, Middle Section and Lower Section openings (Figure 3.3). These were adopted here, but re-named as 'right-shifted openings', 'centered openings' and 'left-shifted openings'; and all three were considered to be on the middle horizontal axis of exterior walls (Figure 3.4).

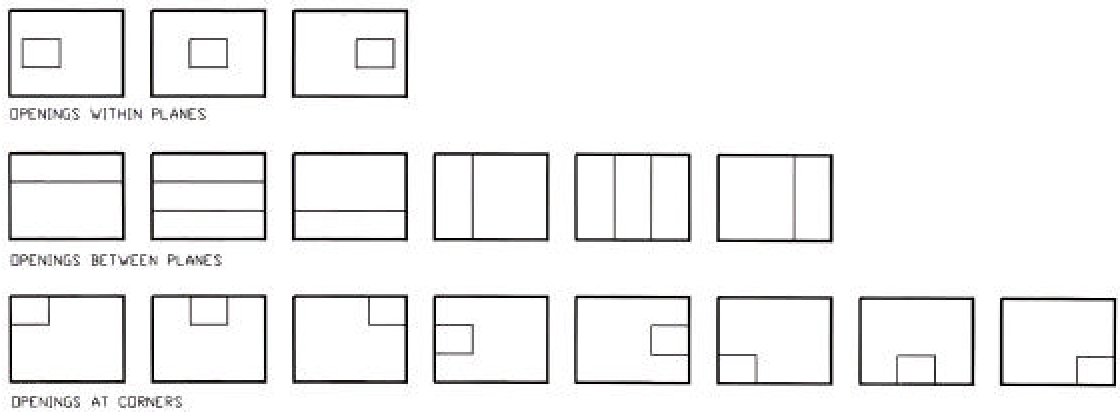


Figure 3.2: Classification of openings according to Ching (1996).

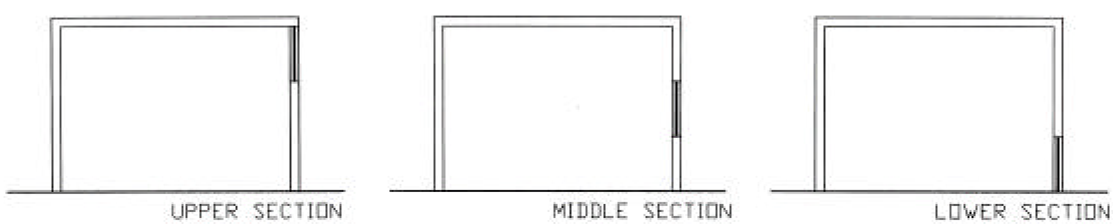


Figure 3.3: Classification of openings according to Egan and Olgyay (2002).

The size and lateral position and the cill height of the window openings, on the external walls are the same in all three. The size of window openings was determined in reference to the Municipal by-laws of Ankara (2004; 65), according to which they are required to be between 1/8th to 1/12th of overall room area. With due regard to heating concerns, the ratio here was accepted as the mean of the two, at 1 to 10. In addition, windows were considered as uninterrupted single planes of glass, without window frames.

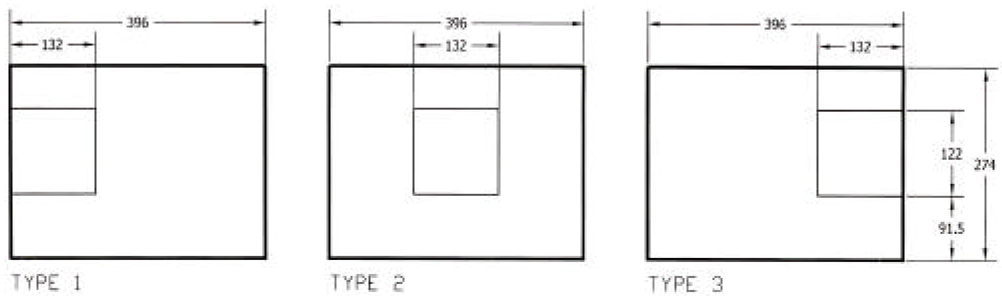


Figure 3.4: Interior elevations of window walls in patient rooms:

Type 1: left-shifted opening;

Type 2: centered opening;

Type 3: right-shifted opening.

3.1.3. Orientations

Each of the three patient room types-designated T1, T2 and T3, respectively,–for referral hereafter–were assigned to a total of seven orientations, comprising the three cardinal (south, east, and west) and the four ordinal (northeast, northwest, southeast and southwest) points of the compass as shown in Figure 3.5; the latitude in question precluded a north orientation.

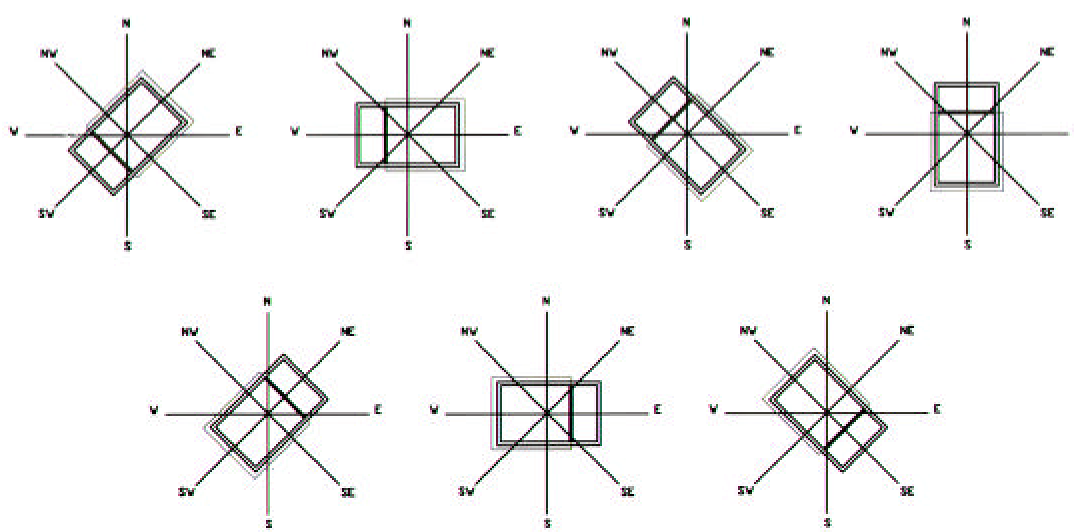


Figure 3.5: Patient room orientations.

3.2. METHOD

The method of the research was constructed to analyze direct sunlight in patient rooms. The sunlight patches on the surfaces of rooms were produced and observed by using a computer simulation program. Although sunlight patches on surfaces can both act as light sources and analog indicators of the illumination levels in rooms, they can be sources of glare as well (Egan and Olgyay, 2002; 94). Therefore, the amount (area) and the patterns (location and path) of sunlight patches on the surfaces were the major concerns of the study.

3.2.1. Data Compilation Process

Simulations were conducted for rooms with different orientations and opening positions at hourly intervals –with integer increments after sunrise up to sunset– on the four principal dates of the year; namely two equinoxes (21 March and 23 September, respectively) and two solstices (21 June and 21 December), with all in local time, for the latitude and on the dates in question (http://www.timeanddate.com, 2005). Specifically:

- patient rooms were first composed using the software cited;
- the perspective views were then produced within this medium to capture relevant sunlight patches on room surfaces;
- the perspective views were subsequently transformed into image files and studied in AutoCAD 2000® for area calculations;
- areas calculated (the raw data) were compiled in table that listed a total of 21 rooms for the 3 different opening positions and the 7 orientations;
- the table itself was designed to enable recording hourly changes in the patterns of sunlight patches on room surfaces on each of the four dates considered (Appendix A).

3.2.2. Simulation Program: Desktop Radiance 1.02

Patches of sunlight on patient room surfaces were produced and recorded by means of Desktop Radiance 1.02® for Windows® software, as developed by and made available through the courtesy of the Lawrence Berkley Institute (http://radsite.lbl.gov/deskrad/download.htm, 2005).

Radiance was developed in UNIX operating system in 1988, for the accurate predictions of the distribution of light in architectural spaces, and it has been continuously refined and validated since then. It uses a combination of ray tracing and radiosity algorithms to determine to luminance and illuminance values, which are then processed to produce photometrically accurate renderings. Desktop Radiance was developed afterwards, to make the Radiance simulation easier to use on the desktop computers which are used by the majority of the designers (Papamicheal; 2005).

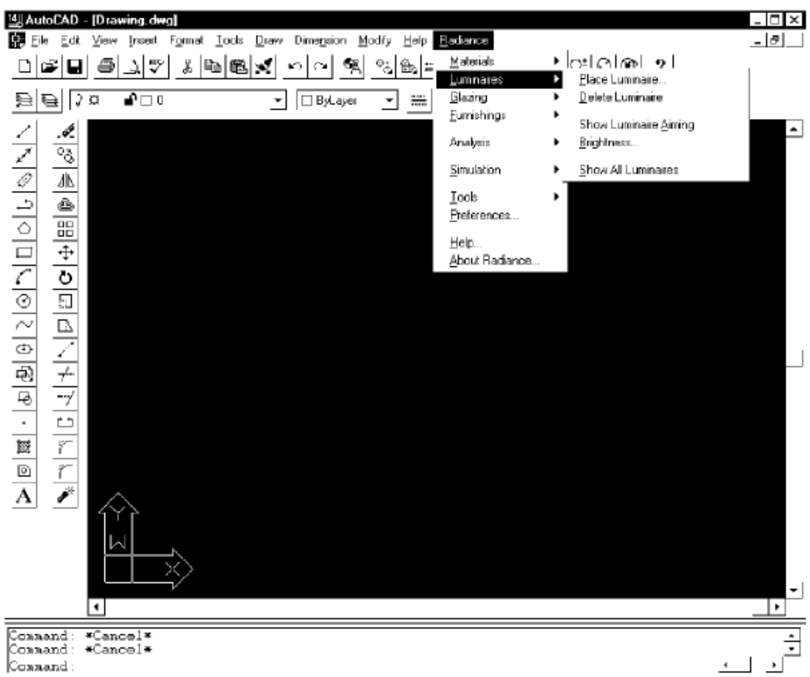


Figure 3.6 AutoCAD R-14 used as a front end to the Desktop Radiance modules (Papamicheal; 2005)

Desktop Radiance 1.02® is a plug-in module that works with other popular computer aided design (CAD) tools such as AutoCAD 14 and 2000 (Figure 3.7), using pull-down menus, to provide the user interaction and 3D modeling capabilities. The 3D model can then be detailed appropriately using the Desktop Radiance library of materials, glazing, luminaries and furnishings. These libraries are accessible through a graphical user interface (Figure 3.8) and include an editor for user-defined materials. A simulation control interface allows user to choose the location of the space, sky conditions and turbidity (Figure 3.9). Once the model is complete, then the analysis parameters such as camera views or reference point calculations (Figure 3.10) are defined. Finally a rendering or a point calculation is set up using the simulation menu commands that initiate the export of the geometry and analysis parameters (Figure 3.11). Through the simulation manager (Figure 3.12), users can control, duplicate and modify simulations. (http://radsite.lbl.gov/deskrad/download/userman10.pdf, 2005) (Papamicheal; 2005).

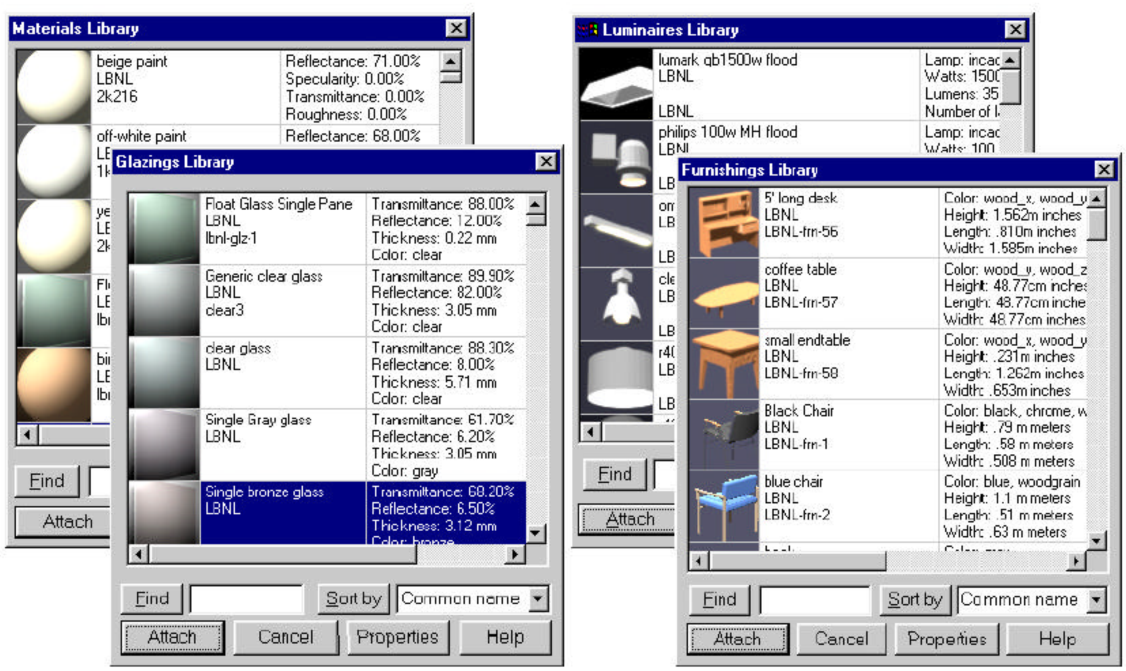


Figure 3.7 Material, glazing, luminaries and furnishing libraries of Desktop Radiance (Papamicheal; 2005)

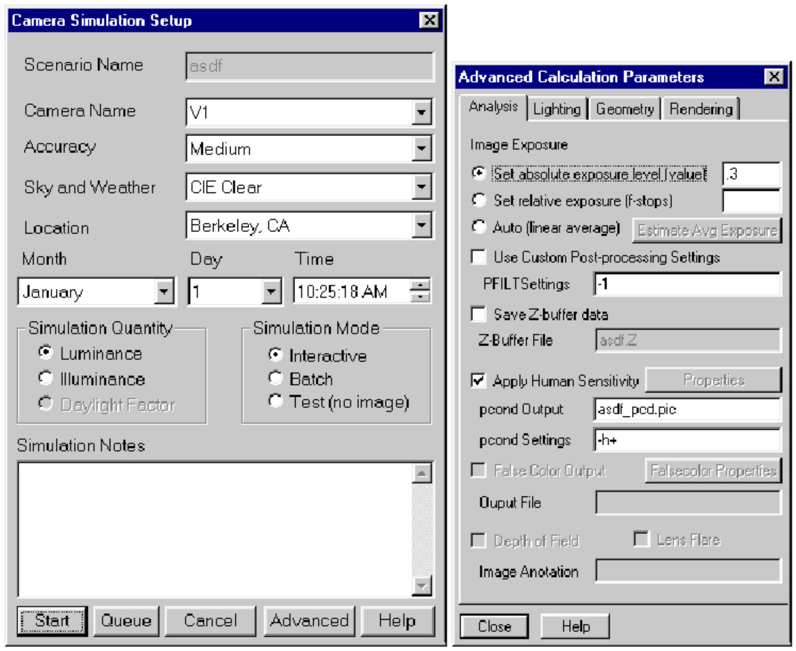


Figure 3.8 Simulation setup and advanced calculation parameters (Papamicheal; 2005)

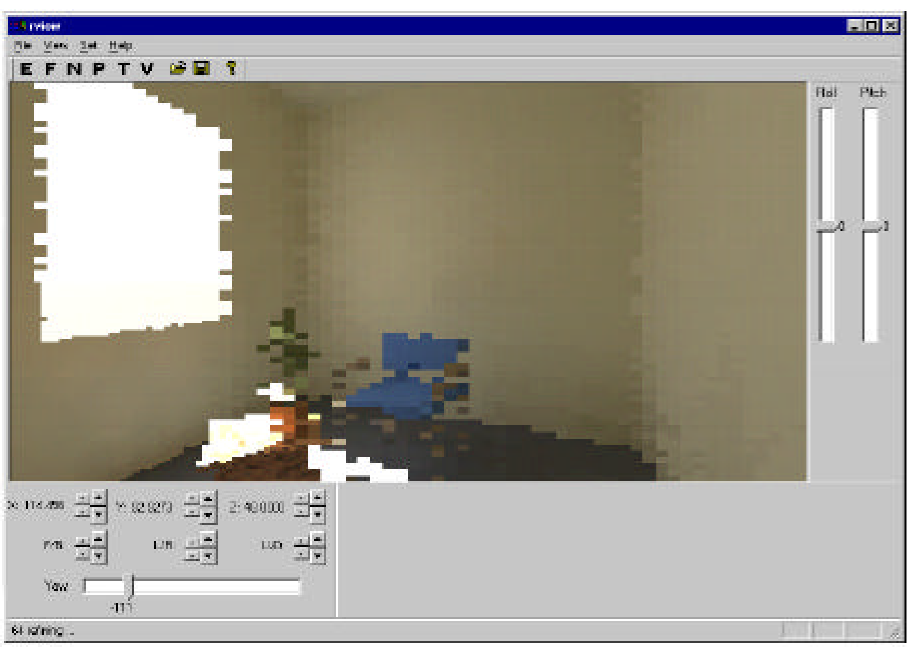


Figure 3.9 Desktop Radiance allows users to view pre-computed radiance images (Papamicheal; 2005)

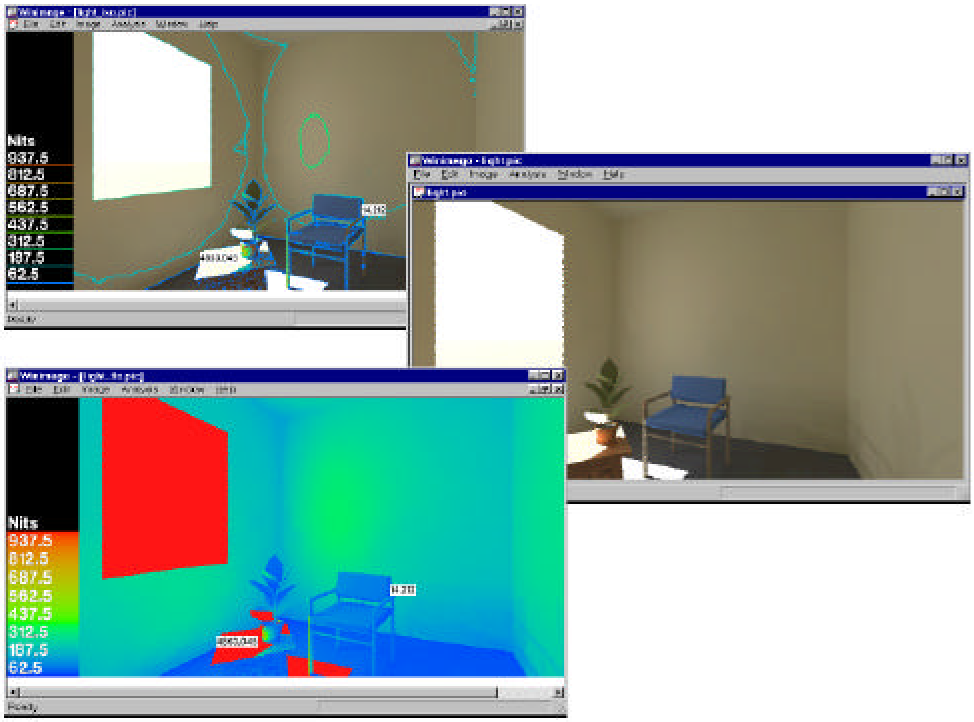


Figure 3.10 Desktop Radiance allows users to view pre-computed radiance images (Papamicheal; 2005)

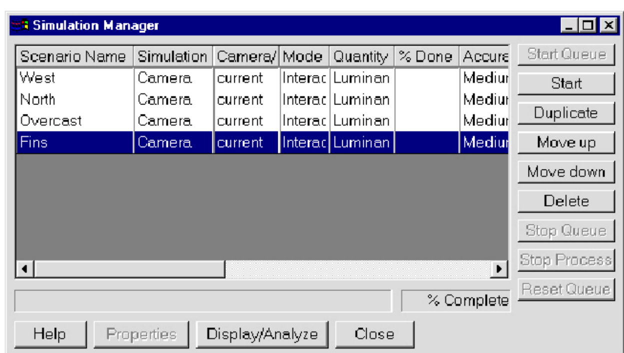


Figure 3.11 Simulation manager allows users to manage and control multiple simulations (Papamicheal; 2005)

Compagnon (2004), Papamicheal (2005) and Byran (2006), mention that Desktop Radiance is more accurate in predicting illumination levels than any other program available today, because its calculations are based on true energy balance equations. Lau and Mistrick (2006) and Byran (2006), also mention that Desktop Radiance produce excellent renderings, falsecolor images but contours are difficult to read. According to Compagnon (2004), besides being a powerful visualization tool, it is also one-well established in the research community, as borne out by its use for similar analyses in several projects.

3.2.3. Simulation

Since the major concern of the simulation was to capture sunlight patches on room surfaces, neither the color nor the material on these surfaces was a matter of concern at this stage of the study. Surfaces were therefore randomly chosen from the materials and colors library of the program merely to enable it. Accordingly, the material with 36.7% reflectance, 0.00% specularity, transmittance and roughness and with a manufacturer's code 1k 127 was specified for walls and ceiling and, another, with 31.50% reflectance, 0.00% specularity, transmittance and roughness, with a manufacturer's code 7k 712 for the floors, while clear single glazing was specified for windows (Figure 3.6). On the same grounds, sky condition was chosen as being 'clear' and turbidity level in the atmosphere as 2.0.

Figure 3.12: Patient room surfaces

To permit subsequent referral, room surfaces with potential for receiving direct sunlight were given in letter designations of A, B, C, and D to represent–in this order–the left-hand wall, the right-hand wall, the rear wall and the floor when facing the window opening (Figure 3.7).

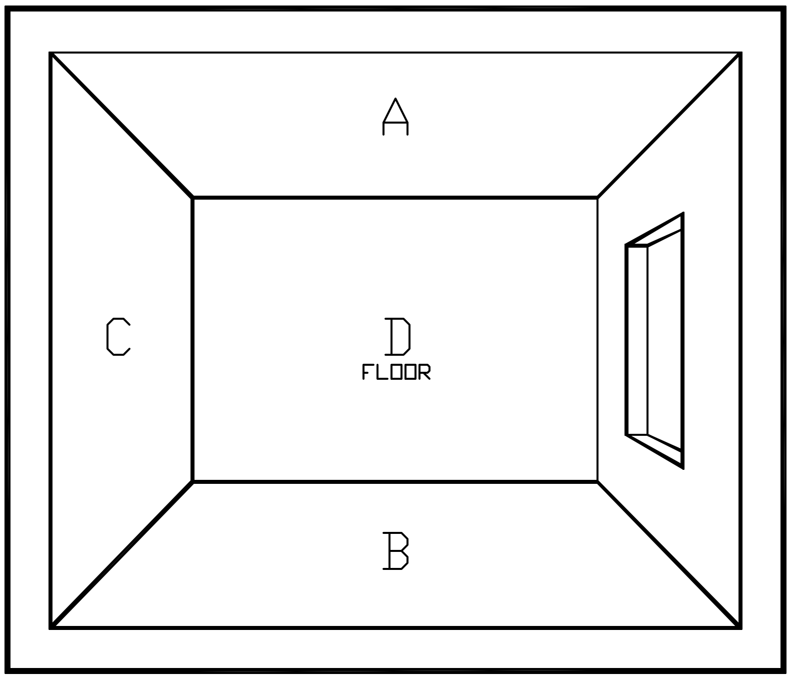


Figure 3.13: Wall specifications for patient room (looking from the top)

Four cameras were placed at specific points in the room to follow the path of sunlight patches on these surfaces throughout the day. Their positions were chosen to minimize inherent perspective distortion–and to thereby improve both the accuracy and the reliability of the area calculations to be made from–as much as possible. For walls, these were on their centerlines, with the optical axes of the cameras normal to the wall under observation at a height of 1.37m (4.5’) and for the floor directly above the intersection of the two wall centerlines, all at a distance of 3.95m (13’) away from their subject surfaces (Figure 3.8).

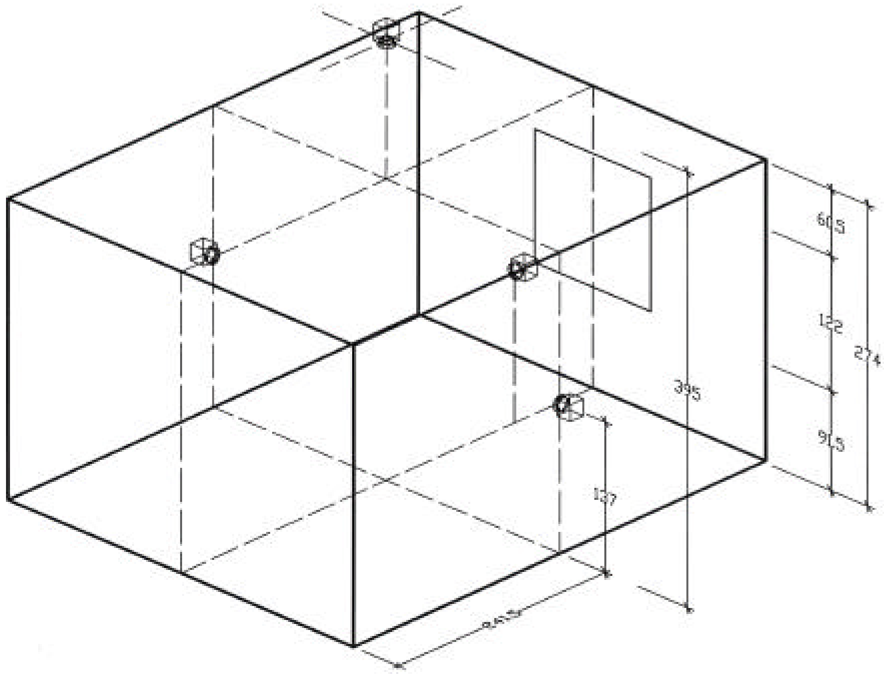


Figure 3.14: Camera setup for patient room

3.2.4. Area Calculations of Sunlight Patches on Surfaces

Actual areas of sunlight patches appearing on the surfaces of rooms had to be calculated in a number of steps. First, the perspective views produced by Desktop Radiance 1.02® were converted to image files. Not being vector drawings, however, these could not be used direct for calculation purposes. To enable this, each patch in each perspective view was then drawn individually in AutoCAD 2000® as a polygon. However, when reopened in this medium, it was found that the images were out of scale. The discrepancy was overcome by a simple correction factor (d) based on the known true area of the surface in question and defined as the product of this area (e) and that of the patch without scale (ß), divided by the area of the surface without scale (?), to give the ratio:

$$d = e * ß / ?$$

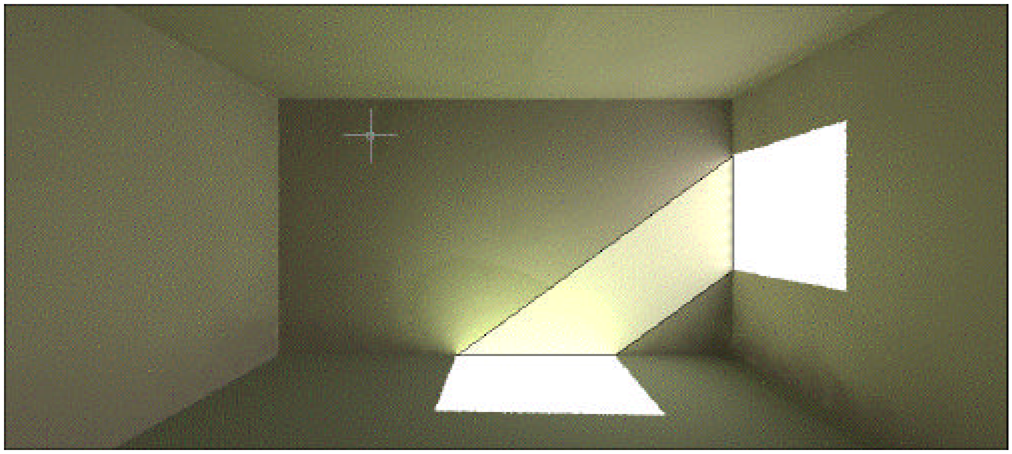


Figure 3.15: Perspective given by Desktop Radiance for the sunlight patch on wall A of room T1, oriented due west, at 18.00 hrs. on the summer solstice (21 June).

One such perspective view –with its corresponding planar projections– for room T1 at 18.00 hrs., when faced west on the summer solstice, is given in Figure 9 as illustration. Finally, due to the fact that both programs used ran under the imperial system of units, all data compiled from these calculations were converted into those of the metric system.

3.2.5. Test of Hypotheses

Tests of hypotheses were performed on data from simulation modeling–ordered from general to specific–for determining whether or not any significant relationships existed between the amounts of direct sunlight received by rooms and their types, orientations, specific dates. Moreover, surfaces in general, as walls and floors; and in specific, A, B, C, and D individually analyzed for the areas of sunlight patches. Hypotheses were:

- The total amount of direct sunlight received by room T2 is not different than rooms T1 and T3,

- The amount of direct sunlight received by walls and floors (surfaces in different axis) is not different in all room types,
- The total amount of direct sunlight (sum of all surfaces) received by differently oriented rooms is not significantly different from each other, due to the sun's symmetric path in the sky,
- The amount of direct sunlight received by the individual surfaces (A, B, C and D) of differently oriented rooms is not different from each other.

Here, the variable, *areas of sunlight patches*, were assigned to a number of germane 'treatments' consistent with the basic factors defined for the investigation and one-way and two-way analyses of variance (AnoVa) conducted thereon as H_o: $t_i = 0$ at a = 0.05. Student's t-test, as H_o: $\mu_1 = \mu_2$ was used where tabulation gave only two treatments. These analyses were done using SPSS 13® software for Windows®, wherefrom significance is determined on the basis of P-value outputs. These comprised AnoVa on the variable for:

01) all dates, hours and orientations on all surfaces (A+B+C+D), by room type;
02) all dates and hours on all surfaces (A+B+C+D) at each orientation, by room type;
03) all dates and hours on all surfaces (A+B+C+D) of each room type, by orientation;
04) all dates, hours and orientations on wall surfaces (A+B+C) and floors (D), by room types;
05) all dates and hours on wall surfaces (A+B+C) and floors (D), at each orientation, by room type;
06) all dates, hours and orientations on wall surfaces (A+B+C), by room types;
07) all dates and hours on wall surfaces (A+B+C) at each orientation, by room type;
08) all dates and hours on wall surfaces (A+B+C) of each room type, by orientation;
09) all dates, hours and orientations on floor surfaces (D), by room types;

10) all dates and hours on floor surfaces (D) at each orientation, by room type;
11) all dates and hours on floor surfaces (D) of each room type, by orientation;
12) All dates, hours and orientations on Wall A, Wall B, Wall C and D (Floor) separately, by room type;
13) All dates and hours on Wall A, Wall B, Wall C and D (Floor) separately, of each room type, by orientation;
14) all dates, hours and orientations on wall A, by room type;
15) all dates, hours and orientations on wall B, by room type;
16) all dates and hours on Wall A, at each orientation, by room type;
17) all dates and hours on Wall B, at each orientation, by room type;
18) all dates and hours on Wall A of each room type, by orientation;
19) all dates and hours on Wall B of each room type, by orientation;
20) the effect of room types and orientations on the total areas;
21) the effect of room types and orientations on wall surfaces (A+B+C);
22) the effect of room types and orientations on Wall A;
23) the effect of room types and orientations on Wall B;
24) the effect of room types and orientations on Wall C;
25) the effect of room types and orientations on floor surfaces (D);
26) the effect of room types and dates on the total areas;
27) the effect of room types and dates on wall surfaces (A+B+C);
28) the effect of room types and dates on Wall A;
29) the effect of room types and dates on Wall B;
30) the effect of room types and dates on Wall C;
31) the effect of room types and dates on floor surfaces (D);
32) the effect of orientations and dates on the total areas;
33) the effect of orientations and dates on wall surfaces (A+B+C);
34) the effect of orientations and dates on Wall A;
35) the effect of orientations and dates on Wall B;
36) the effect of orientations and dates on Wall C;
37) the effect of orientations and dates on floor surfaces (D);

CHAPTER 4

RESULTS AND DISCUSSIONS

In this chapter are presented the results of the various analyses described in the previous chapter. Analyses were conducted in two groups, one-way and two-way ANOVA and so as the results were presented. These are accompanied by brief discussions on their significance, at a level of 5% (a=0.05), as mentioned in the previous chapter. References are given, in brackets, to relevant ANOVA tables for the areas of sunlight patches, depicted in Appendix B as each result is discussed. Self-evident though it is, one aspect to be explicitly noted here is that areas and patterns of sunlight patches were reciprocally identical on cardinal and ordinal points of the compass for T1 and T3.

4.1. One-Way ANOVA

By using One-Way ANOVA, first the total areas of sunlight patches on all surfaces of Type 1 (T1), Type 2 (T2) and Type 3 (T3) rooms were evaluated. Second, the difference between wall and floor surfaces was studied by separate analyses to reveal the surfaces exposed to direct sunlight in patient rooms at the most. In subsequent stages, analysis addressed specific results, regarding the areas of sunlight patches on each surface of all types of rooms separately.

Of immediate concern were results from ANOVA on the treatments cited as items 1, 2 and 3 in the previous section. For the first case, the total areas of sunlight patches measured on all surfaces of T1, T2 and T3 for all dates, hours and orientations, were tested and the results with a P-value less than a (0.05), indicated the presence of a significant difference in this respect as shown in Table C.1.1 (139). On the other hand, both for the second case, where the effect of orientation on total area was analyzed by room type *i.e*., among differently-oriented rooms (Table C.1.2; 140-141); and third case, where the effect of room type on total area was analyzed with respect to orientation; *i.e.*, among similarly-oriented rooms (Table C.1.3; 142-145), results with P-values larger than a (0.05), indicated the absence of a significant difference in these respects.

Of somewhat lesser concern was differentiating between the areas of sunlight patches on walls and floors (items 4 and 5), as sunlight patches on wall surfaces are mentioned in the literature as sources of glare for occupants. Here, the results of the first three *t*-tests (one for each room type, by walls/floors) indicated the presence of a statistically significant difference in the total areas of direct sunlight patches falling on walls and floors in each room type, as shown in Table C.2.1 (146-147). On the other hand, when the effect of orientation on the areas of sunlight patches on walls and floors was analyzed by room type, a statistically significant difference appeared only for northeast-oriented T1 and northwest-oriented T3, as shown in Table C.2.2 (148-156).

Subsequent analyses (items 6, 7 and 8) dealt with areas of sunlight patches on walls only. When considered together (as walls A+B+C) by room type, for all dates, hours and orientations, results pointed out a statistically significant difference, with T2 appearing distinct from the other two types (T1 and T3), as shown in Table C.2.3 (157). Such a difference did not appear, however, in similar analysis conducted for both differently- and similarly-oriented rooms, as exposed in Table C.2.4 (158-159) and Table C.2.5 (160-163).

These were followed by analyses of sunlight patches on floor surfaces alone (items 9, 10 and 11). Done along the same lines cited for walls above, results revealed a lack of significance among rooms when total areas in terms of all dates, hours and orientations on floor surfaces, were considered (Table C.2.6;

164). A remarkably similar lack was established for both of the other cases; *i.e.*, that on the basis of rooms with different orientations as well as on that of rooms with the same orientation as shown in Table C.2.7 (165-166) and Table C.2.8 (167-170).

The analyses for total wall and floor surfaces were followed by a more thorough approach, where the immediate concern became the areas of sunlight patches appearing on each surface in each room type, cited as items 12 and 13. In the first three ANOVA, the areas of sunlight patches on A, B, C and floor (D) surfaces were evaluated for all hours and orientations separately by room type and the results revealed the presence of a significant difference in this respect for T1 and T3, but not for T2. According to the multi comparison tables for T1, wall A was significantly different from wall B and floor (D); and for T3, wall B was significantly different from wall A and floor (D), as shown in Table C.3.1 (171-173). When these surfaces were analyzed for each orientation, by room type, west- and southwest-oriented T1 and east- and southeast-oriented T3 appeared to be significantly different from the others as revealed in Table C.3.2 (174-186). For west-oriented T1, wall A was significantly different from the other surfaces; and in southwest-oriented T1, walls A and B were significantly different from each other. In east-oriented T3, wall B was significantly different from the other surfaces; and in southeast-oriented T3, walls A and B were significantly different from each other. On the other hand, results also indicated the absence of a significant difference in T2, in the amount of direct sunlight on the surfaces concerned, between the differently oriented rooms of each type as shown in Table C.3.2 (178-181).

Subsequent analysis focused on the areas of sunlight patches on wall A and B (items 14 and 15) only. When they were analyzed for all hours, dates and orientations by room type as shown in Table C.3.3 (187) and Table C.3.4 (188), results indicated that for wall A, T3 and for wall B, T1 were significantly different than the other room types. When these walls were analyzed at different orientations by room types, the absence of a significant difference appeared in the areas of sunlight patches on both wall A and B (Table C.3.5; 189-190 and Table C.3.6; 191-192). After that, the areas of sunlight patches on wall A and B of similarly-oriented rooms of all types were analyzed (items 16 and 17). A significant difference appeared for wall A of only southeast-oriented rooms among three room types as presented in Table C.3.7 (193-196). When the same treatment was conducted for wall B, a similar situation, a significant difference appeared for wall B of only southwest-oriented rooms among three room types as well (Table C.3.8; 197-200). Moreover, northwest-oriented rooms of all types and west-oriented rooms of only T3 did not receive direct sunlight on wall A and northeast-oriented rooms of all three types and east-oriented rooms of only T1 did not receive direct sunlight on wall B, at all.

4.2. Two-Way ANOVA

The two-way ANOVA was conducted in three groups, in order to illuminate the effects of room type and orientation; the effects of room type and date; and the effects of orientation and date. These were studied with respect to total areas and individually to the areas on each surface. Orientation was expected to have an effect on the areas of sunlight patches on the surfaces since the positions of openings varied.

The first group of the two-way ANOVA concerned the effect of room type and orientation. According to the results, total areas of sunlight patches on all surfaces (A+B+C+D) and on total wall surfaces (A+B+C) were found to be affected by room type (opening positions), but not by orientation (Table C.4.1; 201 and Table C.4.2; 202-203). Here, T2 was found to be significantly different from T1 and T3. When wall surfaces were studied one by one, the effect of both room type and orientation appeared to be significant for both wall A and wall B, as shown in Table C.4.3 (204-205) and Table C.4.4 (206-207). For wall A, west-oriented rooms were found to be significantly different from east-, south-,

southeast- and northeast-oriented rooms while for wall B, east-oriented rooms appeared to be significantly different from west-, south-, southwest- and northwest-oriented rooms. Furthermore, northwest- oriented rooms appeared to receive no direct sunlight on wall A; and northeast-oriented rooms, on wall B, at all. In terms of room type, T1 appeared to be significantly different from T2 and T3, with regard to the areas of sun-patches on wall A while T3 appeared to be significantly different from T1 and T2, with regard to the areas of sunlight patches on wall B. Lastly, according to the results of the ANOVA conducted for wall C and Floor (D) surfaces, neither room type nor orientation appeared to have any significant effect on the areas of sunlight patches as revealed in Table C.4.5 (208) and Table B.4.6 (209).

The second group of ANOVA consisted of results on the effects of room type and date. For the total areas of sunlight patches on all surfaces of rooms (A+B+C+D), both room type and date were found to be significantly effective as shown in Table C.5.1(210-211). Among room types, T2 was significantly different from T1 and T3; among dates, 21 June and 21 December were significantly different from each other. For total areas on wall surfaces (A+B+C), room types appeared to be significantly effective, but not date (Table C.5.2; 212-213). Wall surfaces were then analyzed separately. Room type was found to be effective rather than date for both wall A and wall B (Table C.5.3; 214-215 and Table C.5.4; 216-217). For wall A, T1 and for wall B, T3 appeared to be significantly different from the others. However, neither room types nor dates appeared to have any effect on the areas of sunlight patches on wall C as shown in Table C.5.5 (218). On the other hand, according to the results shown in Table C.5.6 (219-220), date was effective for floor (D) surfaces only, but not room type. The areas of sunlight patches on dates 21 June and 21 December were significantly different from each other.

The last group of two-way ANOVA covered the results on the effects of orientation and date. For the total area of sunlight patches on all room surfaces

(A+B+C+D), date appeared to have an effect, but not the orientation (Table C.6.1; 221-222). Dates 21 June and 21 December were significantly different from each other. For the total areas of sunlight patches on wall surfaces (A+B+C), neither orientation nor date appeared to have any affect (Table C.6.2; 223-224). Areas of sunlight patches on wall A and wall B taken separately were found to be affected by orientation, but not by date as presented in Table C.6.3 (225-226) and Table C.6.4 (227-228). For wall A, west-oriented rooms were found to be significantly different from east-, south-, southeast-, and northeast-oriented rooms. For wall B, east-oriented rooms, were significantly different from west-, south-, southwest- and northwest-oriented rooms. According to the results shown in Table C.6.5 (229) neither orientation nor date had any effect on the areas of sunlight patches on wall C. On the other hand, date appeared to have an effect on floors (D), but not orientation according to Table C.6.6 (230-231).

CHAPTER 5

CONCLUSION

Tests of hypotheses were ordered from general to specific in determining the relationship – if any – between the amounts of direct sunlight received, patient room orientations and types. Findings of the One-Way and Two-Way ANOVA were interpreted and concluded with four proposals to enable hospital designers make an informal choice from the combinations of room type and orientation, analyzed. Proposals were presented with references, in brackets, to relevant perspectives views in Appendix C.

As a general finding, T2, with a centered opening, appeared to receive less direct sunlight –irrespective of orientation– than both T1 and T3 in terms of overall areas of sunlight patches. This was expected, since openings were located adjacent to walls A and B in T1 and T3, respectively.

When the effect of orientation was tested on the total areas of sunlight patches in different room types differences disappeared. This was attributed to the symmetry of the path traced by the sun as it moves across the sky during a given day so that, though differently-oriented rooms all in all received similar amounts of direct sunlight, but at different times of day. Thus, both the areas and the patterns of sunlight patches were reciprocally identical in mirror symmetry for:-

- T2 facing east and west, southeast and southwest, northeast and northwest;
- T1 and T3 facing south;

- T1 facing east and T3 facing west;
- T1 facing west and T3 facing east;
- T1 facing southeast and T3 facing southwest;
- T1 facing southwest and T3 facing south east;
- T1 facing northeast and T3 facing northwest;
- T1 facing northwest and T3 facing northeast.

While only south-oriented T2 showed some difference with respect to these reciprocal pairs in that it received more hours of direct sunlight, the areas of sunlight patches were smaller due to the higher noon solar altitude angles and the difference remained too marginal to be of significance.

At the next level, concern was focused on the difference between areas of sunlight patches on walls and floors, as those on wall surfaces were presumed to have a higher propensity to cause glare for room occupants. When total areas on walls and floors were compared for all room types, results revealed that walls and floors received different amounts of direct sunlight in all types of room. Especially rooms T1 and T3 received direct sunlight on walls more than floors. However, when orientation was considered, the difference disappeared. It was observed that there was no difference in the amounts of direct sunlight received by walls and floors in differently-oriented rooms of all three types. The rooms being positioned reciprocally identical in mirror symmetry and the lower solar altitude angles on the winter solstice and higher solar altitude angles on the summer solstice equalized the amounts of direct sunlight falling on wall and floor surfaces in rooms. Intermediary solar altitude angles on equinoxes did not create any significant difference between wall and floor surfaces, which was independent of orientation.

In the next stage, the analysis of the areas of sunlight patches on wall and floor surfaces were followed by a more thorough approach which focused on each surface (A/B/C/D) separately. The significant difference that appeared only in rooms T1 and T3 among these four surfaces was again a result of opening position (room type). Walls adjacent to openings received longer hours of direct sunlight when compared to the other surfaces of the same room while all surfaces of T2 receive similar amounts of direct sunlight. Especially when the opening adjacent to one of these two major walls (A or B) was positioned with regard to the symmetrical path of the sun in the sky, the amount of direct sunlight received (so long as these major walls “saw’ the sun) by these walls increased. In contrast, in similarly-oriented rooms of all 3 types, wall A in west-oriented T3 as shown in Tables B.3.2.1, B.3.2.2 and B.3.2.3 (121-123), and wall B of east-oriented T1 as shown in Tables B.1.1.1, B.1.1.2 and B.1.1.3 (76-78), were significantly different from the other surfaces, because they did not receive direct sunlight at all. Apart from opening positions (room types), low and intermediate altitude angles of sunlight coming from these four specific directions resulted in a significant difference. Since A and B were opposite walls, they appeared to be significantly different from each other when rooms were oriented towards east, west, southeast and southwest.

Wall C and Floor (D) revealed less significant differences in all three types of rooms. In particular, Wall C received very little direct sunlight regardless of room type, orientation and date since the distance between the window wall and wall C was large. Therefore, no significant difference was recorded.

In the two-way ANOVA, the effects of room type and orientation; the effects of room type and date; and the effects of orientation and date were studied, first with respect to total areas and then individually with respect to the areas on each surface.

The total areas of sunlight patches on all surfaces of rooms were affected by room type (opening positions) and by date, but not by orientation. Among types, T2 was different from the others, with its centered opening. While right and left-shifted openings affected mostly adjacent walls (A or B), centered openings enabled light to fall almost equally on all surfaces as revealed in Tables B.2. (97-117). Among dates, 21 June and 21 December were significantly different from each other, as the difference between the altitude angles of the sun on these dates is large (Tables B.1.3.1, B.1.3.2 and B.1.3.3; 82-84). However, different orientations did not affect total areas since the transigent matters such as the symmetric path traced by the sun in the sky, four specific dates and all hours of the day equalize the areas of the sunlight patches in oppositely-oriented pairs of rooms on the N-S axis.

Walls, when individually studied, gave different results. For example, both room type and orientation was effective for areas of sunlight patches on wall A and wall B but not date. For wall A, west-oriented T3 as shown in Tables B.3.2.1, B.3.2.2 and B.3.2.3 (121-123); and for wall B east-oriented T1 as shown in Tables B.1.1.1, B.1.1.2 and B.1.1.3 (76-78) were significantly different from the others. This was an expected outcome since the opening positions were shifted to the sides of the window wall. This shift increased the areas of patches on walls adjacent to the openings but also prevented opposite walls from receiving direct sunlight. None of these parameters had a significant effect on wall C since it received very little direct sunlight. On the other hand, date was effective only for floor surfaces owing to the fact that the altitude angles, varying throughout the year, affected the areas of sunlight patches on surfaces with different axis.

5.1. Proposals for Patient Room Design

In reference to the results noted above, it was concluded that the position of opening on the exterior wall, rather than orientation of the room, was the most important aspect to consider in the design of patient rooms with regard to both lighting and glare potential. However, orientation seemed to be effective when the surfaces were studied individually. In order to design the layout of the room, the major walls (A or B) and their potential of creating glare by reflecting sunlight must be taken as the main criteria with regard to the orientations as well.

The following four proposals are made to enable an informal choice from the combinations of room type (opening position) and orientation that both admit sunlight and protect the patient from glare and excessive heat gain. Proposals are presented by putting orientation forth, since it is usually one of the major constraints of the site. References are given, in brackets, to relevant perspective views of sunlight patches on the surfaces of rooms, depicted in Appendix B as each proposal was presented.

- For east- and west-oriented rooms, right-shifted (T3) and left-shifted openings (T1) should be considered. They were subject to create more glare for occupants of the room, since they were found to be receiving more direct sunlight walls, when compared to centered openings (T2). In fact, the path traced by the sunlight patches in T1 and T3 do not fall on either one of the major walls. Accordingly, it is recommended for east-oriented rooms to have left-shifted openings (T1) with bed heads against wall B (Tables B.1.1.1; B.1.12.; and B.1.1.3; 76-78); and for west-oriented rooms to have right-shifted openings (T3) with bed heads against wall A (Tables B.3.2.1; B.3.2.2; and B.3.2.3; 121-123), as both appeared to be significantly different from all other surfaces of the room.

- In south oriented rooms, there is no significant difference between the room types, due to the symmetrical path of the sun on N-S axis, the symmetrical positions of openings in T1 and T3 and the centered position of the opening in T2; where all equalize the areas of sunlight patches on two opposite major walls (A and B). However, in the events south oriented rooms were chosen, wall A in T3 (right-shifted openings) and wall B in T1 (left-shifted openings) appeared to be appropriate for the bed heads to locate against because they receive less direct sunlight when compared to T2 (centered openings) as seen in Tables B.2.3.1; B.2.3.2; and B.2.3.3 (103-105).

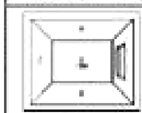
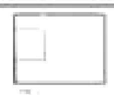
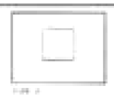
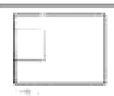
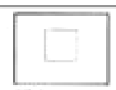
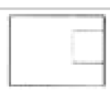
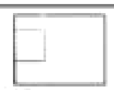
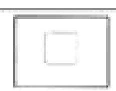
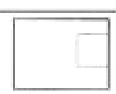
- For southeast-oriented rooms, right-shifted openings (T3) would be appropriate, since wall A in T3 rooms rarely receive direct sunlight (only in winter). It is therefore recommended that beds be against wall A (Tables B.3.4.1; B.3.4.2; and B.3.4.3; 127-129). Southeast- and southwest-oriented rooms being in mirror symmetry, wall B of southwest-oriented rooms with left-shifted openings (T1) would rarely receive direct sunlight as well. Therefore for such rooms, it is appropriate to locate beds against wall B (Tables B.1.5.1; B.1.5.2; and B.1.5.3; 88-90).

- Northeast and northwest rooms of all types receive very little amount of direct sunlight, early in the morning and late in the afternoon and only in summer. Therefore, they are not very suitable both from the economical and health points of view. However, in the event they were chosen, wall B in all types of northeast rooms (Tables B.1.6.1; B.1.6.2; B.1.6.3; 91-93); and wall A in all types of northwest rooms (Tables B.1.7.1; B.1.7.2; B.1.7.3; 94-96) would be appropriate for bed heads to be located against.

Regardless of opening position (T1, T2, and T3) and orientation, both horizontal and vertical surfaces receiving direct sunlight must be given special treatment. The choice of surface material, color and the texture for these surfaces are critical design decisions as these decisions are effective in the sunlighting potential–the overall ambient illumination of the room–and the potential of creating discomfort glare from a given surface.

All combinations of opening types and orientations at four specific dates of a year are presented in the form of a matrix in Table 5.1. The surfaces which do not receive direct sunlight or do relatively less than the other surfaces in the room are found to be appropriate to locate bed heads against and therefore they were indicated with bold letters.

Table 5.1 Proposals Matrix

DATE	ROOM TYPE	ORIENTATION						
		EAST	WEST	SOUTH	SOUTHEAST	SOUTHWEST	NORTHEAST	NORTHWEST
21 MARCH/SEPTEMBER		Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: No direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight (more than wall B) **Wall B: Direct sunlight (less than wall A) (bed head)** Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: No direct sunlight Floor (D): No direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight
		Wall A: Direct sunlight Wall B: No direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight (same with wall B) Wall B: Direct sunlight (same with wall A) Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight
		Wall A: No direct sunlight Wall B: No direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	**Wall A: Direct sunlight (less than wall B) (bed head)** Wall B: Direct sunlight (more than wall A) Wall C: Direct sunlight Floor (D): Direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): No direct sunlight
21 JUNE		Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: No direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight
		Wall A: No direct sunlight Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight (same with wall B) Wall B: Direct sunlight (same with wall A) Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight
		Wall A: No direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: No direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight
21 DECEMBER		Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: No direct sunlight Floor (D): No direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight (more than wall B) **Wall B: Direct sunlight (less than wall A) (bed head)** Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight **Wall B: Direct sunlight (less than wall A) (bed head)** Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: No direct sunlight Floor (D): No direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): No direct sunlight
		Wall A: Direct sunlight **Wall B: No direct sunlight (bed head)** Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight (same with wall B) Wall B: Direct sunlight (same with wall A) Wall C: No direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: No direct sunlight Floor (D): No direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): No direct sunlight
		Wall A: Direct sunlight Wall B: No direct sunlight Wall C: No direct sunlight Floor (D): Direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): No direct sunlight	**Wall A: Direct sunlight (less than wall B) (bed head)** Wall B: Direct sunlight (more than wall A) Wall C: Direct sunlight Floor (D): Direct sunlight	**Wall A: Direct sunlight (less than wall B) (bed head)** Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: No direct sunlight Wall B: Direct sunlight Wall C: Direct sunlight Floor (D): Direct sunlight	Wall A: Direct sunlight Wall B: No direct sunlight Wall C: No direct sunlight Floor (D): No direct sunlight	**Wall A: No direct sunlight (bed head)** Wall B: Direct sunlight Wall C: No direct sunlight Floor (D): No direct sunlight

This study was conducted in order to arrive at a basis on which viable proposals for patient room design in hospitals could be put forth according to the movement of the sun throughout the year. In this context, it is expected that design decisions related to the layout of the room and the characteristics of the room surfaces (materials, color and textures) –the subjects to be covered in further research– will be developed and applied accordingly.

Although only three basic but commonly-used opening types were tested in this study, results indicated that there were sufficient grounds for further investigation focusing on decisions regarding the design of patient rooms, such as layout (*e.g.,* the location of beds, circulation) and the choosing of surface material, color and texture. The methodology constructed and used in this study also seemed promising enough to be adopted for further and more advanced investigations; not only for healthcare facilities, but also for other types of buildings open to the public-at-large.

5.2. Further Investigations and Studies

Further studies, which seem likely to develop in three different routes, will be structured to make use of the results of this thesis.

- Surface properties of the patient rooms will be tested, as a continuation of this thesis, since the surfaces receiving direct sunlight are clearly defined. Materials varying in color, texture, reflectivity and luminance will be applied on the surfaces by using material library of Desktop Radiance 1.02®. Illumination levels and reflectances will be tested. At the end, certain materials will be proposed for use in patient rooms.

- Visual material (perspectives) produced in this thesis will be developed by using the material library of Desktop Radiance and, will be used in interviews with patients in hospitals. Patients’ perception of space and preferences regarding the penetration of sunlight and use of material will be tested.

- The methodology constructed and used in this thesis will be adapted to building types other than healthcare buildings which are open to public use. Different locations (different latitudes) and opening types will be tested.

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APPENDIX A. SIMULATION TABLES

A.1. Type 1

Table A.1.1 Type 1 – East Simulation Tables

TYPE 1		TYPE 1		TYPE 1		TYPE 1		TOTAL
EAST		EAST		EAST		EAST		
21 MAR. / 23 SEP.		21 MAR. / 23 SEP.		21 MAR. / 23 SEP.		21 MAR. / 23 SEP.		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7		-7		0,00
-6		-6		-6	1,51	-6		1,51
-5	6,10	-5		-5	0,52	-5	0,26	6,88
-4	3,94	-4		-4		-4	0,40	4,34
-3	2,27	-3		-3		-3	0,24	2,51
-2	1,34	-2		-2		-2	0,14	1,48
-1	0,64	-1		-1		-1	0,06	0,70
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2		0,00
3		3		3		3		0,00
4		4		4		4		0,00
5		5		5		5		0,00
6		6		6		6		0,00
7		7		7		7		0,00
	14,29				2,03		1,10	17,42

TYPE 1		TYPE 1		TYPE 1		TYPE 1		TOTAL
EAST		EAST		EAST		EAST		
21 JUNE		21 JUNE		21 JUNE		21 JUNE		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7	1,60	-7		1,60
-6		-6		-6	1,02	-6	2,03	3,05
-5		-5		-5		-5	3,32	3,32
-4		-4		-4		-4	2,11	2,11
-3	1,64	-3		-3		-3	1,17	2,81
-2	1,02	-2		-2		-2	0,63	1,65
-1	0,46	-1		-1		-1	0,28	0,74
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2		0,00
3		3		3		3		0,00
4		4		4		4		0,00
5		5		5		5		0,00
6		6		6		6		0,00
7		7		7		7		0,00
	3,12				2,62		9,54	15,28

TYPE 1		TYPE 1		TYPE 1		TYPE 1		TOTAL
EAST		EAST		EAST		EAST		
21 DECEMBER		21 DECEMBER		21 DECEMBER		21 DECEMBER		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7		-7		0,00
-6		-6		-6		-6		0,00
-5		-5		-5		-5		0,00
-4	2,21	-4		-4		-4		2,21
-3	1,47	-3		-3		-3		1,47
-2	0,93	-2		-2		-2		0,93
-1	0,46	-1		-1		-1		0,46
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2		0,00
3		3		3		3		0,00
4		4		4		4		0,00
5		5		5		5		0,00
6		6		6		6		0,00
7		7		7		7		0,00
	5,07							5,07

22,48	0	4,65	10,64

Table A.1.2 Type 1 – West Simulation Tables

	TYPE 1	TYPE 1	TYPE 1	TYPE 1	TOTAL
	WEST	WEST	WEST	WEST	
	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON					0,00
1				0,57	0,57
2				1,23	1,23
3				2,12	2,12
4			0,27	3,64	3,91
5			1,59	0,45	2,04
6					0,00
7					0,00
			1,86	8,01	9,87

	TYPE 1	TYPE 1	TYPE 1	TYPE 1	TOTAL
	WEST	WEST	WEST	WEST	
	21 JUNE	21 JUNE	21 JUNE	21 JUNE	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON				0,06	0,06
1				0,42	0,42
2				0,87	0,87
3				1,40	1,40
4	2,68			2,06	4,74
5	4,16			1,92	6,10
6	4,58				4,58
7	3,00				3,00
	14,44			6,73	21,17

	TYPE 1	TYPE 1	TYPE 1	TYPE 1	TOTAL
	WEST	WEST	WEST	WEST	
	21 DECEMBER	21 DECEMBER	21 DECEMBER	21 DECEMBER	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON		0,04		0,13	0,17
1		0,19		0,53	0,72
2		0,53		0,92	1,45
3		1,24		0,73	1,97
4		1,70	0,68		2,38
5					0,00
6					0,00
7					0,00
		3,70	0,68	2,31	6,69

14,44	3,70	2,54	17,05

Table A.1.3. Type 1 – South Simulation Tables

TYPE 1		TYPE 1	TYPE 1	TYPE 1	
SOUTH		SOUTH	SOUTH	SOUTH	TOTAL
21 MAR. / 23 SEP.		21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5		0,28			0,28
-4		0,35		0,61	0,96
-3		0,02		1,37	1,39
-2				1,38	1,38
-1				1,37	1,37
NOON				1,35	1,35
1	1,59			0,83	2,42
2	1,54			0,24	1,78
3	1,08				1,08
4	0,64				0,64
5	0,30				0,30
6					0,00
7					0,00
	5,15	0,65		7,15	12,95

TYPE 1		TYPE 1	TYPE 1	TYPE 1	
SOUTH		SOUTH	SOUTH	SOUTH	TOTAL
21 JUNE		21 JUNE	21 JUNE	21 JUNE	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3				0,23	0,23
-2				0,38	0,38
-1				0,45	0,45
NOON	0,60			0,46	1,06
1	0,54			0,32	0,86
2	0,46			0,15	0,61
3	0,27			0,02	0,29
4					0,00
5					0,00
6					0,00
7					0,00
	1,87			2,01	3,88

TYPE 1		TYPE 1	TYPE 1	TYPE 1	
SOUTH		SOUTH	SOUTH	SOUTH	TOTAL
21 DECEMBER		21 DECEMBER	21 DECEMBER	21 DECEMBER	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4		1,25			1,25
-3		1,28		1,34	2,62
-2				3,52	3,52
-1				3,30	3,30
NOON	3,73			2,98	6,71
1	3,86			1,21	5,07
2	2,91				2,91
3	1,87				1,87
4	1,25				1,25
5					0,00
6					0,00
7					0,00
	13,62	2,53		12,35	28,50

20,64	3,18	0	21,51

Table A.1.4. Type 1 – Southeast Simulation Tables

	TYPE 1 SOUTHEAST 21 MAR. / 23 SEP. WALL A	TYPE 1 SOUTHEAST 21 MAR. / 23 SEP. WALL B	TYPE 1 SOUTHEAST 21 MAR. / 23 SEP. WALL C	TYPE 1 SOUTHEAST 21 MAR. / 23 SEP. FLOOR	TOTAL
-7					0,00
-6		1,70			1,70
-5		1,24	0,55		1,79
-4					0,00
-3				2,46	2,46
-2	2,16			1,71	3,87
-1	1,68			0,83	2,51
NOON	1,15				1,46
1	0,64				0,64
2	0,09				0,09
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	5,72	2,94	0,55	5,31	14,52

	TYPE 1 SOUTHEAST 21 JUNE WALL A	TYPE 1 SOUTHEAST 21 JUNE WALL B	TYPE 1 SOUTHEAST 21 JUNE WALL C	TYPE 1 SOUTHEAST 21 JUNE FLOOR	TOTAL
-7		0,53			0,53
-6		0,76		0,20	0,96
-5		0,22		1,56	1,78
-4				1,48	1,48
-3				1,16	1,16
-2				0,87	0,87
-1	0,58			0,60	1,18
NOON	0,23			0,25	0,48
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	0,81	1,51		6,12	8,44

	TYPE 1 SOUTHEAST 21 DECEMBER WALL A	TYPE 1 SOUTHEAST 21 DECEMBER WALL B	TYPE 1 SOUTHEAST 21 DECEMBER WALL C	TYPE 1 SOUTHEAST 21 DECEMBER FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4			1,62		1,62
-3	5,72		1,00	1,28	8,00
-2	4,60			0,98	5,58
-1	2,80			0,13	2,93
NOON	1,66				1,66
1	0,97				0,97
2	0,48				0,48
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	16,23		2,62	2,39	21,24

22,76	4,45	3,17	13,82

Table A.1.5 Type 1 – Southwest Simulation Tables

	TYPE 1	TYPE 1	TYPE 1	TYPE 1	
	SOUTHWEST	SOUTHWEST	SOUTHWEST	SOUTHWEST	TOTAL
	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1				0,52	0,52
NOON				0,92	0,92
1				1,33	1,33
2				1,77	1,77
3	2,87			1,60	4,47
4	3,56			0,27	3,83
5	2,45				2,45
6	1,73				1,73
7					0,00
	10,61			6,41	17,02

	TYPE 1	TYPE 1	TYPE 1	TYPE 1	
	SOUTHWEST	SOUTHWEST	SOUTHWEST	SOUTHWEST	TOTAL
	21 JUNE	21 JUNE	21 JUNE	21 JUNE	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON				0,31	0,31
1				0,58	0,58
2	1,08			0,66	1,74
3	1,35			0,51	1,86
4	1,52			0,13	1,65
5	1,23				1,23
6	0,88				0,88
7	0,56				0,56
	6,62			2,19	8,81

	TYPE 1	TYPE 1	TYPE 1	TYPE 1	
	SOUTHWEST	SOUTHWEST	SOUTHWEST	SOUTHWEST	TOTAL
	21 DECEMBER	21 DECEMBER	21 DECEMBER	21 DECEMBER	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3		0,11		0,01	0,12
-2		0,31		0,32	0,63
-1		0,27		1,12	1,39
NOON		0,09		2,10	2,19
1				2,87	2,87
2			0,17	3,51	3,68
3			1,10	1,91	3,01
4	6,10		0,90		7,00
5					0,00
6					0,00
7					0,00
	6,10	0,78	2,17	11,84	20,89

23,33	0,78	2,17	20,44

Table A.1.6 Type 1 – Northeast Simulation Tables

	TYPE 1 NORTHEAST 21 MAR. / 23 SEP. WALL A		TYPE 1 NORTHEAST 21 MAR. / 23 SEP. WALL B		TYPE 1 NORTHEAST 21 MAR. / 23 SEP. WALL C		TYPE 1 NORTHEAST 21 MAR. / 23 SEP. FLOOR		TOTAL
-7		-7		-7		-7			0,00
-6	2,03	-6		-6		-6			2,03
-5	1,19	-5		-5		-5			1,19
-4	0,78	-4		-4		-4			0,78
-3	0,39	-3		-3		-3			0,39
-2	0,12	-2		-2		-2			0,12
-1		-1		-1		-1			0,00
NOON		NOON		NOON		NOON			0,00
1		1		1		1			0,00
2		2		2		2			0,00
3		3		3		3			0,00
4		4		4		4			0,00
5		5		5		5			0,00
6		6		6		6			0,00
7		7		7		7			0,00
	4,51								4,51

	TYPE 1 NORTHEAST 21 JUNE WALL A		TYPE 1 NORTHEAST 21 JUNE WALL B		TYPE 1 NORTHEAST 21 JUNE WALL C		TYPE 1 NORTHEAST 21 JUNE FLOOR		TOTAL
-7	5,40	-7		-7		-7			5,40
-6	3,39	-6		-6		-6			3,39
-5	2,39	-5		-5		-5	0,05		2,44
-4	1,60	-4		-4		-4	0,13		1,73
-3	0,99	-3		-3		-3	0,17		1,16
-2	0,42	-2		-2		-2	0,20		0,62
-1		-1		-1		-1			0,00
NOON		NOON		NOON		NOON			0,00
1		1		1		1			0,00
2		2		2		2			0,00
3		3		3		3			0,00
4		4		4		4			0,00
5		5		5		5			0,00
6		6		6		6			0,00
7		7		7		7			0,00
	14,19				0,00		0,55		14,74

	TYPE 1 NORTHEAST 21 DECEMBER WALL A		TYPE 1 NORTHEAST 21 DECEMBER WALL B		TYPE 1 NORTHEAST 21 DECEMBER WALL C		TYPE 1 NORTHEAST 21 DECEMBER FLOOR		TOTAL
-7		-7		-7		-7			0,00
-6		-6		-6		-6			0,00
-5		-5		-5		-5			0,00
-4	0,17	-4		-4		-4			0,17
-3		-3		-3		-3			0,00
-2		-2		-2		-2			0,00
-1		-1		-1		-1			0,00
NOON		NOON		NOON		NOON			0,00
1		1		1		1			0,00
2		2		2		2			0,00
3		3		3		3			0,00
4		4		4		4			0,00
5		5		5		5			0,00
6		6		6		6			0,00
7		7		7		7			0,00
	0,17								0,17

18,87	0	0,00	0,55

Table A.1.7 Type 1 – Northwest Simulation Tables

TYPE 1		TYPE 1		TYPE 1		TYPE 1		TOTAL
NORTHWEST		NORTHWEST		NORTHWEST		NORTHWEST		
21 MAR. / 23 SEP.		21 MAR. / 23 SEP.		21 MAR. / 23 SEP.		21 MAR. / 23 SEP.		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7		-7		0,00
-6		-6		-6		-6		0,00
-5		-5		-5		-5		0,00
-4		-4		-4		-4		0,00
-3		-3		-3		-3		0,00
-2		-2		-2		-2		0,00
-1		-1		-1		-1		0,00
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2		0,00
3		3	0,02	3		3	0,50	0,52
4		4	0,36	4		4	0,77	1,13
5		5	1,10	5		5		1,10
6		6	1,60	6		6		1,60
7		7		7		7		0,00
			3,08				1,27	4,35

TYPE 1		TYPE 1		TYPE 1		TYPE 1		TOTAL
NORTHWEST		NORTHWEST		NORTHWEST		NORTHWEST		
21 JUNE		21 JUNE		21 JUNE		21 JUNE		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7		-7		0,00
-6		-6		-6		-6		0,00
-5		-5		-5		-5		0,00
-4		-4		-4		-4		0,00
-3		-3		-3		-3		0,00
-2		-2		-2		-2		0,00
-1		-1		-1		-1		0,00
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2	0,31	0,31
3		3		3		3	0,78	0,78
4		4		4		4	1,45	1,45
5		5		5		5	2,65	2,65
6		6		6	0,95	6	2,52	3,47
7		7		7	1,62	7		1,62
					2,57		7,71	10,28

TYPE 1		TYPE 1		TYPE 1		TYPE 1		TOTAL
NORTHWEST		NORTHWEST		NORTHWEST		NORTHWEST		
21 DECEMBER		21 DECEMBER		21 DECEMBER		21 DECEMBER		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7		-7		0,00
-6		-6		-6		-6		0,00
-5		-5		-5		-5		0,00
-4		-4		-4		-4		0,00
-3		-3		-3		-3		0,00
-2		-2		-2		-2		0,00
-1		-1		-1		-1		0,00
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2		0,00
3		3		3		3		0,00
4		4	0,23	4		4		0,23
5		5		5		5		0,00
6		6		6		6		0,00
7		7		7		7		0,00
			0,23					0,23

0	3,31	2,57	8,98

A.2. Type 2 Rooms

Table A.2.1. Type 2 – East Simulation Tables

	TYPE 2	TYPE 2	TYPE 2	TYPE 2	TOTAL
	EAST	EAST	EAST	EAST	
	21MAR. / 23 SEP.	21MAR. / 23 SEP.	21MAR. / 23 SEP.	21MAR. / 23 SEP.	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6			1,61		1,61
-5			0,74	0,42	1,16
-4	0,40			3,30	3,70
-3	0,22			1,94	2,16
-2	0,13			1,12	1,25
-1				0,51	0,57
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	0,81		2,35	7,29	10,45

	TYPE 2	TYPE 2	TYPE 2	TYPE 2	TOTAL
	EAST	EAST	EAST	EAST	
	21 JUNE	21 JUNE	21 JUNE	21 JUNE	
	WALL A	WALL B	WALL C	FLOOR	
-7		2,87	0,32		3,19
-6		0,89	0,80	1,85	3,54
-5				3,29	3,29
-4				2,13	2,13
-3				1,40	1,40
-2				0,86	0,86
-1				0,45	0,45
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
		3,76	1,12	9,98	14,86

	TYPE 2	TYPE 2	TYPE 2	TYPE 2	TOTAL
	EAST	EAST	EAST	EAST	
	21 DECEMBER	21 DECEMBER	21 DECEMBER	21 DECEMBER	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4	2,21				2,21
-3	1,49			0,02	1,51
-2	0,90			0,11	1,01
-1	0,41			0,08	0,49
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	5,01			0,21	5,22

5,82	3,76	3,47	17,48

Table A.2.2. Type 2 – West Simulation Tables

TYPE 2		TYPE 2		TYPE 2		TYPE 2		TOTAL
WEST		WEST		WEST		WEST		
21MAR. / 23 SEP.		21MAR. / 23 SEP.		21MAR. / 23 SEP.		21MAR. / 23 SEP.		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7		-7		0,00
-6		-6		-6		-6		0,00
-5		-5		-5		-5		0,00
-4		-4		-4		-4		0,00
-3		-3		-3		-3		0,00
-2		-2		-2		-2		0,00
-1		-1		-1		-1		0,00
NOON		NOON		NOON		NOON		0,00
1		1	0,06	1		1	0,51	0,57
2		2	0,13	2		2	1,12	1,25
3		3	0,22	3		3	1,94	2,16
4		4	0,40	4	0,74	4	3,30	4,44
5		5		5	1,61	5	0,42	2,03
6		6		6		6		0,00
7		7		7		7		0,00
			0,81		2,35		7,29	10,45

TYPE 2		TYPE 2		TYPE 2		TYPE 2		TOTAL
WEST		WEST		WEST		WEST		
21 JUNE		21 JUNE		21 JUNE		21 JUNE		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7		-7		0,00
-6		-6		-6		-6		0,00
-5		-5		-5		-5		0,00
-4		-4		-4		-4		0,00
-3		-3		-3		-3		0,00
-2		-2		-2		-2		0,00
-1		-1		-1		-1		0,00
NOON		NOON		NOON		NOON		0,00
1		1		1		1	0,45	0,45
2		2		2		2	0,86	0,86
3		3		3		3	1,40	1,40
4		4		4		4	2,13	2,13
5		5		5		5	3,29	3,29
6	0,89	6		6	0,80	6	1,85	3,54
7	2,87	7		7	0,32	7		3,19
	3,76				1,12		9,98	14,86

TYPE 2		TYPE 2		TYPE 2		TYPE 2		TOTAL
WEST		WEST		WEST		WEST		
21 DECEMBER		21 DECEMBER		21 DECEMBER		21 DECEMBER		
WALL A		WALL B		WALL C		FLOOR		
-7		-7		-7		-7		0,00
-6		-6		-6		-6		0,00
-5		-5		-5		-5		0,00
-4		-4		-4		-4		0,00
-3		-3		-3		-3		0,00
-2		-2		-2		-2		0,00
-1		-1		-1		-1		0,00
NOON		NOON	0,09	NOON		NOON	0,02	0,11
1		1	0,41	1		1	0,11	0,52
2		2	0,90	2		2	0,08	0,98
3		3	1,49	3		3		1,49
4		4	2,21	4		4		2,21
5		5		5		5		0,00
6		6		6		6		0,00
7		7		7		7		0,00
			5,10				0,21	5,31

3,76	5,91	3,47	17,48

Table A.2.3. Type 2 – South Simulation Tables

TYPE 2 SOUTH 21MAR. / 23 SEP.	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5		0,31			0,31
-4		0,60		0,08	0,68
-3		0,55		0,73	1,28
-2		0,06		1,34	1,40
-1				1,36	1,36
NOON				1,36	1,36
1				1,36	1,36
2	0,06			1,30	1,36
3	0,55			0,91	1,46
4	0,60			0,05	0,65
5	0,31				0,31
6					0,00
7					0,00
	1,52	1,52		8,49	11,53

TYPE 2 SOUTH 21 JUNE	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3		0,03		0,24	0,27
-2				0,38	0,38
-1				0,46	0,46
NOON				0,47	0,47
1				0,45	0,45
2				0,36	0,36
3	0,03			0,18	0,21
4					0,00
5					0,00
6					0,00
7					0,00
	0,03	0,03		2,54	2,60

TYPE 2 SOUTH 21 DECEMBER	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4		1,27			1,27
-3		1,81		0,22	2,03
-2		1,35		2,50	3,85
-1				3,26	3,26
NOON				3,17	3,17
1	0,05			3,34	3,39
2	1,35			1,33	2,68
3	1,81				1,81
4	1,27				1,27
5					0,00
6					0,00
7					0,00
	4,48	4,43		13,82	22,73

	WALL A	WALL B	WALL C	FLOOR
	6,03	5,98	0	24,85

Table A.2.4. Type 2 – Southeast Simulation Tables

TYPE 2 SOUTHEAST 21MAR. / 23 SEP.	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6		1,69			1,69
-5		2,35			2,35
-4		0,77		2,83	3,60
-3				2,48	2,48
-2				1,84	1,84
-1				1,37	1,37
NOON				0,97	0,97
1	0,05			0,53	0,58
2	0,03			0,06	0,09
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	0,08	4,81		10,08	14,97

TYPE 2 SOUTHEAST 21 JUNE	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7		0,47			0,47
-6		0,82			0,82
-5		0,89		0,44	1,33
-4		0,26		1,23	1,49
-3				1,15	1,15
-2				0,90	0,90
-1				0,62	0,62
NOON				0,33	0,33
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
		2,44		4,67	7,11

TYPE 2 SOUTHEAST 21 DECEMBER	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4			1,63		1,63
-3			1,17	1,62	2,79
-2	0,39		0,45	3,33	4,17
-1	0,82			2,26	3,08
NOON	0,95			0,97	1,92
1	0,68			0,28	0,96
2	0,39			0,05	0,44
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	3,23		3,25	8,51	14,99
	3,31	7,25	3,25	23,26	

Table A.2.5. Type 2 – Southwest Simulation Tables

	TYPE 2	TYPE 2	TYPE 2	TYPE 2	TOTAL
	SOUTHWEST	SOUTHWEST	SOUTHWEST	SOUTHWEST	
	21MAR. / 23 SEP.	21MAR. / 23 SEP.	21MAR. / 23 SEP.	21MAR. / 23 SEP.	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2		0,03		0,06	0,09
-1		0,05		0,53	0,58
NOON				0,97	0,97
1				1,37	1,37
2				1,84	1,84
3				2,48	4,17
4	2,35			2,83	5,18
5	1,20				1,22
6	0,77				0,77
7					0,00
	4,32	0,08		10,10	14,50

	TYPE 2	TYPE 2	TYPE 2	TYPE 2	TOTAL
	SOUTHWEST	SOUTHWEST	SOUTHWEST	SOUTHWEST	
	21 JUNE	21 JUNE	21 JUNE	21 JUNE	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1				0,07	0,07
NOON				0,33	0,33
1				0,62	0,62
2				0,90	0,90
3				1,15	1,15
4	0,26			1,23	1,49
5	0,89			0,44	1,33
6	0,82				0,82
7	0,47				0,47
	2,44			4,74	7,18

	TYPE 2	TYPE 2	TYPE 2	TYPE 2	TOTAL
	SOUTHWEST	SOUTHWEST	SOUTHWEST	SOUTHWEST	
	21 DECEMBER	21 DECEMBER	21 DECEMBER	21 DECEMBER	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3		0,17			0,17
-2		0,39		0,05	0,44
-1		0,82		0,28	1,10
NOON		0,95		0,97	1,92
1		0,68		2,26	2,94
2			0,45	3,33	3,78
3			1,17	1,62	2,79
4			1,63		1,63
5					0,00
6					0,00
7					0,00
		3,01	3,25	8,51	14,77

6,76	3,09	3,25	23,35

Table A.2.6. Type 2 – Northeast Simulation Tables

TYPE 2 NORTHEAST 21MAR. / 23 SEP.	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6	1,59				1,59
-5	1,14				1,14
-4	0,69			0,09	0,78
-3	0,23			0,17	0,40
-2					0,00
-1					0,00
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	3,65			0,26	3,91

TYPE 2 NORTHEAST 21 JUNE	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7	1,09		1,33		2,42
-6	2,27		0,17	1,25	3,69
-5	0,82			1,68	2,50
-4	0,20			1,30	1,50
-3	0,02			0,79	0,81
-2				0,30	0,30
-1					0,00
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	4,40		1,50	5,32	11,22

TYPE 2 NORTHEAST 21 DECEMBER	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4	0,23				0,23
-3					0,00
-2					0,00
-1					0,00
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	0,23				0,23
	8,28	0	1,50	5,58	

Table A.2.7. Type 2 – Northwest Simulation Tables

	TYPE 2 NORTHWEST 21MAR. / 23 SEP. WALL A	TYPE 2 NORTHWEST 21MAR. / 23 SEP. WALL B	TYPE 2 NORTHWEST 21MAR. / 23 SEP. WALL C	TYPE 2 NORTHWEST 21MAR. / 23 SEP. FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON					0,00
1					0,00
2					0,00
3		0,23		0,17	0,40
4		0,69		0,09	0,78
5		1,14			1,14
6		1,59			1,59
7					0,00
		3,65		0,26	3,91

	TYPE 2 NORTHWEST 21 JUNE WALL A	TYPE 2 NORTHWEST 21 JUNE WALL B	TYPE 2 NORTHWEST 21 JUNE WALL C	TYPE 2 NORTHWEST 21 JUNE FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON					0,00
1					0,00
2				0,30	0,30
3		0,02		0,79	0,81
4		0,20		1,30	1,50
5		0,82		1,68	2,50
6		2,27	0,17	1,25	3,69
7		1,09	1,33		2,42
		4,40	1,50	5,32	11,22

	TYPE 2 NORTHWEST 21 DECEMBER WALL A	TYPE 2 NORTHWEST 21 DECEMBER WALL B	TYPE 2 NORTHWEST 21 DECEMBER WALL C	TYPE 2 NORTHWEST 21 DECEMBER FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON					0,00
1					0,00
2					0,00
3					0,00
4		0,23			0,23
5					0,00
6					0,00
7					0,00
		0,23			0,23

0	8,28	1,50	5,58

A.3. Type 3 Rooms

Table A.3.1. Type 3 – East Simulation Tables

TYPE 3 / EAST / 21 MAR. / 23 SEP.	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6			1,59		1,59
-5			0,27	0,45	0,72
-4				3,64	3,64
-3				2,12	2,12
-2				1,23	1,23
-1				0,57	0,57
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
			1,86	8,01	9,87

TYPE 3 / EAST / 21 JUNE	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7		3,00			3,00
-6		4,58		0,26	4,84
-5		4,18		1,92	6,10
-4		2,68		2,06	4,74
-3				1,40	1,40
-2				0,87	0,87
-1				0,42	0,42
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
		14,44		6,93	21,37

TYPE 3 / EAST / 21 DECEMBER	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4	1,70		0,68		2,38
-3	1,24			0,73	1,97
-2	0,53			0,92	1,45
-1	0,19			0,53	0,72
NOON					0,00
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
	3,66		0,68	2,18	6,52
	3,66	14,44	2,54	17,12	

Table A.3.2. Type 3 – West Simulation Tables

TYPE 3 / WEST / 21 MAR. / 23 SEP.	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON		0,06			0,06
1		0,64		0,06	0,70
2		1,34		0,14	1,48
3		2,27		0,24	2,51
4		3,94		0,40	4,34
5		6,10	0,52		6,88
6			1,51		1,51
7					0,00
		14,35	2,03	1,10	17,48

TYPE 3 / WEST / 21 JUNE	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON		0,02		0,04	0,06
1		0,46		0,28	0,74
2		1,02		0,63	1,65
3		1,64		1,17	2,81
4				2,11	2,11
5				3,32	3,32
6			1,02	2,03	3,05
7			1,60		1,60
		3,14	2,62	9,58	15,34

TYPE 3 / WEST / 21 DECEMBER	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON		0,02			0,02
1		0,46			0,46
2		0,93			0,93
3		1,47			1,47
4		2,21			2,21
5					0,00
6					0,00
7					0,00
		5,09			5,09

WALL A	WALL B	WALL C	FLOOR
0	22,58	4,65	10,68

Table A.3.3. Type 3 – South Simulation Tables

	TYPE 3 SOUTH 21 MAR. / 23 SEP. WALL A	TYPE 3 SOUTH 21 MAR. / 23 SEP. WALL B	TYPE 3 SOUTH 21 MAR. / 23 SEP. WALL C	TYPE 3 SOUTH 21 MAR. / 23 SEP. FLOOR	TOTAL
-7					0,00
-6					0,00
-5		0,30			0,30
-4		0,64			0,64
-3		1,08			1,08
-2		1,54		0,24	1,78
-1		1,59		0,83	2,42
NOON				1,35	1,35
1				1,37	1,37
2				1,38	1,38
3	0,02			1,37	1,39
4	0,35			0,61	0,96
5	0,28				0,28
6					0,00
7					0,00
	0,65	5,15		7,15	12,95

	TYPE 3 SOUTH 21 JUNE WALL A	TYPE 3 SOUTH 21 JUNE WALL B	TYPE 3 SOUTH 21 JUNE WALL C	TYPE 3 SOUTH 21 JUNE FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3		0,27		0,02	0,29
-2		0,46		0,15	0,61
-1		0,54		0,32	0,86
NOON				0,46	0,46
1				0,45	0,45
2				0,38	0,38
3				0,23	0,23
4					0,00
5					0,00
6					0,00
7					0,00
		1,27		2,01	3,28

	TYPE 3 SOUTH 21 DECEMBER WALL A	TYPE 3 SOUTH 21 DECEMBER WALL B	TYPE 3 SOUTH 21 DECEMBER WALL C	TYPE 3 SOUTH 21 DECEMBER FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4		1,25			1,25
-3		1,87			1,87
-2		2,91		0,10	3,01
-1		3,86		1,21	5,07
NOON				2,98	2,98
1				3,30	3,30
2	0,16			3,52	3,68
3	1,28			1,34	2,62
4	1,25				1,25
5					0,00
6					0,00
7					0,00
	2,69	9,89	0,00	12,45	25,03
	3,34	16,31	0,00	21,61	

Table A.3.4. Type 3 – Southeast Simulation Tables

	TYPE 3	TYPE 3	TYPE 3	TYPE 3	TOTAL
	SOUTHEAST	SOUTHEAST	SOUTHEAST	SOUTHEAST	
	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	21 MAR. / 23 SEP.	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6		1,73			1,73
-5		2,45			2,45
-4		3,56			3,83
-3		2,87		1,60	4,47
-2				1,77	1,77
-1				1,33	1,33
NOON				0,92	0,92
1				0,52	0,52
2				0,07	0,07
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
		10,61		6,48	17,09

	TYPE 3	TYPE 3	TYPE 3	TYPE 3	TOTAL
	SOUTHEAST	SOUTHEAST	SOUTHEAST	SOUTHEAST	
	21 JUNE	21 JUNE	21 JUNE	21 JUNE	
	WALL A	WALL B	WALL C	FLOOR	
-7		0,56			0,56
-6		0,88			0,88
-5		1,23			1,23
-4		1,52		0,13	1,65
-3		1,35		0,51	1,86
-2		1,08		0,66	1,74
-1				0,58	0,58
NOON				0,31	0,31
1					0,00
2					0,00
3					0,00
4					0,00
5					0,00
6					0,00
7					0,00
		6,62		2,19	8,81

	TYPE 3	TYPE 3	TYPE 3	TYPE 3	TOTAL
	SOUTHEAST	SOUTHEAST	SOUTHEAST	SOUTHEAST	
	21 DECEMBER	21 DECEMBER	21 DECEMBER	21 DECEMBER	
	WALL A	WALL B	WALL C	FLOOR	
-7					0,00
-6					0,00
-5					0,00
-4		6,10	0,90		7,00
-3			1,10	1,91	3,01
-2			0,17	3,51	3,68
-1				2,87	2,87
NOON	0,09			2,10	2,19
1	0,27			1,12	1,39
2	0,31			0,32	0,63
3	0,11				0,11
4					0,00
5					0,00
6					0,00
7					0,00
	0,78	6,10	2,17	11,83	20,88

0,78	23,33	2,17	20,50

Table A.3.5. Type 3 – Southwest Simulation Tables

TYPE 3 SOUTHWEST 21 MAR. / 23 SEP.	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2		0,09			0,09
-1		0,64		0,07	0,71
NOON		1,15		0,31	1,46
1		1,68		0,83	2,51
2		2,16		1,71	3,87
3				2,46	2,46
4				3,56	3,56
5	1,24		0,55	1,03	2,82
6	1,70				1,70
7					0,00
	2,94	5,72	0,55	9,97	19,18

TYPE 3 SOUTHWEST 21 JUNE	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1		0,23		0,05	0,28
NOON		0,58		0,25	0,83
1				0,60	0,60
2				0,87	0,87
3				1,16	1,16
4				1,48	1,48
5	0,22			1,56	1,78
6	0,76			0,20	0,96
7	0,53				0,53
	1,51	0,81		6,17	8,49

TYPE 3 SOUTHWEST 21 DECEMBER	WALL A	WALL B	WALL C	FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2		0,48			0,48
-1		0,97			0,97
NOON		1,66		0,01	1,67
1		2,80		0,13	2,93
2		4,60		0,98	5,58
3		5,72	1,00	1,28	8,00
4			1,62		1,62
5					0,00
6					0,00
7					0,00
		16,23	2,62	2,40	21,25

	WALL A	WALL B	WALL C	FLOOR
	4,45	22,76	3,17	18,54

Table A.3.6. Type 3 – Northeast Simulation Tables

	TYPE 3 / NORTHEAST / 21 MAR. / 23 SEP. / WALL A		TYPE 3 / NORTHEAST / 21 MAR. / 23 SEP. / WALL B		TYPE 3 / NORTHEAST / 21 MAR. / 23 SEP. / WALL C		TYPE 3 / NORTHEAST / 21 MAR. / 23 SEP. / FLOOR	TOTAL
-7		-7		-7		-7		0,00
-6	1,60	-6		-6		-6		1,60
-5	1,10	-5		-5		-5	0,04	1,14
-4	0,36	-4		-4		-4	0,77	1,13
-3	0,02	-3		-3		-3	0,50	0,52
-2		-2		-2		-2		0,00
-1		-1		-1		-1		0,00
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2		0,00
3		3		3		3		0,00
4		4		4		4		0,00
5		5		5		5		0,00
6		6		6		6		0,00
7		7		7		7		0,00
	3,08						1,31	4,39

	TYPE 3 / NORTHEAST / 21 JUNE / WALL A		TYPE 3 / NORTHEAST / 21 JUNE / WALL B		TYPE 3 / NORTHEAST / 21 JUNE / WALL C		TYPE 3 / NORTHEAST / 21 JUNE / FLOOR	TOTAL
-7		-7		-7	1,62	-7		1,62
-6		-6		-6	0,95	-6	2,52	3,47
-5		-5		-5		-5	2,65	2,65
-4		-4		-4		-4	1,45	1,45
-3		-3		-3		-3	0,78	0,78
-2		-2		-2		-2	0,31	0,31
-1		-1		-1		-1		0,00
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2		0,00
3		3		3		3		0,00
4		4		4		4		0,00
5		5		5		5		0,00
6		6		6		6		0,00
7		7		7		7		0,00
					2,57		7,71	10,28

	TYPE 3 / NORTHEAST / 21 DECEMBER / WALL A		TYPE 3 / NORTHEAST / 21 DECEMBER / WALL B		TYPE 3 / NORTHEAST / 21 DECEMBER / WALL C		TYPE 3 / NORTHEAST / 21 DECEMBER / FLOOR	TOTAL
-7		-7		-7		-7		0,00
-6		-6		-6		-6		0,00
-5		-5		-5		-5		0,00
-4	0,23	-4		-4		-4		0,23
-3		-3		-3		-3		0,00
-2		-2		-2		-2		0,00
-1		-1		-1		-1		0,00
NOON		NOON		NOON		NOON		0,00
1		1		1		1		0,00
2		2		2		2		0,00
3		3		3		3		0,00
4		4		4		4		0,00
5		5		5		5		0,00
6		6		6		6		0,00
7		7		7		7		0,00
	0,23							0,23

WALL A	WALL B	WALL C	FLOOR
3,31	0	2,57	9,02

Table A.3.7. Type 3 – Northwest Simulation Tables

	TYPE 3 NORTHWEST 21 MAR. / 23 SEP. WALL A	TYPE 3 NORTHWEST 21 MAR. / 23 SEP. WALL B	TYPE 3 NORTHWEST 21 MAR. / 23 SEP. WALL C	TYPE 3 NORTHWEST 21 MAR. / 23 SEP. FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON					0,00
1					0,00
2					0,00
3		0,39			0,39
4		0,78			0,78
5		1,19			1,19
6					0,00
7					0,00
		2,36			2,36

	TYPE 3 NORTHWEST 21 JUNE WALL A	TYPE 3 NORTHWEST 21 JUNE WALL B	TYPE 3 NORTHWEST 21 JUNE WALL C	TYPE 3 NORTHWEST 21 JUNE FLOOR	TOTAL
-7					0,00
-6					0,00
-5					0,00
-4					0,00
-3					0,00
-2					0,00
-1					0,00
NOON					0,00
1					0,00
2		0,42		0,13	0,55
3		0,99		0,17	1,16
4		1,60		0,13	1,73
5		2,39		0,05	2,44
6		3,39			3,39
7		5,40			5,40
		14,19		0,48	14,67

	TYPE 3 NORTHWEST 21 DECEMBER WALL A	TYPE 3 NORTHWEST 21 DECEMBER WALL B	TYPE 3 NORTHWEST 21 DECEMBER WALL C	TYPE 3 NORTHWEST 21 DECEMBER FLOOR	TOTAL
-7					0
-6					0
-5					0
-4					0
-3					0
-2					0
-1					0
NOON					0
1					0
2					0
3					0
4		0,17			0,17
5					0
6					0
7					0
		0,17			0,17

WALL A	WALL B	WALL C	FLOOR
0	16,72	0	0,48

APPENDIX B. PERSPECTIVE VIEWS

B.1. Type 1 Rooms

Table B.1.1.1. East-oriented rooms of Type 1 on 21 March/23 September

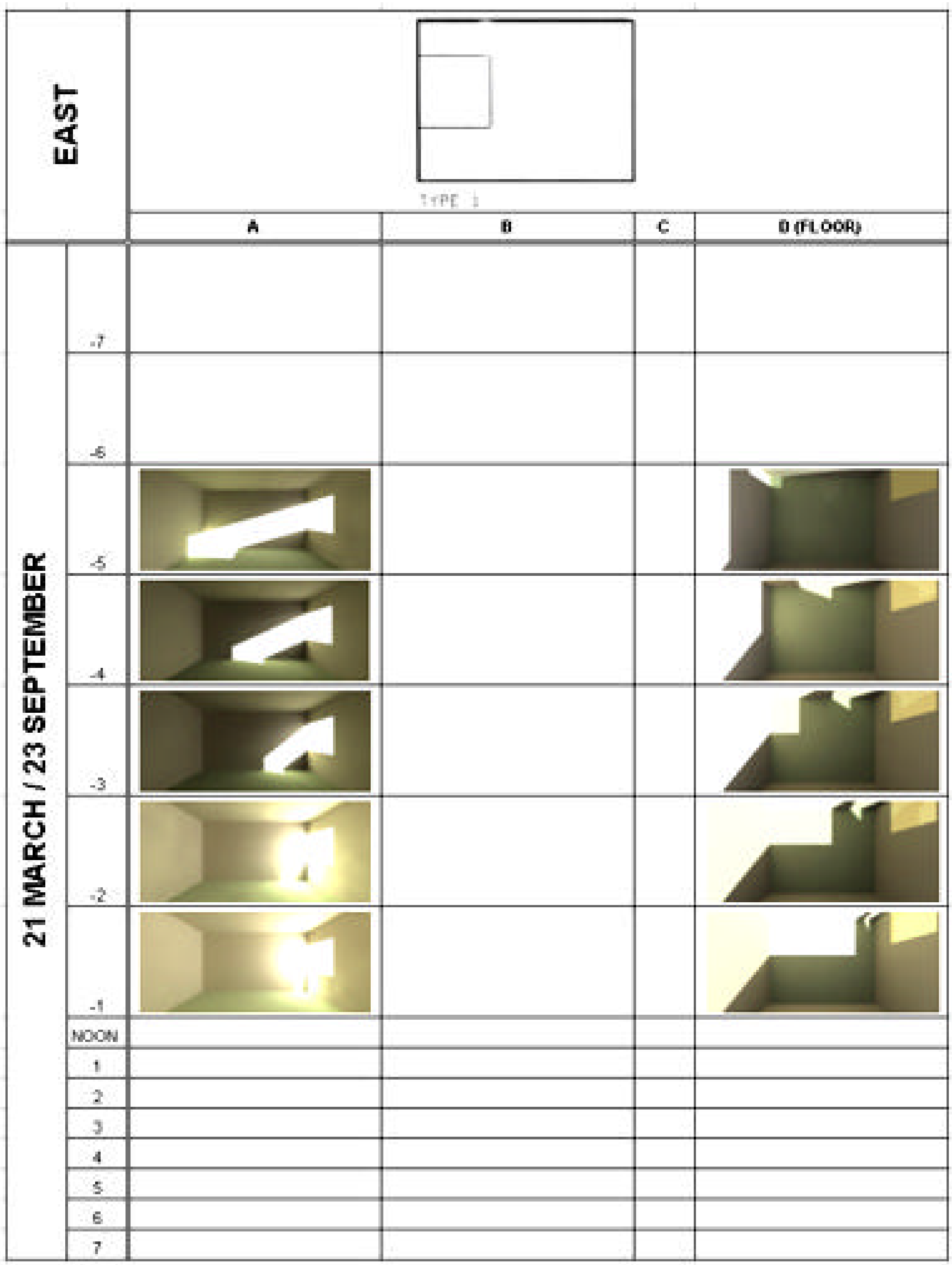


Table B.1.1.2. East-oriented rooms of Type 1 on 21 June

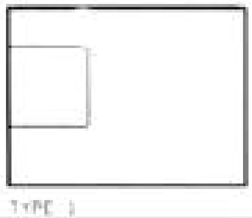
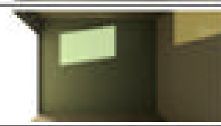
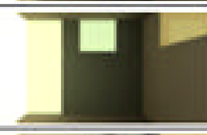
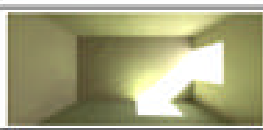
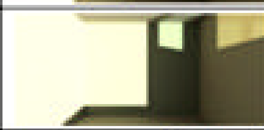
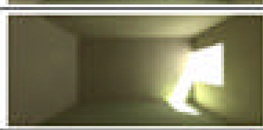
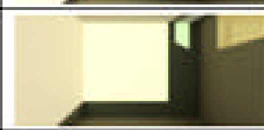
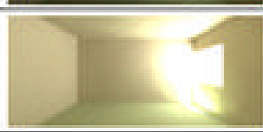
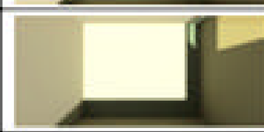
EAST					
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.1.3. East-oriented rooms of Type 1 on 21 December

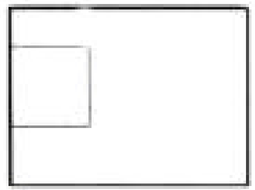
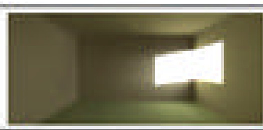
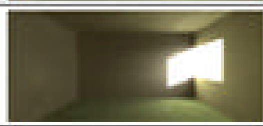
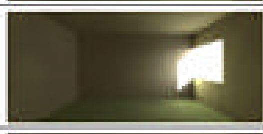
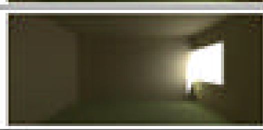
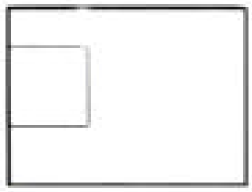
EAST		 TYPE 1			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.2.1. West-oriented rooms of Type 1 on 21 March/23 September



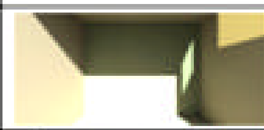
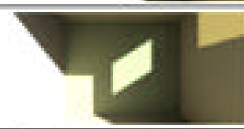
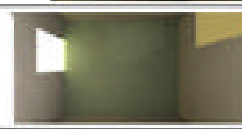
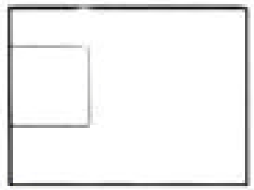
WEST		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.2.2. West-oriented rooms of Type 1 on 21 June



TYPE 1

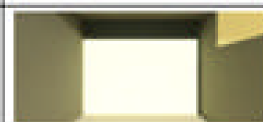
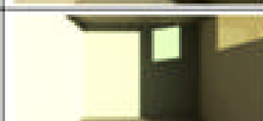
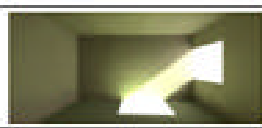
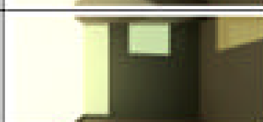
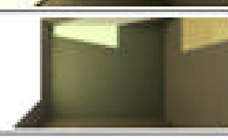
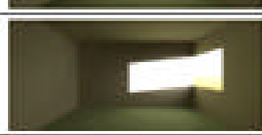
WEST		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.2.3. West-oriented rooms of Type 1 on 21 December

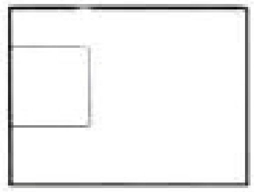
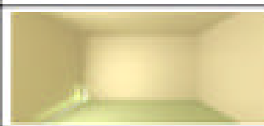
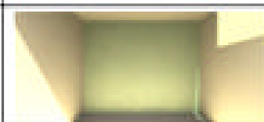
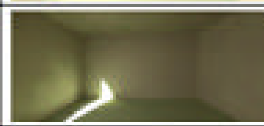
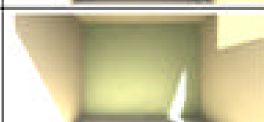
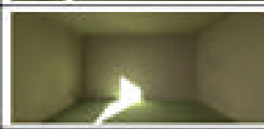
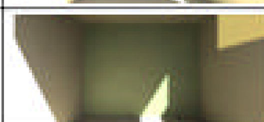
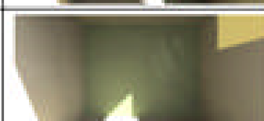
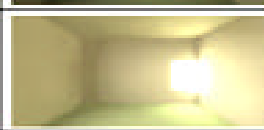
WEST		 TYPE 1			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.3.1. South-oriented rooms of Type 1 on 21 March/23 September

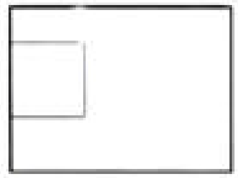
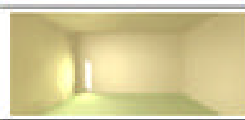
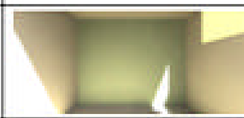
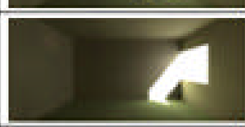
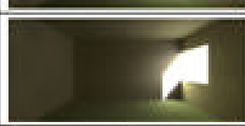
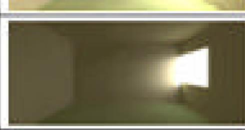
SOUTH					
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.3.2. South-oriented rooms of Type 1 on 21 June

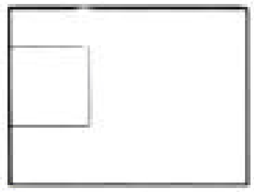
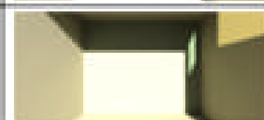
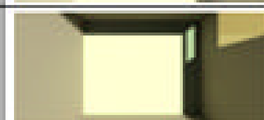
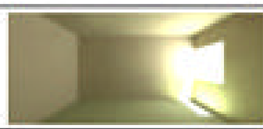
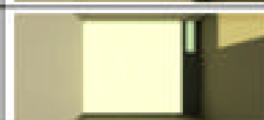
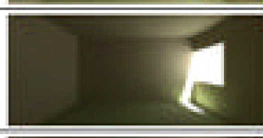
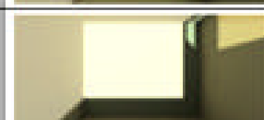
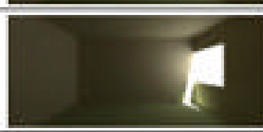
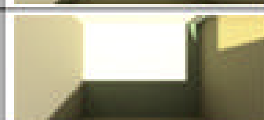
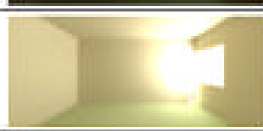
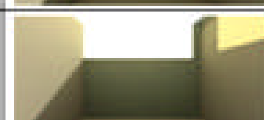
SOUTH		 TYPE 1			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.3.3. South-oriented rooms of Type 1 on 21 December

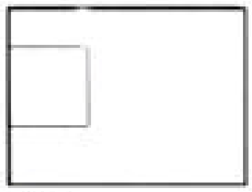
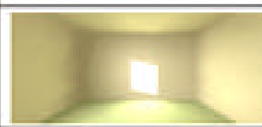
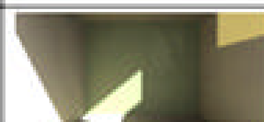
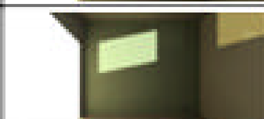
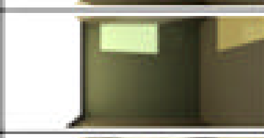
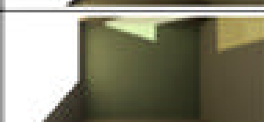
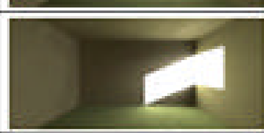
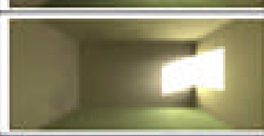
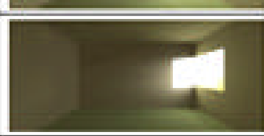
SOUTH		 TYPE 1			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.4.1. Southeast-oriented rooms of Type 1 on 21 March/23 September

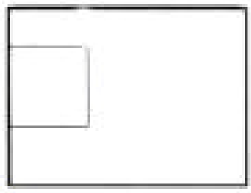
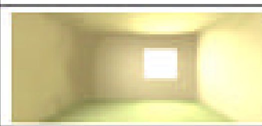
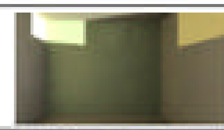
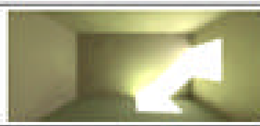
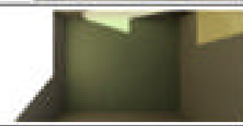
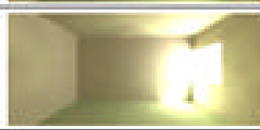
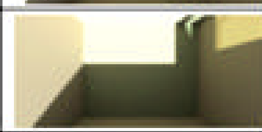
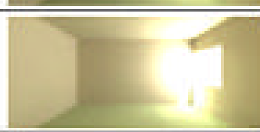
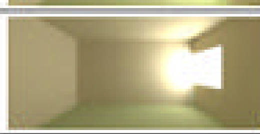
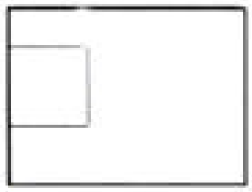
SOUTHEAST		 TYPE 1			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.4.2. Southeast-oriented rooms of Type 1 on 21 June



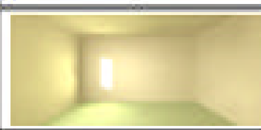
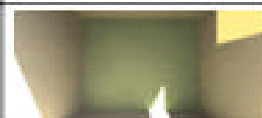
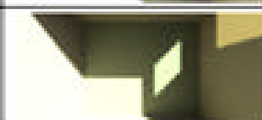
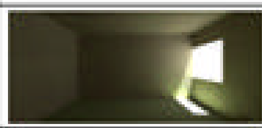
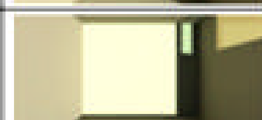
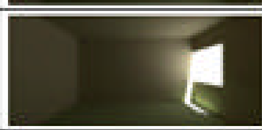
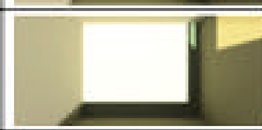
SOUTHEAST		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.4.3. Southeast-oriented rooms of Type 1 on 21 December

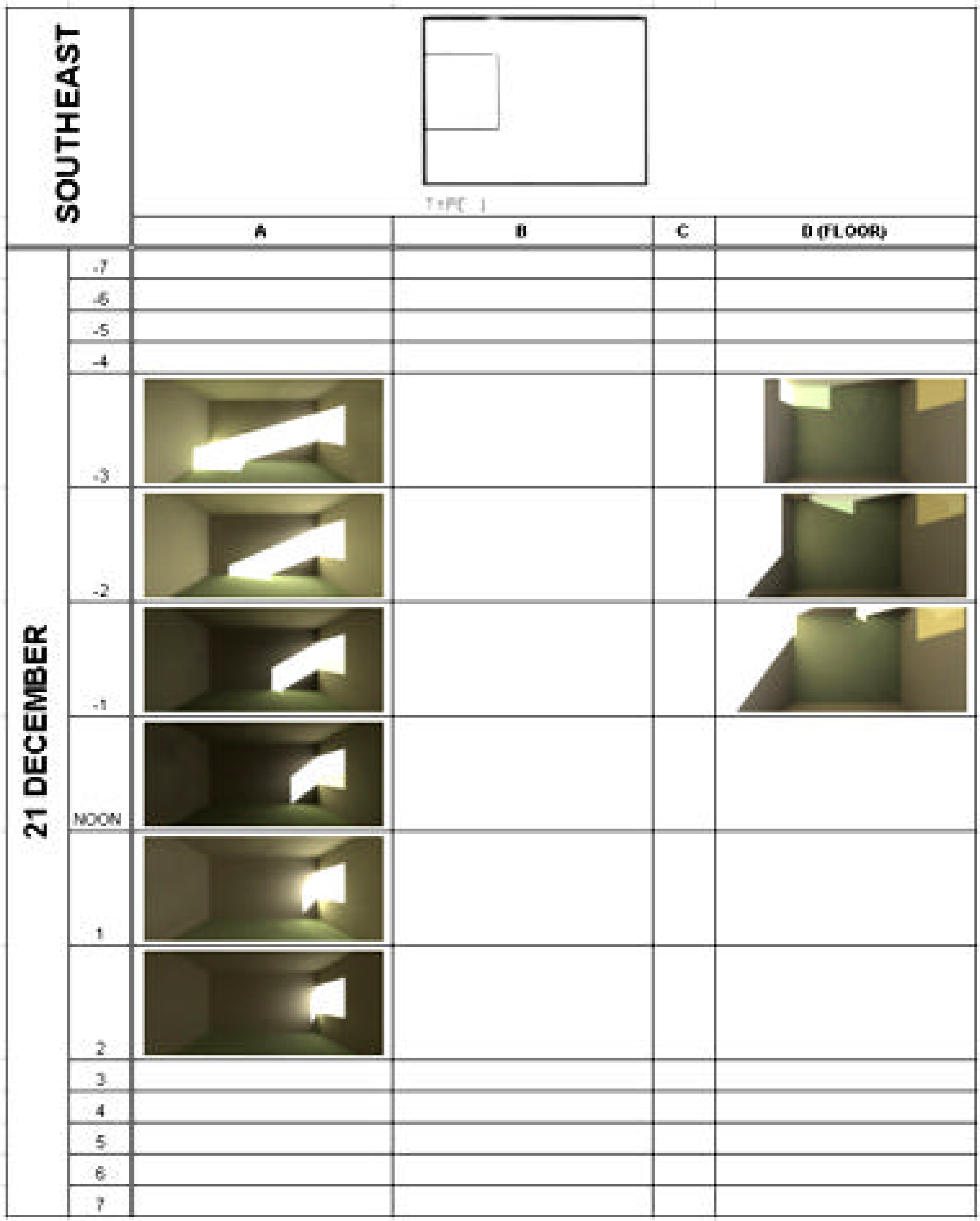


Table B.1.5.1. Southwest-oriented rooms of Type 1 on 21 March/23 September

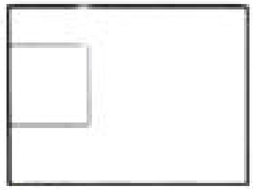
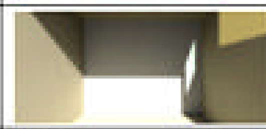
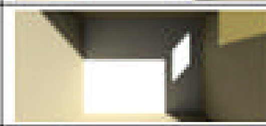
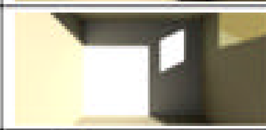
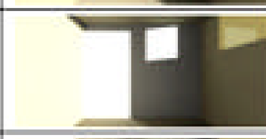
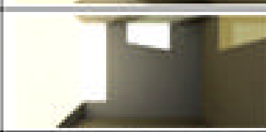
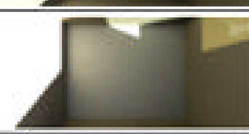
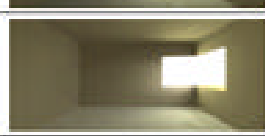
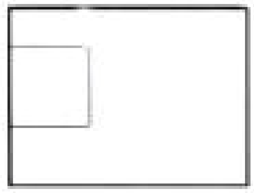
SOUTHWEST		 TYPE 1			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.5.2. Southwest-oriented rooms of Type 1 on 21 June



TYPE 1

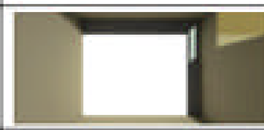
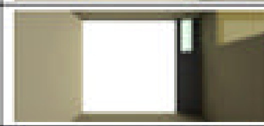
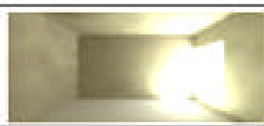
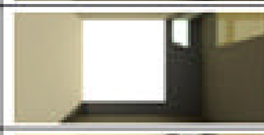
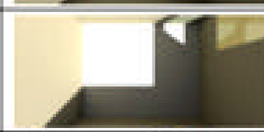
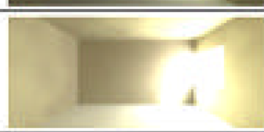
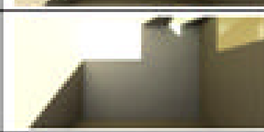
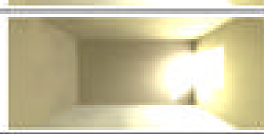
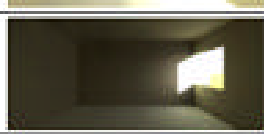
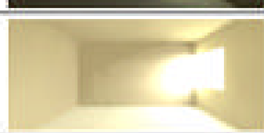
SOUTHWEST		A	B	C	D (FLOOR)
21 JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.5.3. Southwest-oriented rooms of Type 1 on 21 December

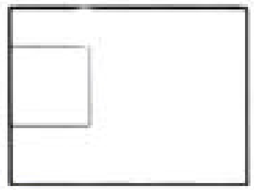
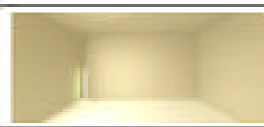
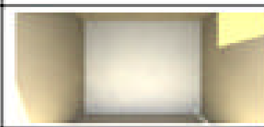
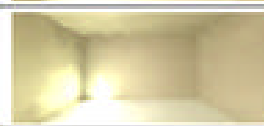
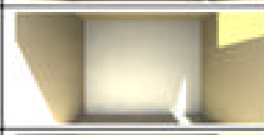
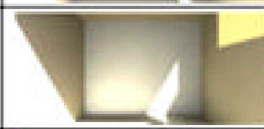
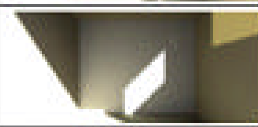
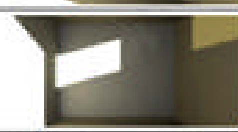
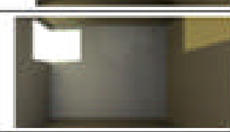
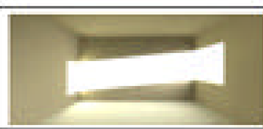
SOUTHWEST		 TYPE 1			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.6.1. Northeast-oriented rooms of Type 1 on 21 March/23 September

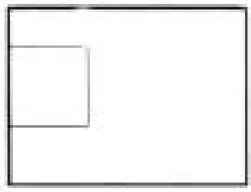
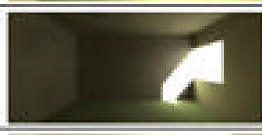
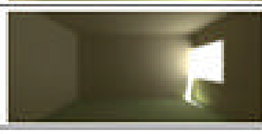
NORTHEAST		 TYPE 1			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.6.2. Northeast-oriented rooms of Type 1 on 21 June

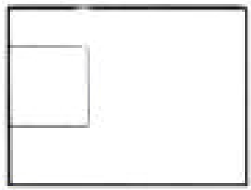
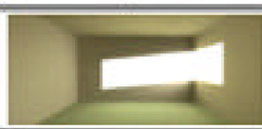
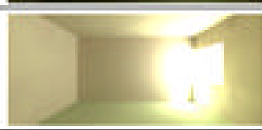
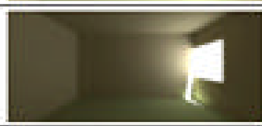
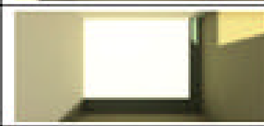
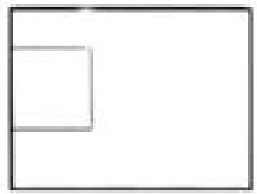
NORTHEAST		 TYPE 1			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.6.3. Northeast-oriented rooms of Type 1 on 21 December



TYPE 1

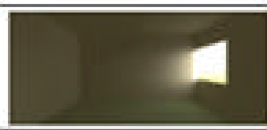
NORTHEAST		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.7.1. Northwest-oriented rooms of Type 1 on 21 March/23 September

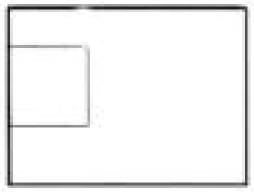
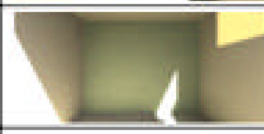
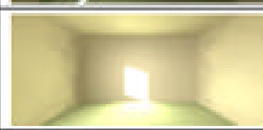
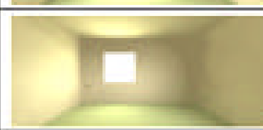
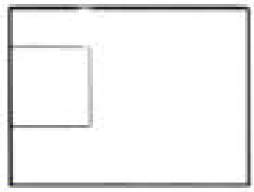
NORTHWEST		 TYPE 1			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.7.2. Northwest-oriented rooms of Type 1 on 21 June



TYPE 1

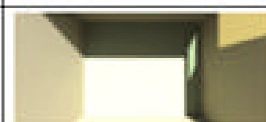
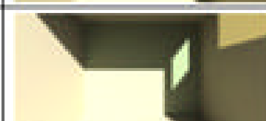
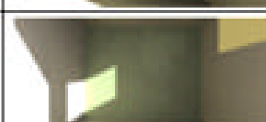
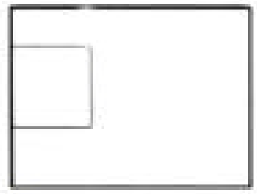
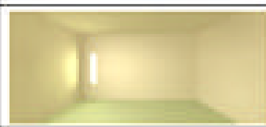
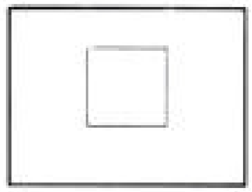
NORTHWEST		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.1.7.3. Northwest-oriented rooms of Type 1 on 21 December

NORTHWEST		 TYPE 1			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

B.2. Type 2 Rooms

Table B.2.1.1. East-oriented rooms of Type 2 on 21 March/23 September



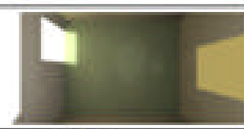
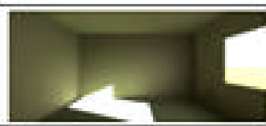
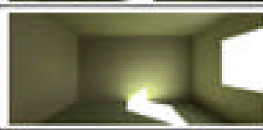
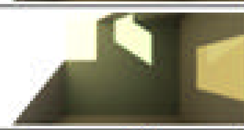
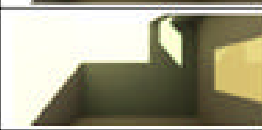
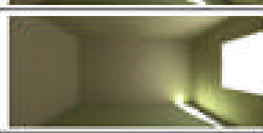
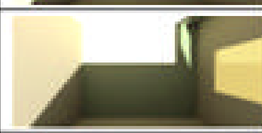
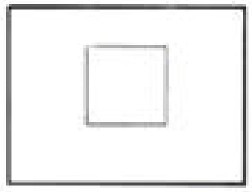
EAST		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.1.2. East-oriented rooms of Type 2 on 21 June

EAST



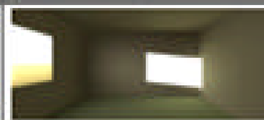
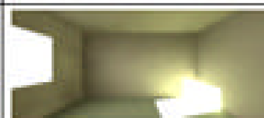
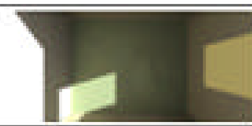
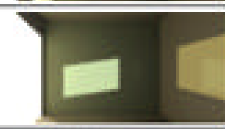
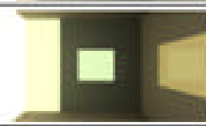
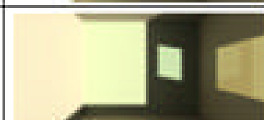
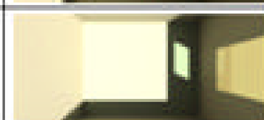
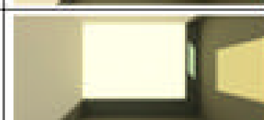
21JUNE		A	B	C	D (FLOOR)
	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.1.3. East-oriented rooms of Type 2 on 21 December

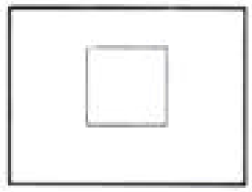
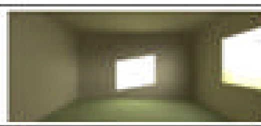
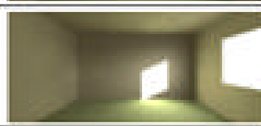
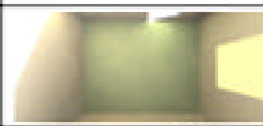
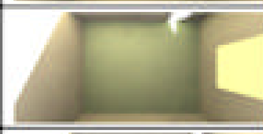
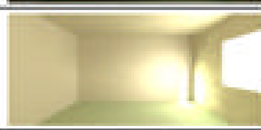
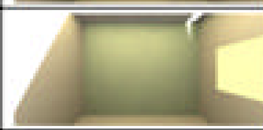
EAST		 TYPE 2			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.2.1. West-oriented rooms of Type 2 on 21 March/23 September

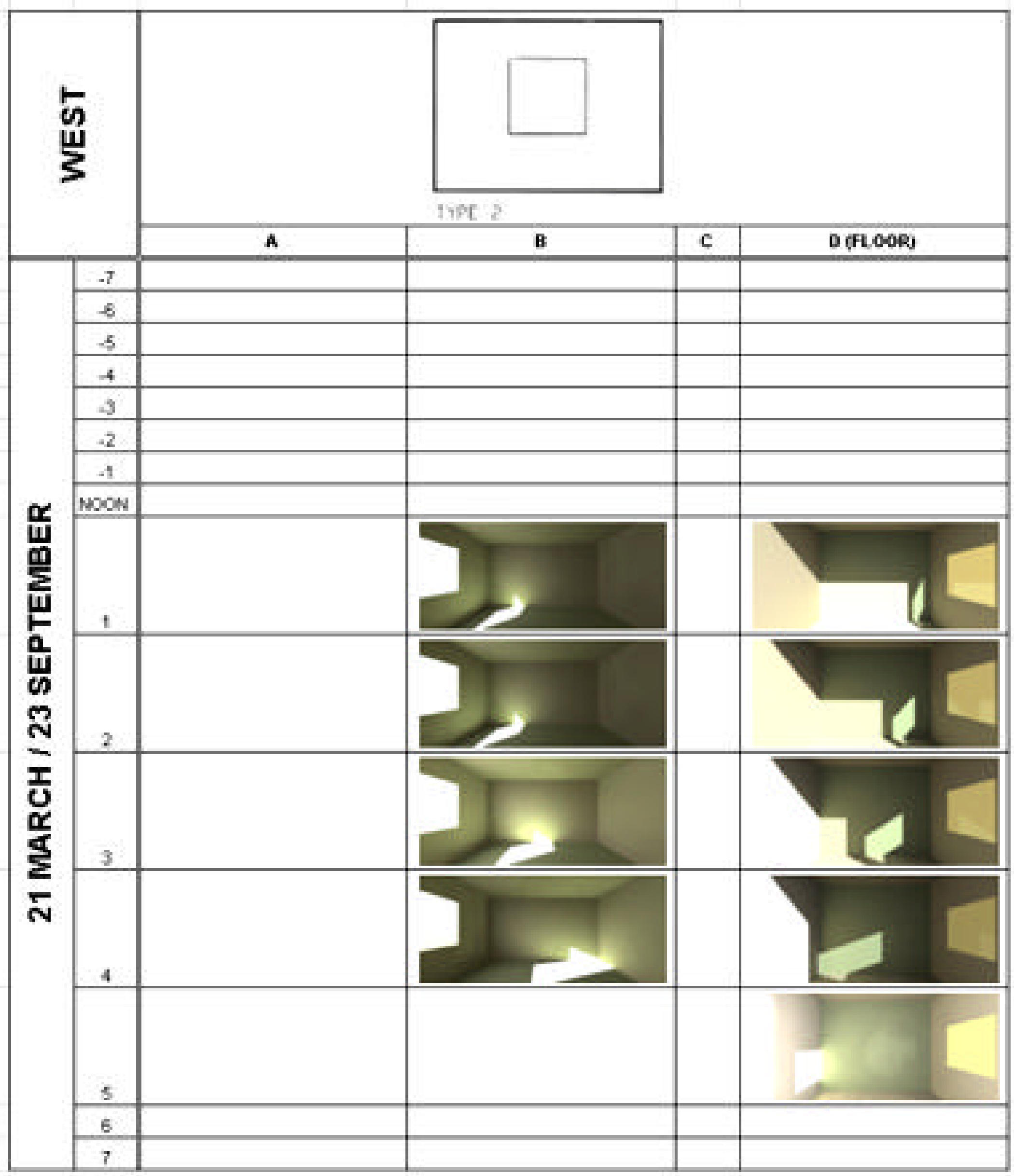


Table B.2.2.2. West-oriented rooms of Type 2 on 21 June

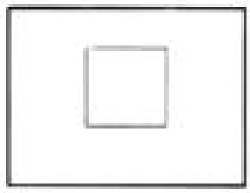
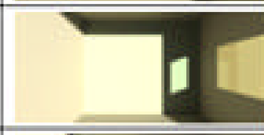
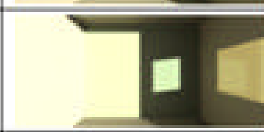
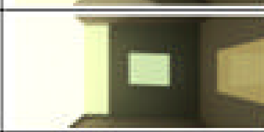
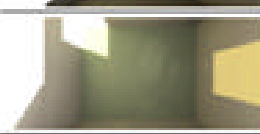
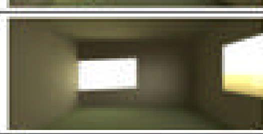
WEST		 TYPE 2			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.2.3. West-oriented rooms of Type 2 on 21 December

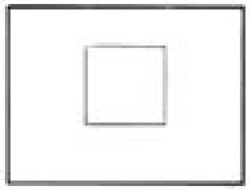
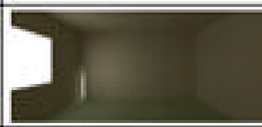
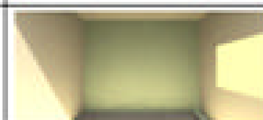
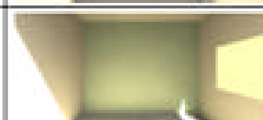
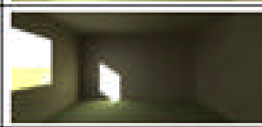
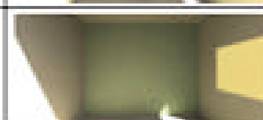
WEST		A	B	C	D (FLOOR)
			 TYPE 2		
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.3.1. South-oriented rooms of Type 2 on 21 March/23 September

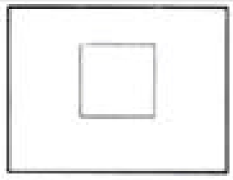
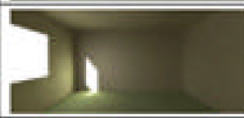
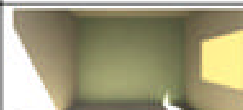
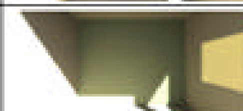
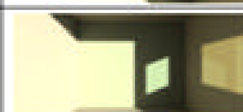
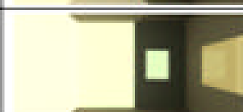
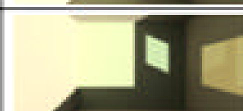
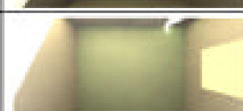
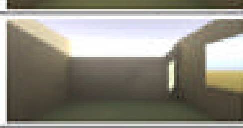
SOUTH		 TYPE 2			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.3.2. South-oriented rooms of Type 2 on 21 June

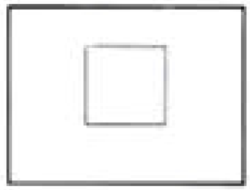
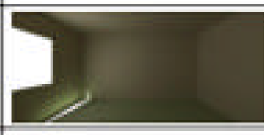
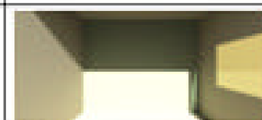
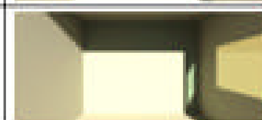
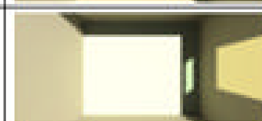
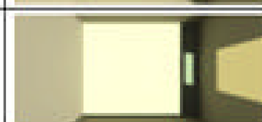
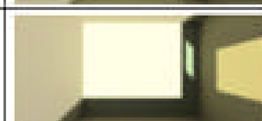
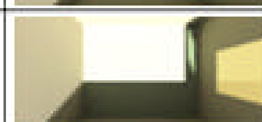
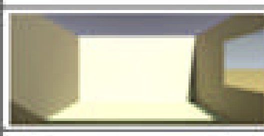
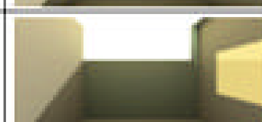
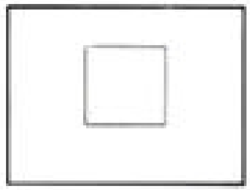
SOUTH		 TYPE 2			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.3.3. South-oriented rooms of Type 2 on 21 December



TYPE 2

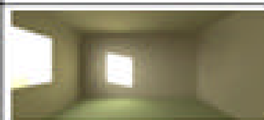
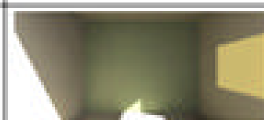
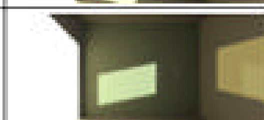
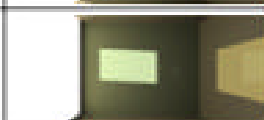
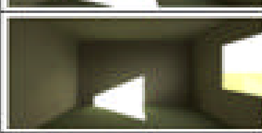
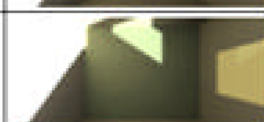
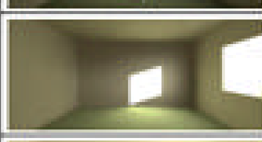
SOUTH		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.4.1. Southeast-oriented rooms of Type 2 on 21 March/23 September

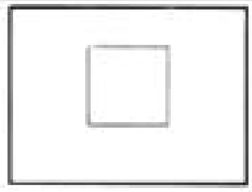
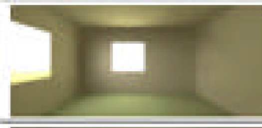
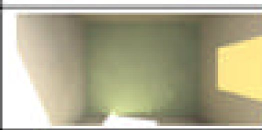
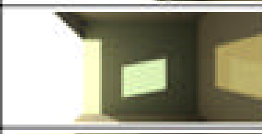
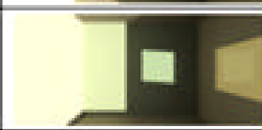
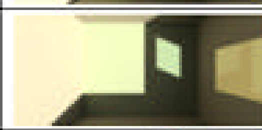
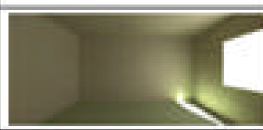
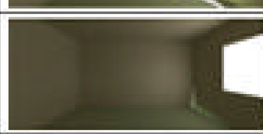
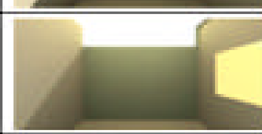
SOUTHEAST		 TYPE 2			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.4.2. Southeast-oriented rooms of Type 2 on 21 June

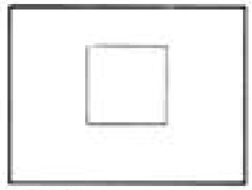
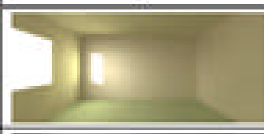
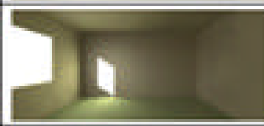
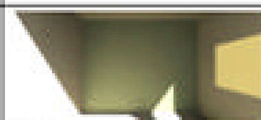
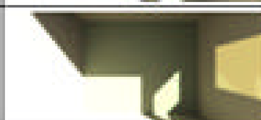
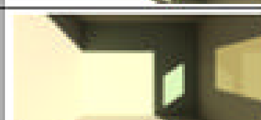
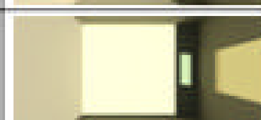
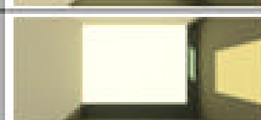
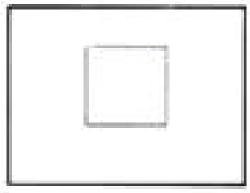
SOUTHEAST					
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.4.3. Southeast-oriented rooms of Type 2 on 21 December



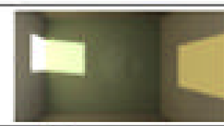
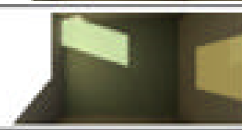
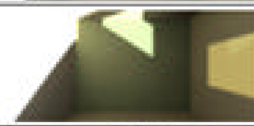
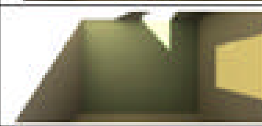
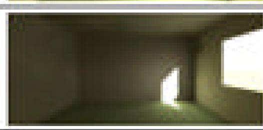
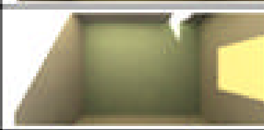
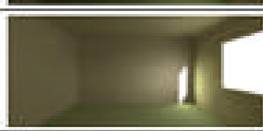
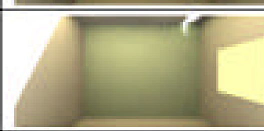
SOUTHEAST		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.5.1. Southwest-oriented rooms of Type 2 on 21 March/23 September

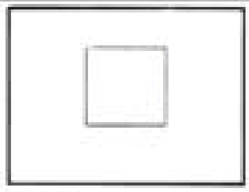
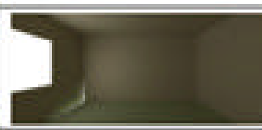
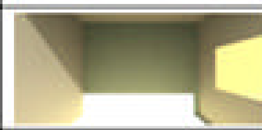
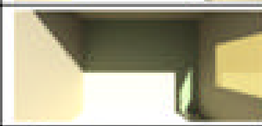
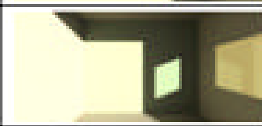
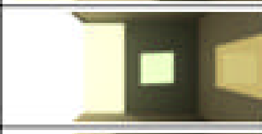
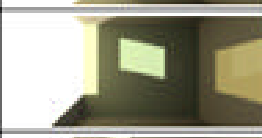
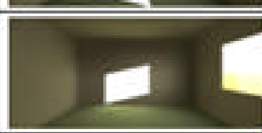
SOUTHWEST		 TYPE 2			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.5.2. Southwest-oriented rooms of Type 2 on 21 June

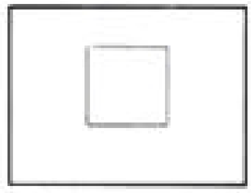
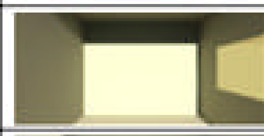
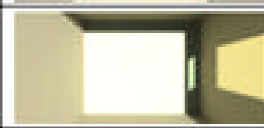
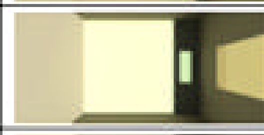
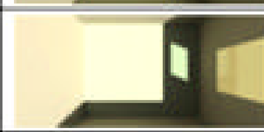
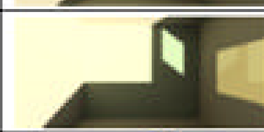
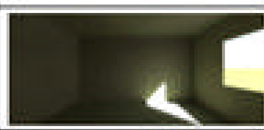
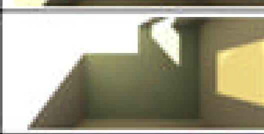
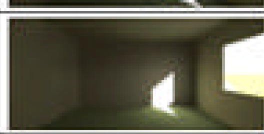
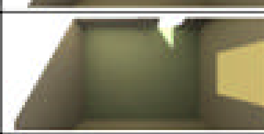
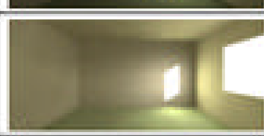
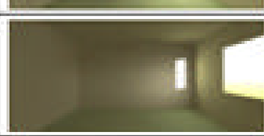
SOUTHWEST		 TYPE 2			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.5.3. Southwest-oriented rooms of Type 2 on 21 December

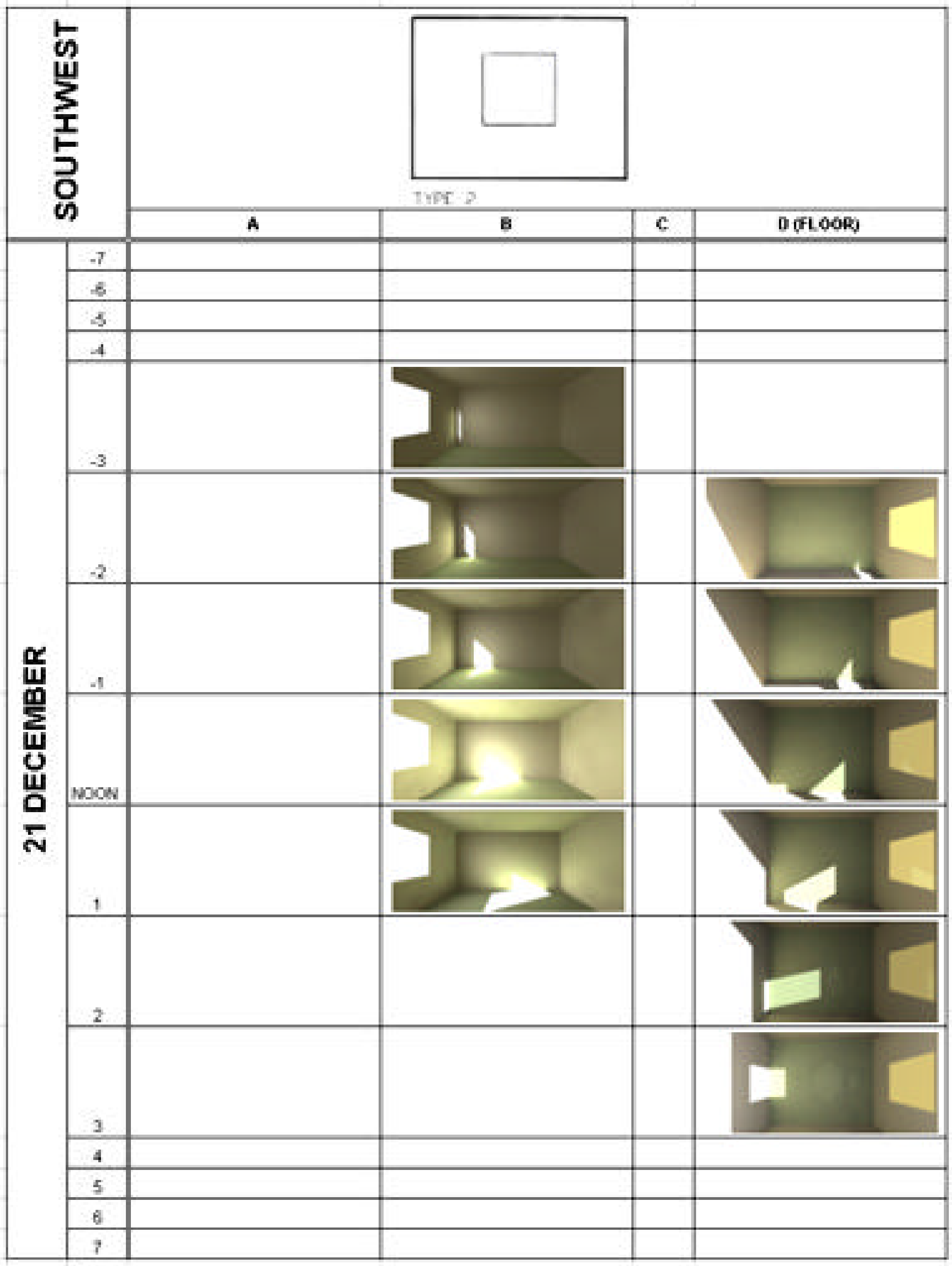


Table B.2.6.1. Northeast-oriented rooms of Type 2 on 21 March/23 September

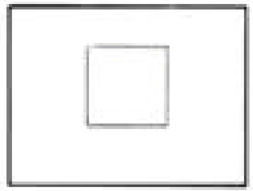
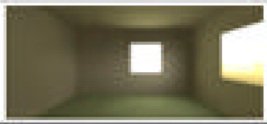
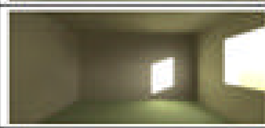
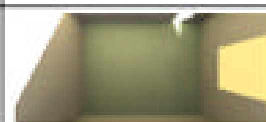
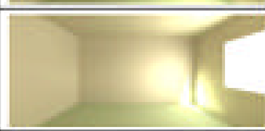
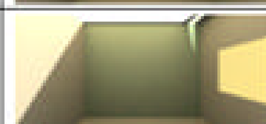
NORTHEAST		 TYPE 2			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.6.2. Northeast-oriented rooms of Type 2 on 21 June

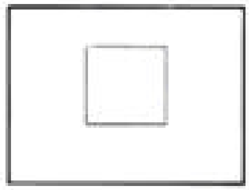
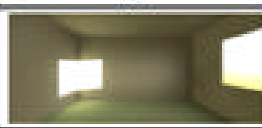
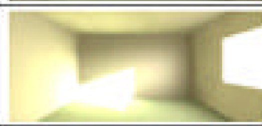
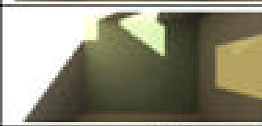
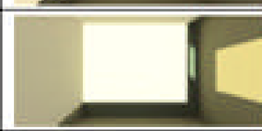
NORTHEAST		 TYPE 2			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.6.3. Northeast-oriented rooms of Type 2 on 21 December

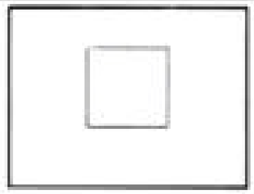
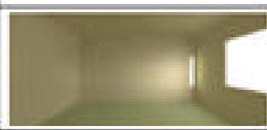
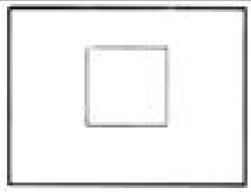
NORTHEAST		 TYPE 2			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.7.1. Northwest-oriented rooms of Type 2 on 21 March/23 September



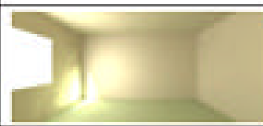
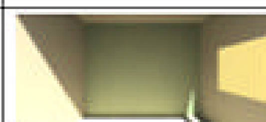
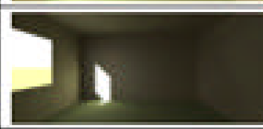
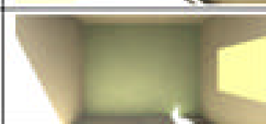
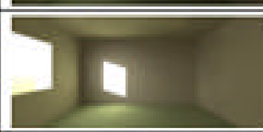
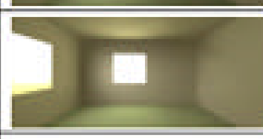
NORTHWEST		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.7.2. Northwest-oriented rooms of Type 2 on 21 June

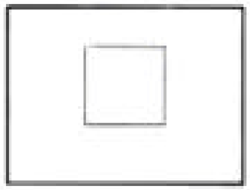
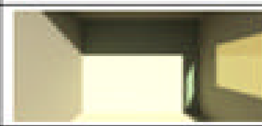
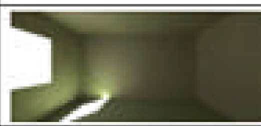
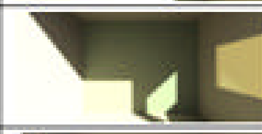
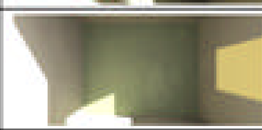
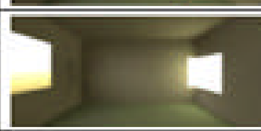
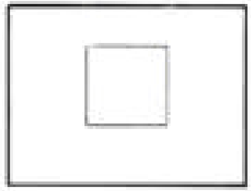
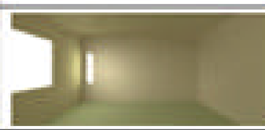
NORTHWEST					
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.2.7.3. Northwest-oriented rooms of Type 2 on 21 December

NORTHWEST



21 DECEMBER	A	B	C	D (FLOOR)
-7				
-6				
-5				
-4				
-3				
-2				
-1				
NOON				
1				
2				
3				
4				
5				
6				
7				

B.3. Type 3 Rooms

Table B.3.1.1. East-oriented rooms of Type 3 on 21 March/23 September

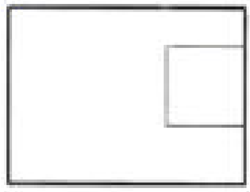
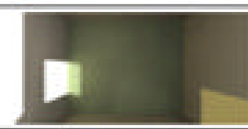
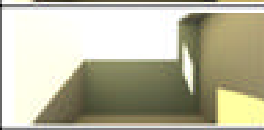
EAST		 TYPE 3			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.1.2. East-oriented rooms of Type 3 on 21 June

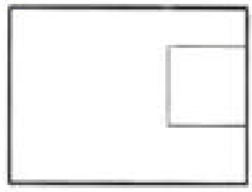
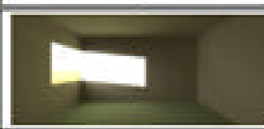
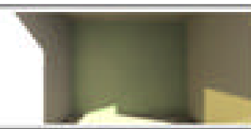
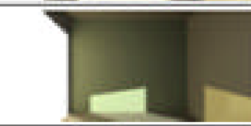
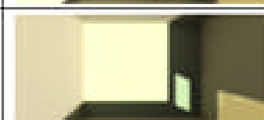
EAST			 TYPE 3		
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.1.3. East-oriented rooms of Type 3 on 21 December

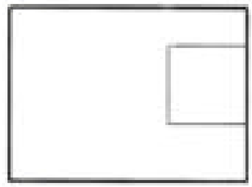
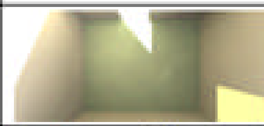
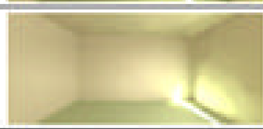
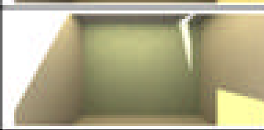
		A	B	C	D (FLOOR)
EAST		 TYPE 3			
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.2.1. West-oriented rooms of Type 3 on 21 March/23 September

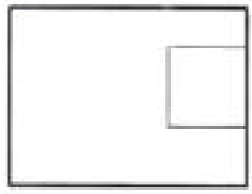
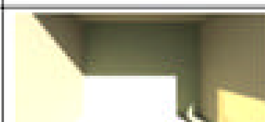
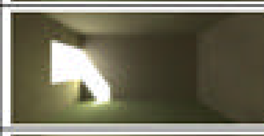
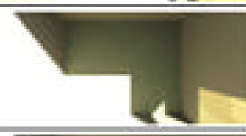
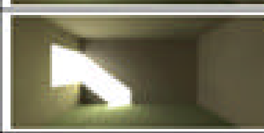
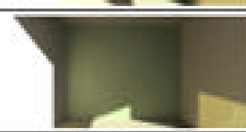
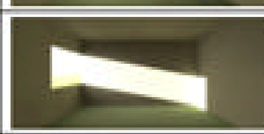
WEST		 TYPE 3			
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.2.2. West-oriented rooms of Type 3 on 21 June

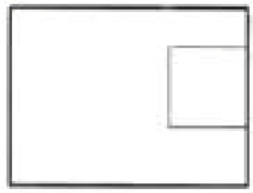
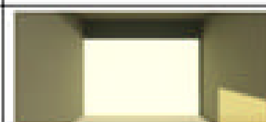
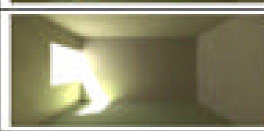
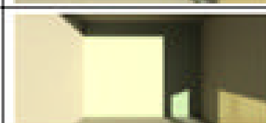
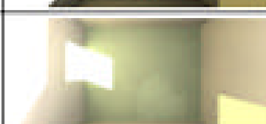
WEST		 TYPE 3			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.2.3. West-oriented rooms of Type 3 on 21 December

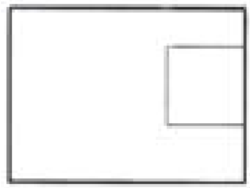
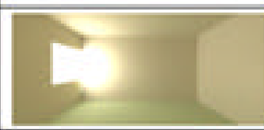
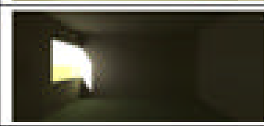
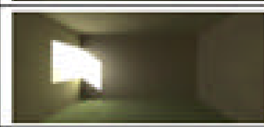
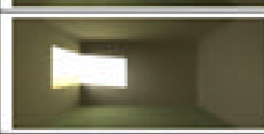
WEST			 TYPE 3		
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.3.1. South-oriented rooms of Type 3 on 21 March/23 September

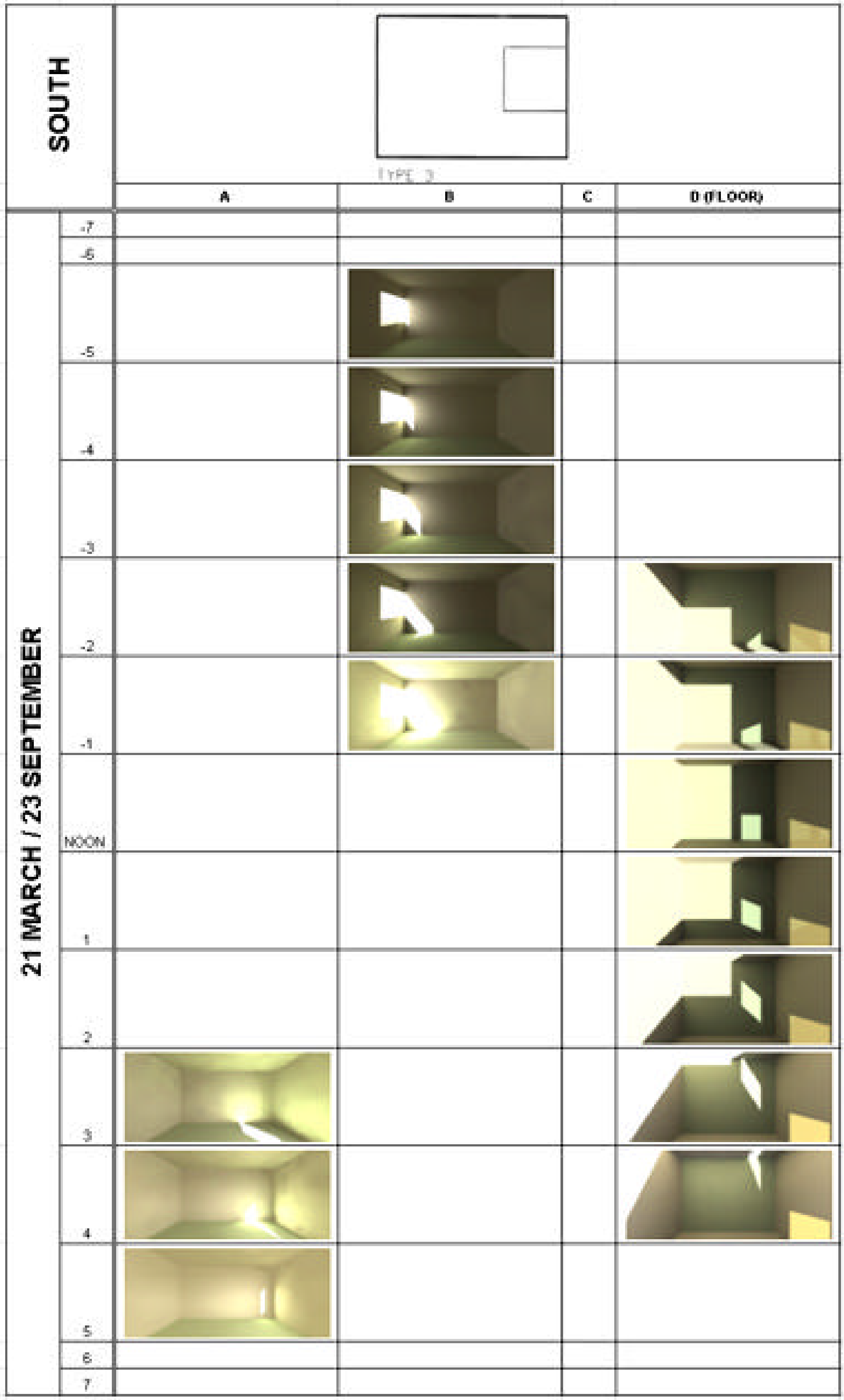


Table B.3.3.2. South-oriented rooms of Type 3 on 21 June

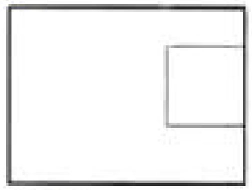
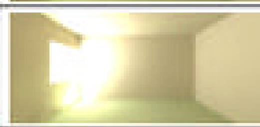
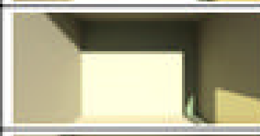
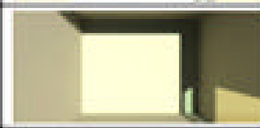
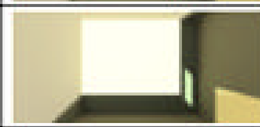
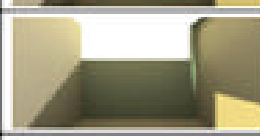
SOUTH		 TYPE 3			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.3.3. South-oriented rooms of Type 3 on 21 December

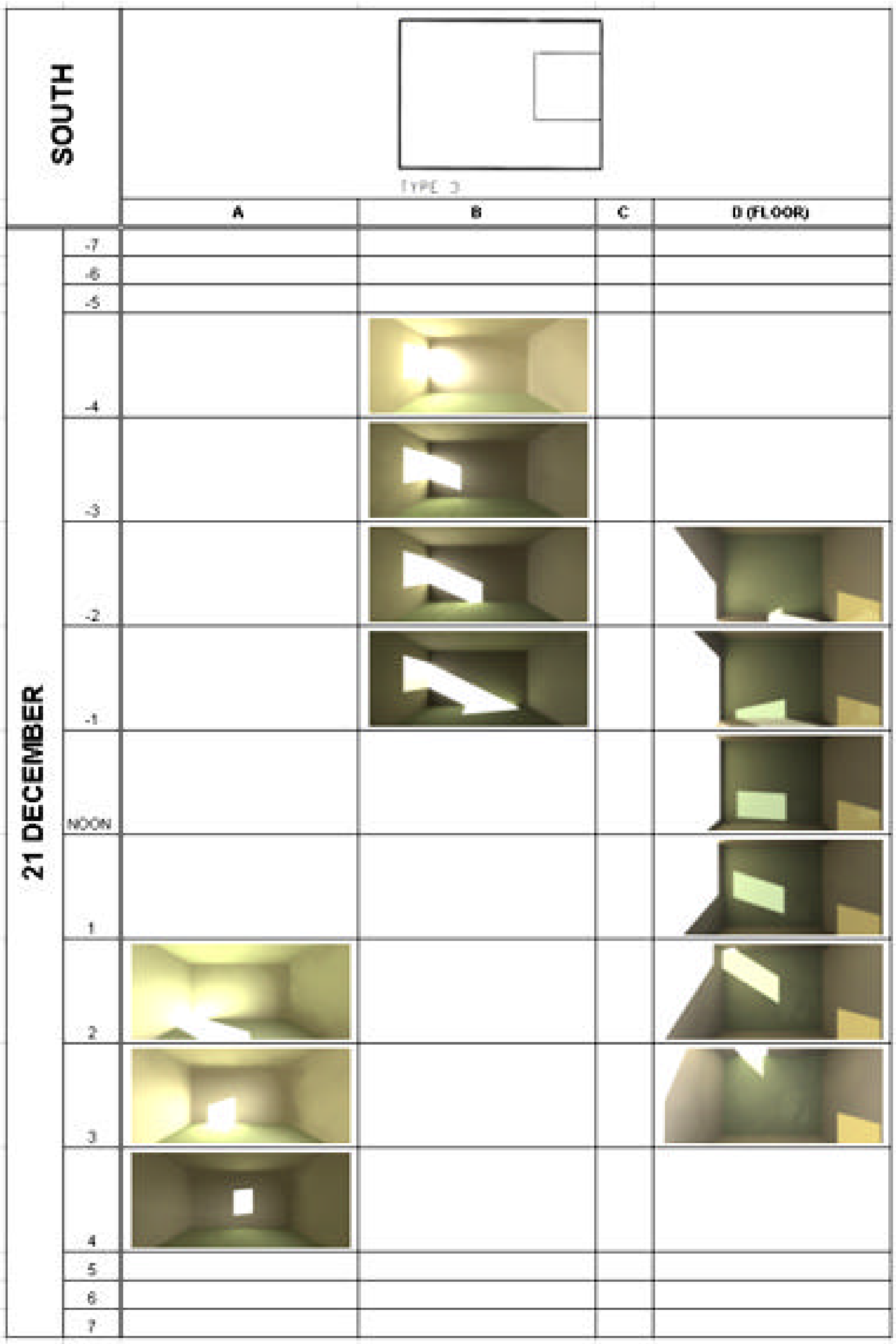
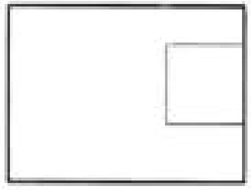


Table B.3.4.1. Southeast-oriented rooms of Type 3 on 21 March/23 September



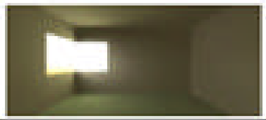
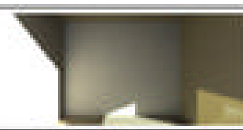
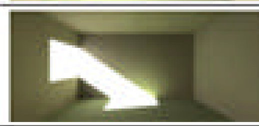
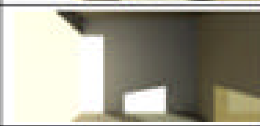
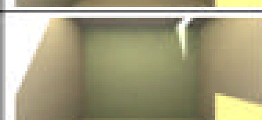
SOUTHEAST		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.4.2. Southeast-oriented rooms of Type 3 on 21 June

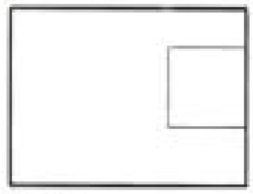
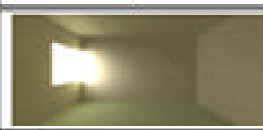
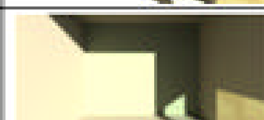
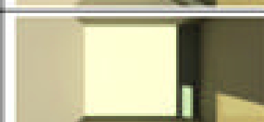
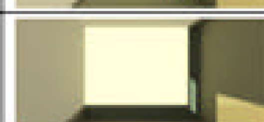
SOUTHEAST					
		 TYPE 3			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.4.3. Southeast-oriented rooms of Type 3 on 21 December

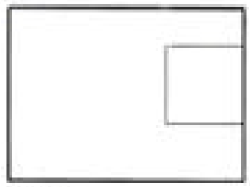
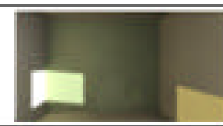
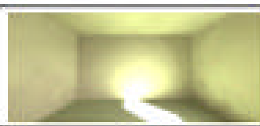
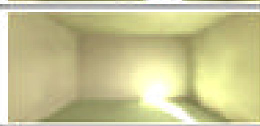
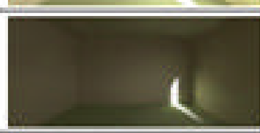
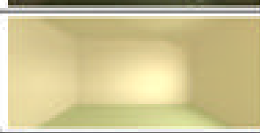
SOUTHEAST			 TYPE 3		
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.5.1. Southwest-oriented rooms of Type 3 on 21 March/23 September

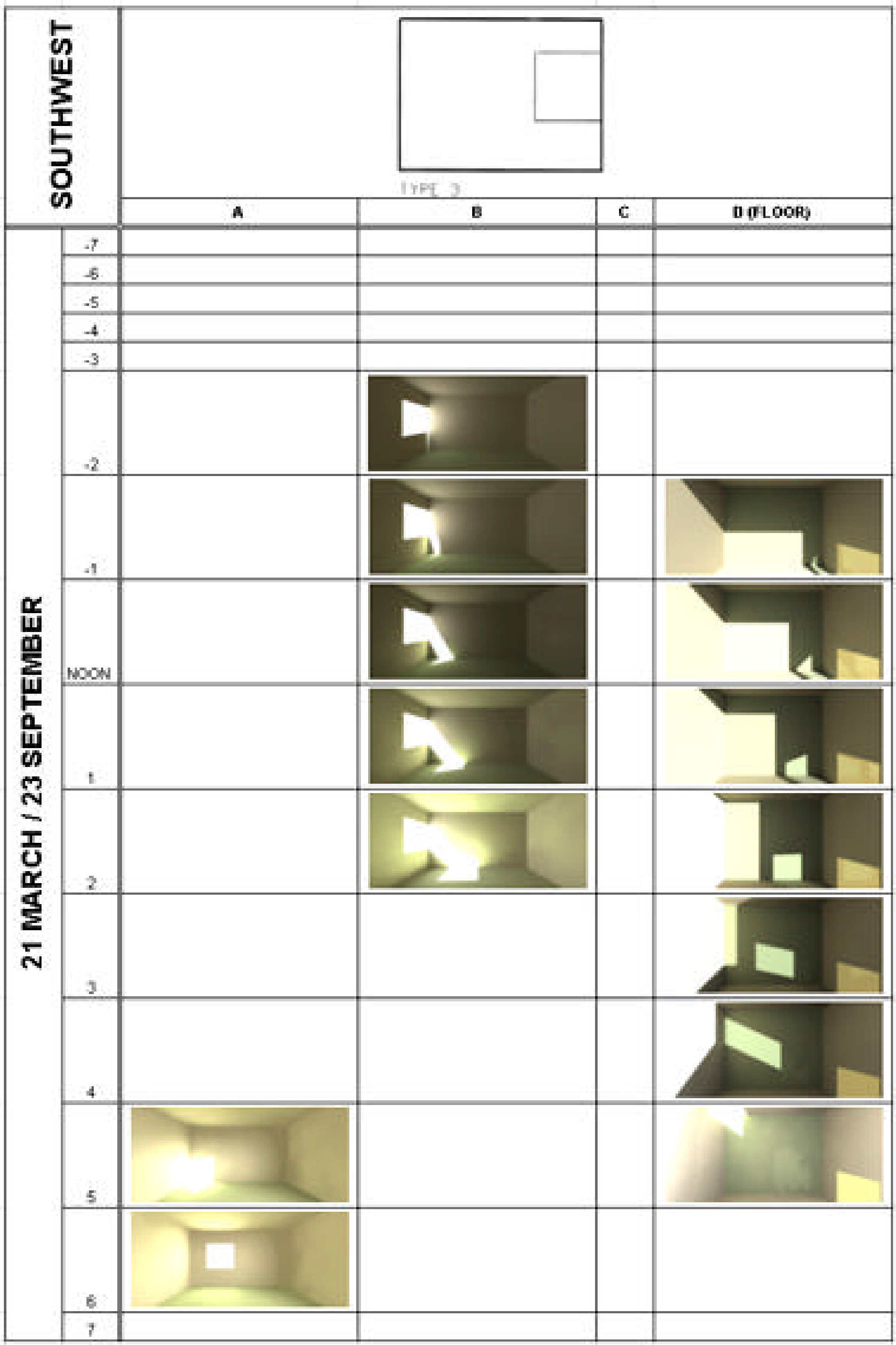


Table B.3.5.2. Southwest-oriented rooms of Type 3 on 21 June

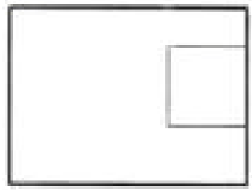
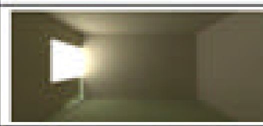
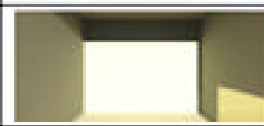
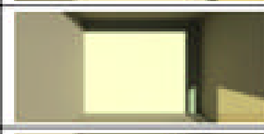
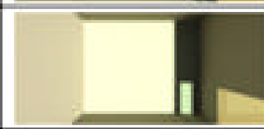
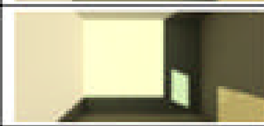
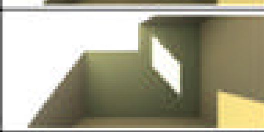
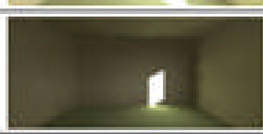
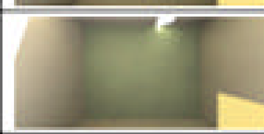
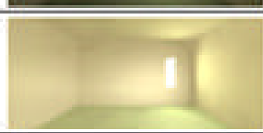
SOUTHWEST		A	B	C	D (FLOOR)
			 TYPE 3		
21 JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.5.3. Southwest-oriented rooms of Type 3 on 21 December

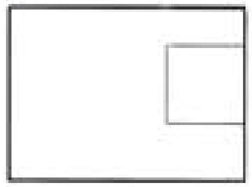
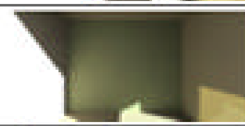
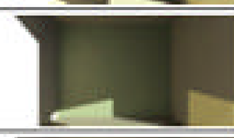
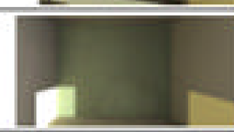
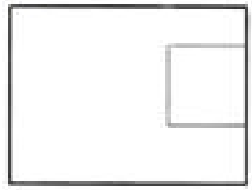
SOUTHWEST		 TYPE 3			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.6.1. Northeast-oriented rooms of Type 3 on 21 March/23 September



TYPE 3

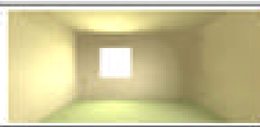
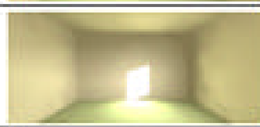
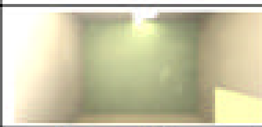
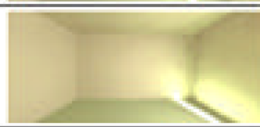
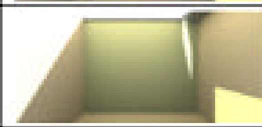
NORTHEAST		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.6.2. Northeast-oriented rooms of Type 3 on 21 June

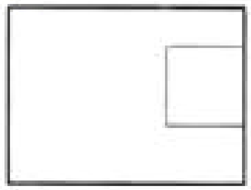
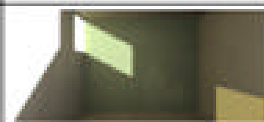
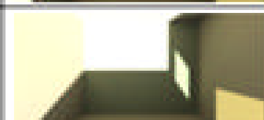
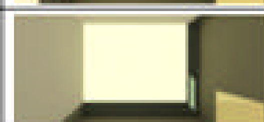
NORTHEAST		 TYPE 3			
		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.6.3. Northeast-oriented rooms of Type 3 on 21 December

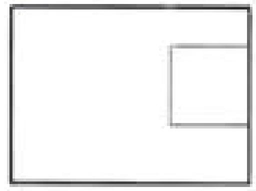
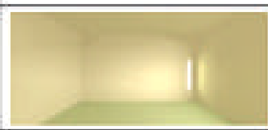
NORTHEAST		 TYPE 3			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.7.1. Northwest-oriented rooms of Type 3 on 21 March/23 September

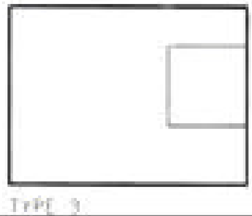
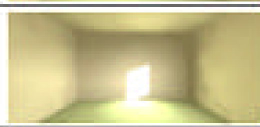
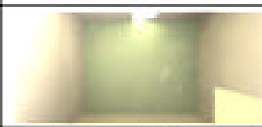
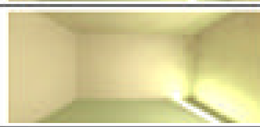
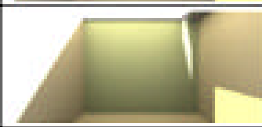
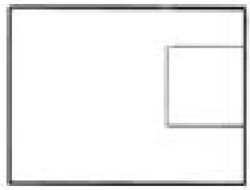
NORTHEAST					
		A	B	C	D (FLOOR)
21 MARCH / 23 SEPTEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.7.2. Northwest-oriented rooms of Type 3 on 21 June



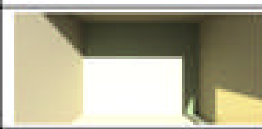
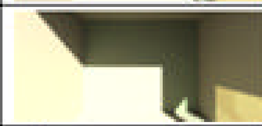
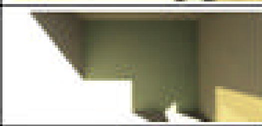
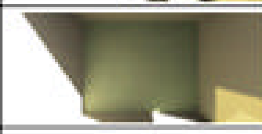
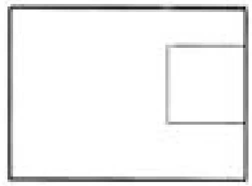
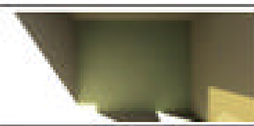
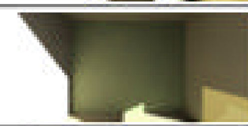
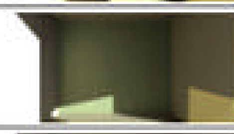
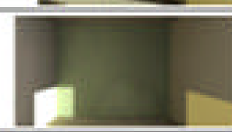
NORTHWEST		A	B	C	D (FLOOR)
21JUNE	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

Table B.3.7.3. Northwest-oriented rooms of Type 3 on 21 December

NORTHWEST		 TYPE 3			
		A	B	C	D (FLOOR)
21 DECEMBER	-7				
	-6				
	-5				
	-4				
	-3				
	-2				
	-1				
	NOON				
	1				
	2				
	3				
	4				
	5				
	6				
	7				

APPENDIX C. ANOVA Tables

C.1. All Surfaces

Table C.1.1. All dates, hours and orientations on all surfaces (A+B+C+D), by room type;

Descriptive

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	202	1,2336	1,21595	,08555	1,0649	1,4023	,01	6,10
type 2	214	,9511	,85505	,05845	,8359	1,0663	,02	3,34
type 3	202	1,2339	1,21570	,08554	1,0652	1,4025	,01	6,10
Total	618	1,1358	1,11069	,04468	1,0481	1,2236	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11,176	2	5,588	4,582	,011
Within Groups	749,975	615	1,219		
Total	761,151	617			

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	,28249*	,10833	,025	,0280	,5370
	type 3	-,00030	,10988	1,000	-,2585	,2579
type 2	type 1	-,28249*	,10833	,025	-,5370	-,0280
	type 3	-,28279*	,10833	,025	-,5373	-,0283
type 3	type 1	,00030	,10988	1,000	-,2579	,2585
	type 2	,28279*	,10833	,025	,0283	,5373

*. The mean difference is significant at the .05 level.

Table C.1.2. All dates and hours on all surfaces (A+B+C+D) at each orientation, by room type;

TYPE 1

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	29	1,3059	1,34438	,24964	,7945	1,8172	,04	6,10
west	28	1,3546	1,26765	,23956	,8631	1,8462	,04	4,58
south	40	1,1398	1,08693	,17186	,7921	1,4874	,02	3,86
southeast	39	1,2538	1,21942	,19526	,8586	1,6491	,05	5,72
southwest	37	1,2646	1,26773	,20841	,8419	1,6873	,01	6,10
northeast	14	1,2286	1,54969	,41417	,3338	2,1233	,05	5,40
northwest	15	,9933	,83253	,21496	,5323	1,4544	,02	2,65
Total	202	1,2336	1,21595	,08555	1,0649	1,4023	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,832	6	,305	,202	,976
Within Groups	295,355	195	1,515		
Total	297,187	201			

TYPE 2

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	29	1,0559	,98105	,18218	,6827	1,4290	,02	3,30
west	29	1,0559	,98105	,18218	,6827	1,4290	,02	3,30
south	40	,9228	,90862	,14367	,6322	1,2133	,03	3,34
southeast	39	,9572	,83387	,13353	,6869	1,2275	,02	3,33
southwest	39	,9572	,83387	,13353	,6869	1,2275	,02	3,33
northeast	19	,8084	,65277	,14975	,4938	1,1230	,02	2,27
northwest	19	,8084	,65277	,14975	,4938	1,1230	,02	2,27
Total	214	,9511	,85505	,05845	,8359	1,0663	,02	3,34

(cont. Table C.1.2.)

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,445	6	,241	,323	,924
Within Groups	154,281	207	,745		
Total	155,726	213			

TYPE 3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	28	1,3568	1,26568	,23919	,8660	1,8476	,04	4,58
west	29	1,3059	1,34438	,24964	,7945	1,8172	,04	6,10
south	40	1,1395	1,08700	,17187	,7919	1,4871	,02	3,86
southeast	37	1,2646	1,26773	,20841	,8419	1,6873	,01	6,10
southwest	39	1,2541	1,21929	,19524	,8589	1,6494	,05	5,72
northeast	15	,9933	,83253	,21496	,5323	1,4544	,02	2,65
northwest	14	1,2286	1,54969	,41417	,3338	2,1233	,05	5,40
Total	202	1,2339	1,21570	,08554	1,0652	1,4025	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,849	6	,308	,204	,975
Within Groups	295,214	195	1,514		
Total	297,062	201			

Table C.1.3. All dates and hours on all surfaces (A+B+C+D) of each room type, by orientation;

EAST – TYPE1/TYPE2/TYPE3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	29	1,3059	1,34438	,24964	,7945	1,8172	,04	6,10
type 2	29	1,0559	,98105	,18218	,6827	1,4290	,02	3,30
type 3	28	1,3568	1,26568	,23919	,8660	1,8476	,04	4,58
Total	86	1,2381	1,19950	,12935	,9810	1,4953	,02	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,491	2	,745	,512	,601
Within Groups	120,807	83	1,456		
Total	122,298	85			

WEST – TYPE1/TYPE2/TYPE3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	28	1,3546	1,26765	,23956	,8631	1,8462	,04	4,58
type 2	29	1,0559	,98105	,18218	,6827	1,4290	,02	3,30
type 3	29	1,3059	1,34438	,24964	,7945	1,8172	,04	6,10
Total	86	1,2374	1,20009	,12941	,9801	1,4947	,02	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,477	2	,738	,507	,604
Within Groups	120,942	83	1,457		
Total	122,419	85			

(cont. Table C.1.3.)

SOUTH – TYPE1/TYPE2/TYPE3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	40	1,1398	1,08693	,17186	,7921	1,4874	,02	3,86
type 2	40	,9228	,90862	,14367	,6322	1,2133	,03	3,34
type 3	40	1,1395	1,08700	,17187	,7919	1,4871	,02	3,86
Total	120	1,0673	1,02739	,09379	,8816	1,2530	,02	3,86

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,254	2	,627	,590	,556
Within Groups	124,354	117	1,063		
Total	125,609	119			

SOUTHEAST – TYPE1/TYPE2/TYPE3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	39	1,2538	1,21942	,19526	,8586	1,6491	,05	5,72
type 2	39	,9572	,83387	,13353	,6869	1,2275	,02	3,33
type 3	37	1,2646	1,26773	,20841	,8419	1,6873	,01	6,10
Total	115	1,1567	1,12053	,10449	,9497	1,3637	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,351	2	1,176	,935	,396
Within Groups	140,786	112	1,257		
Total	143,137	114			

(cont. Table C.1.3.)

SOUTHWEST – TYPE1/TYPE2/TYPE3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	37	1,2646	1,26773	,20841	,8419	1,6873	,01	6,10
type 2	39	,9572	,83387	,13353	,6869	1,2275	,02	3,33
type 3	39	1,2541	1,21929	,19524	,8589	1,6494	,05	5,72
Total	115	1,1568	1,12049	,10449	,9498	1,3638	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,353	2	1,177	,936	,395
Within Groups	140,773	112	1,257		
Total	143,127	114			

NORTHEAST – TYPE1/TYPE2/TYPE3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	14	1,2286	1,54969	,41417	,3338	2,1233	,05	5,40
type 2	19	,8084	,65277	,14975	,4938	1,1230	,02	2,27
type 3	15	,9933	,83253	,21496	,5323	1,4544	,02	2,65
Total	48	,9888	1,03159	,14890	,6892	1,2883	,02	5,40

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,423	2	,712	,659	,522
Within Groups	48,593	45	1,080		
Total	50,017	47			

(cont. Table C.1.3.)

NORTHWEST – TYPE1/TYPE2/TYPE3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	15	,9933	,83253	,21496	,5323	1,4544	,02	2,65
type 2	19	,8084	,65277	,14975	,4938	1,1230	,02	2,27
type 3	14	1,2286	1,54969	,41417	,3338	2,1233	,05	5,40
Total	48	,9888	1,03159	,14890	,6892	1,2883	,02	5,40

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,423	2	,712	,659	,522
Within Groups	48,593	45	1,080		
Total	50,017	47			

C.2. Walls and Floors

Table C.2.1. All dates, hours and orientations on walls (A+B+C) and floors (D), by room types;

TYPE 1 – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	105	1,4390	1,38019	,13469
	floor	97	1,0111	,96740	,09822

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	4,238	,041	2,532	200	,012	,42791	,16898	,09470	,76113
	Equal variances not assumed			2,567	186,797	,011	,42791	,16670	,09905	,75678

TYPE 2 – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	108	,7950	,68585	,06600
	floor	106	1,1101	,97630	,09483

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	12,883	,000	-2,736	212	,007	-,31509	,11516	-,54211	-,08808
	Equal variances not assumed			-2,727	188,055	,007	-,31509	,11553	-,54300	-,08719

TYPE 3 – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	105	1,4391	1,38013	,13469
	floor	97	1,0116	,96691	,09818

(cont. Table C.2.1)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	4,251	,041	2,530	200	,012	,42749	,16895	,09434	,76065
	Equal variances not assumed			2,565	186,758	,011	,42749	,16667	,09869	,75629

Table C.2.2. All dates and hours on walls (A+B+C) and floors (D), at each orientation, by room type;

TYPE 1 – EAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	17	1,5994	1,47524	,35780
	floor	12	,8900	1,05505	,30457

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	,111	,742	1,425	27	,166	,70941	,49780	-,31199	1,73081
	Equal variances not assumed			1,510	26,982	,143	,70941	,46987	-,25472	1,67354

TYPE 1 – WEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	12	1,7233	1,56095	,45061
	floor	16	1,0781	,95675	,23919

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	3,756	,064	1,353	26	,188	,64521	,47681	-,33489	1,62531
	Equal variances not assumed			1,265	17,078	,223	,64521	,51016	-,43075	1,72117

TYPE 1 – SOUTH – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	20	1,1990	1,13596	,25401
	floor	20	1,0805	1,06170	,23740

(cont.Table C.2.2)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	,032	,859	,341	38	,735	,11850	,34768	-,58534	,82234
	Equal variances not assumed			,341	37,828	,735	,11850	,34768	-,58544	,82244

TYPE 1 – SOUTHEAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	21	1,4462	1,42462	,31088
	floor	18	1,0294	,91496	,21566

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	1,399	,244	1,066	37	,293	,41675	,39099	-,37547	1,20896
	Equal variances not assumed			1,101	34,485	,278	,41675	,37836	-,35177	1,18526

TYPE 1 – SOUTHWEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	18	1,4600	1,51241	,35648
	floor	19	1,0795	,98977	,22707

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	,858	,361	,910	35	,369	,38053	,41798	-,46801	1,22906
	Equal variances not assumed			,900	29,073	,375	,38053	,42265	-,48380	1,24486

(cont.Table C.2.2)

TYPE 1 – NORTHEAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	10	1,6720	1,64419	,51994
	floor	4	,1200	,05033	,02517

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	5,385	,039	1,842	12	,090	1,55200	,84253	-,28372	3,38772
	Equal variances not assumed			2,981	9,042	,015	1,55200	,52055	,37527	2,72873

TYPE 1 – NORTHWEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	7	,8400	,65072	,24595
	floor	8	1,1275	,98954	,34986

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	1,630	,224	-,653	13	,525	-,28750	,43997	-1,23801	,66301
	Equal variances not assumed			-,672	12,163	,514	-,28750	,42766	-1,21790	,64290

TYPE 2 – EAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	15	,8760	,83323	,21514
	floor	14	1,2486	1,11714	,29857

(cont.Table C.2.2)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	1,972	,172	-1,023	27	,315	-,37257	,36427	-1,11999	,37485
	Equal variances not assumed			-1,012	23,997	,321	-,37257	,36800	-1,13210	,38696

TYPE 2 – WEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	15	,8760	,83323	,21514
	floor	14	1,2486	1,11714	,29857

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	1,972	,172	-1,023	27	,315	-,37257	,36427	-1,11999	,37485
	Equal variances not assumed			-1,012	23,997	,321	-,37257	,36800	-1,13210	,38696

TYPE 2 – SOUTH – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	18	,6700	,63589	,14988
	floor	22	1,1295	1,05184	,22425

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	2,977	,093	-1,624	38	,113	-,45955	,28290	-1,03224	,11315
	Equal variances not assumed			-1,704	35,260	,097	-,45955	,26973	-1,00698	,08789

(cont.Table C.2.2)

TYPE 2 – SOUTHEAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	18	,7767	,61686	,14540
	floor	21	1,1119	,97120	,21193

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	3,929	,055	-1,261	37	,215	-,33524	,26579	-,87377	,20329
	Equal variances not assumed			-1,304	34,314	,201	-,33524	,25701	-,85737	,18690

TYPE 2 – SOUTHWEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	18	,7767	,61686	,14540
	floor	21	1,1119	,97120	,21193

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	3,929	,055	-1,261	37	,215	-,33524	,26579	-,87377	,20329
	Equal variances not assumed			-1,304	34,314	,201	-,33524	,25701	-,85737	,18690

TYPE 2 – NORTHEAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	12	,8150	,69351	,20020
	floor	7	,7971	,62954	,23794

(cont.Table C.2.2)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	,041	,842	,056	17	,956	,01786	,31942	-,65607	,69178
	Equal variances not assumed			,057	13,745	,955	,01786	,31096	-,65025	,68597

TYPE 2 – NORHWEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	12	,8150	,69351	,20020
	floor	7	,7971	,62954	,23794

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	,041	,842	,056	17	,956	,01786	,31942	-,65607	,69178
	Equal variances not assumed			,057	13,745	,955	,01786	,31096	-,65025	,68597

TYPE 3 – EAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	12	1,7233	1,56095	,45061
	floor	16	1,0819	,95319	,23830

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	3,807	,062	1,347	26	,190	,64146	,47621	-,33741	1,62032
	Equal variances not assumed			1,258	17,036	,225	,64146	,50974	-,43382	1,71674

(cont.Table C.2.2)

TYPE 3 – WEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	17	1,5994	1,47524	,35780
	floor	12	,8900	1,05505	,30457

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	,111	,742	1,425	27	,166	,70941	,49780	-,31199	1,73081
	Equal variances not assumed			1,510	26,982	,143	,70941	,46987	-,25472	1,67354

TYPE 3 – SOUTH – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	20	1,1990	1,13596	,25401
	floor	20	1,0800	1,06183	,23743

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	,031	,861	,342	38	,734	,11900	,34770	-,58488	,82288
	Equal variances not assumed			,342	37,828	,734	,11900	,34770	-,58498	,82298

TYPE 3 – SOUTHEAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	18	1,4600	1,51241	,35648
	floor	19	1,0795	,98977	,22707

(cont. Table C.2.2)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	,858	,361	,910	35	,369	,38053	,41798	-,46801	1,22906
	Equal variances not assumed			,900	29,073	,375	,38053	,42265	-,48380	1,24486

TYPE 3 – SOUTHWEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	21	1,4467	1,42433	,31081
	floor	18	1,0294	,91496	,21566

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	1,396	,245	1,067	37	,293	,41722	,39093	-,37488	1,20932
	Equal variances not assumed			1,103	34,488	,278	,41722	,37831	-,35119	1,18563

TYPE 3 – NORTHEAST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	7	,8400	,65072	,24595
	floor	8	1,1275	,98954	,34986

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	1,630	,224	-,653	13	,525	-,28750	,43997	-1,23801	,66301
	Equal variances not assumed			-,672	12,163	,514	-,28750	,42766	-1,21790	,64290

(cont. Table C.2.2)

TYPE 3 – NORTHWEST – Walls & Floor

Group Statistics

	plane	N	Mean	Std. Deviation	Std. Error Mean
area of the sunlight patch	wall	10	1,6720	1,64419	,51994
	floor	4	,1200	,05033	,02517

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
area of the sunlight patch	Equal variances assumed	5,385	,039	1,842	12	,090	1,55200	,84253	-,28372	3,38772
	Equal variances not assumed			2,981	9,042	,015	1,55200	,52055	,37527	2,72873

Table C.2.3. All dates, hours and orientations on walls (A+B+C), by room types;

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	105	1,4390	1,38019	,13469	1,1719	1,7061	,02	6,10
type 2	108	,7950	,68585	,06600	,6642	,9258	,02	2,87
type 3	105	1,4391	1,38013	,13469	1,1721	1,7062	,02	6,10
Total	318	1,2203	1,22555	,06873	1,0851	1,3556	,02	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29,588	2	14,794	10,436	,000
Within Groups	446,538	315	1,418		
Total	476,126	317			

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	,64405*	,16318	,000	,2598	1,0283
	type 3	-,00010	,16432	1,000	-,3870	,3869
type 2	type 1	-,64405*	,16318	,000	-1,0283	-,2598
	type 3	-,64414*	,16318	,000	-1,0284	-,2599
type 3	type 1	,00010	,16432	1,000	-,3869	,3870
	type 2	,64414*	,16318	,000	,2599	1,0284

*. The mean difference is significant at the .05 level.

Table C.2.4. All dates and hours on walls (A+B+C) at each orientation, by room type;

TYPE 1

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	17	1,5994	1,47524	,35780	,8409	2,3579	,06	6,10
west	12	1,7233	1,56095	,45061	,7316	2,7151	,04	4,58
south	20	1,1990	1,13596	,25401	,6674	1,7306	,02	3,86
southeast	21	1,4462	1,42462	,31088	,7977	2,0947	,09	5,72
southwest	18	1,4600	1,51241	,35648	,7079	2,2121	,09	6,10
northeast	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
northwest	7	,8400	,65072	,24595	,2382	1,4418	,02	1,62
Total	105	1,4390	1,38019	,13469	1,1719	1,7061	,02	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5,623	6	,937	,477	,824
Within Groups	192,488	98	1,964		
Total	198,111	104			

TYPE 2

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	15	,8760	,83323	,21514	,4146	1,3374	,06	2,87
west	15	,8760	,83323	,21514	,4146	1,3374	,06	2,87
south	18	,6700	,63589	,14988	,3538	,9862	,03	1,81
southeast	18	,7767	,61686	,14540	,4699	1,0834	,03	2,35
southwest	18	,7767	,61686	,14540	,4699	1,0834	,03	2,35
northeast	12	,8150	,69351	,20020	,3744	1,2556	,02	2,27
northwest	12	,8150	,69351	,20020	,3744	1,2556	,02	2,27
Total	108	,7950	,68585	,06600	,6642	,9258	,02	2,87

(cont. Table C.2.4.)

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,500	6	,083	,169	,985
Within Groups	49,832	101	,493		
Total	50,332	107			

TYPE 3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	12	1,7233	1,56095	,45061	,7316	2,7151	,04	4,58
west	17	1,5994	1,47524	,35780	,8409	2,3579	,06	6,10
south	20	1,1990	1,13596	,25401	,6674	1,7306	,02	3,86
southeast	18	1,4600	1,51241	,35648	,7079	2,2121	,09	6,10
southwest	21	1,4467	1,42433	,31081	,7983	2,0950	,09	5,72
northeast	7	,8400	,65072	,24595	,2382	1,4418	,02	1,62
northwest	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
Total	105	1,4391	1,38013	,13469	1,1721	1,7062	,02	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5,623	6	,937	,477	,824
Within Groups	192,472	98	1,964		
Total	198,095	104			

Table C.2.5. All dates and hours on walls (A+B+C) of each room type, by orientation;

EAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	17	1,5994	1,47524	,35780	,8409	2,3579	,06	6,10
type 2	15	,8760	,83323	,21514	,4146	1,3374	,06	2,87
type 3	12	1,7233	1,56095	,45061	,7316	2,7151	,04	4,58
Total	44	1,3866	1,34151	,20224	,9787	1,7944	,04	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6,041	2	3,021	1,736	,189
Within Groups	71,343	41	1,740		
Total	77,385	43			

WEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	12	1,7233	1,56095	,45061	,7316	2,7151	,04	4,58
type 2	15	,8760	,83323	,21514	,4146	1,3374	,06	2,87
type 3	17	1,5994	1,47524	,35780	,8409	2,3579	,06	6,10
Total	44	1,3866	1,34151	,20224	,9787	1,7944	,04	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6,041	2	3,021	1,736	,189
Within Groups	71,343	41	1,740		
Total	77,385	43			

(cont. Table C.2.5)

SOUTH

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	20	1,1990	1,13596	,25401	,6674	1,7306	,02	3,86
type 2	18	,6700	,63589	,14988	,3538	,9862	,03	1,81
type 3	20	1,1990	1,13596	,25401	,6674	1,7306	,02	3,86
Total	58	1,0348	1,02069	,13402	,7665	1,3032	,02	3,86

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,474	2	1,737	1,709	,191
Within Groups	55,909	55	1,017		
Total	59,383	57			

SOUTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	21	1,4462	1,42462	,31088	,7977	2,0947	,09	5,72
type 2	18	,7767	,61686	,14540	,4699	1,0834	,03	2,35
type 3	18	1,4600	1,51241	,35648	,7079	2,2121	,09	6,10
Total	57	1,2391	1,27876	,16938	,8998	1,5784	,03	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5,628	2	2,814	1,768	,180
Within Groups	85,945	54	1,592		
Total	91,573	56			

(cont. Table C.2.5)

SOUTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	18	1,4600	1,51241	,35648	,7079	2,2121	,09	6,10
type 2	18	,7767	,61686	,14540	,4699	1,0834	,03	2,35
type 3	21	1,4467	1,42433	,31081	,7983	2,0950	,09	5,72
Total	57	1,2393	1,27868	,16937	,9000	1,5786	,03	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5,632	2	2,816	1,770	,180
Within Groups	85,929	54	1,591		
Total	91,561	56			

NORTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
type 2	12	,8150	,69351	,20020	,3744	1,2556	,02	2,27
type 3	7	,8400	,65072	,24595	,2382	1,4418	,02	1,62
Total	29	1,1166	1,14756	,21310	,6800	1,5531	,02	5,40

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,712	2	2,356	1,905	,169
Within Groups	32,161	26	1,237		
Total	36,873	28			

(cont. Table C.2.5)

NORTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	7	,8400	,65072	,24595	,2382	1,4418	,02	1,62
type 2	12	,8150	,69351	,20020	,3744	1,2556	,02	2,27
type 3	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
Total	29	1,1166	1,14756	,21310	,6800	1,5531	,02	5,40

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,712	2	2,356	1,905	,169
Within Groups	32,161	26	1,237		
Total	36,873	28			

Table C.2.6. All dates, hours and orientations on floors (D), by room types;

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	97	1,0111	,96740	,09822	,8162	1,2061	,01	3,64
type 2	106	1,1101	,97630	,09483	,9221	1,2981	,02	3,34
type 3	97	1,0116	,96691	,09818	,8168	1,2065	,01	3,64
Total	300	1,0463	,96830	,05591	,9362	1,1563	,01	3,64

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,668	2	,334	,355	,702
Within Groups	279,678	297	,942		
Total	280,346	299			

Table C.2.7. All dates and hours on floors (D) at each orientation, by room type;

TYPE 1

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	12	,8900	1,05505	,30457	,2197	1,5603	,04	3,32
west	16	1,0781	,95675	,23919	,5683	1,5879	,06	3,64
south	20	1,0805	1,06170	,23740	,5836	1,5774	,02	3,52
southeast	18	1,0294	,91496	,21566	,5744	1,4844	,05	3,56
southwest	19	1,0795	,98977	,22707	,6024	1,5565	,01	3,51
northeast	4	,1200	,05033	,02517	,0399	,2001	,05	,17
northwest	8	1,1275	,98954	,34986	,3002	1,9548	,04	2,65
Total	97	1,0111	,96740	,09822	,8162	1,2061	,01	3,64

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,724	6	,621	,649	,691
Within Groups	86,119	90	,957		
Total	89,843	96			

TYPE 2

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	14	1,2486	1,11714	,29857	,6036	1,8936	,02	3,30
west	14	1,2486	1,11714	,29857	,6036	1,8936	,02	3,30
south	22	1,1295	1,05184	,22425	,6632	1,5959	,05	3,34
southeast	21	1,1119	,97120	,21193	,6698	1,5540	,02	3,33
southwest	21	1,1119	,97120	,21193	,6698	1,5540	,02	3,33
northeast	7	,7971	,62954	,23794	,2149	1,3794	,09	1,68
northwest	7	,7971	,62954	,23794	,2149	1,3794	,09	1,68
Total	106	1,1101	,97630	,09483	,9221	1,2981	,02	3,34

(cont. Table C.2.7)

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,917	6	,319	,322	,924
Within Groups	98,166	99	,992		
Total	100,083	105			

TYPE 3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	16	1,0819	,95319	,23830	,5740	1,5898	,06	3,64
west	12	,8900	1,05505	,30457	,2197	1,5603	,04	3,32
south	20	1,0800	1,06183	,23743	,5831	1,5769	,02	3,52
southeast	19	1,0795	,98977	,22707	,6024	1,5565	,01	3,51
southwest	18	1,0294	,91496	,21566	,5744	1,4844	,05	3,56
northeast	8	1,1275	,98954	,34986	,3002	1,9548	,04	2,65
northwest	4	,1200	,05033	,02517	,0399	,2001	,05	,17
Total	97	1,0116	,96691	,09818	,8168	1,2065	,01	3,64

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,731	6	,622	,651	,690
Within Groups	86,022	90	,956		
Total	89,753	96			

Table C.2.8. All dates, hours and orientations on floors (D) of each room type, by orientation;

EAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	12	,8900	1,05505	,30457	,2197	1,5603	,04	3,32
type 2	14	1,2486	1,11714	,29857	,6036	1,8936	,02	3,30
type 3	16	1,0819	,95319	,23830	,5740	1,5898	,06	3,64
Total	42	1,0826	1,02324	,15789	,7638	1,4015	,02	3,64

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,831	2	,415	,385	,683
Within Groups	42,097	39	1,079		
Total	42,928	41			

WEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	16	1,0781	,95675	,23919	,5683	1,5879	,06	3,64
type 2	14	1,2486	1,11714	,29857	,6036	1,8936	,02	3,30
type 3	12	,8900	1,05505	,30457	,2197	1,5603	,04	3,32
Total	42	1,0812	1,02446	,15808	,7619	1,4004	,02	3,64

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,831	2	,416	,384	,684
Within Groups	42,199	39	1,082		
Total	43,030	41			

(cont. Table C.2.8.)

SOUTH

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	20	1,0805	1,06170	,23740	,5836	1,5774	,02	3,52
type 2	22	1,1295	1,05184	,22425	,6632	1,5959	,05	3,34
type 3	20	1,0800	1,06183	,23743	,5831	1,5769	,02	3,52
Total	62	1,0977	1,04102	,13221	,8334	1,3621	,02	3,52

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,034	2	,017	,015	,985
Within Groups	66,072	59	1,120		
Total	66,107	61			

SOUTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	18	1,0294	,91496	,21566	,5744	1,4844	,05	3,56
type 2	21	1,1119	,97120	,21193	,6698	1,5540	,02	3,33
type 3	19	1,0795	,98977	,22707	,6024	1,5565	,01	3,51
Total	58	1,0757	,94401	,12395	,8275	1,3239	,01	3,56

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,066	2	,033	,036	,965
Within Groups	50,730	55	,922		
Total	50,796	57			

(cont. Table C.2.8.)

SOUTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	19	1,0795	,98977	,22707	,6024	1,5565	,01	3,51
type 2	21	1,1119	,97120	,21193	,6698	1,5540	,02	3,33
type 3	18	1,0294	,91496	,21566	,5744	1,4844	,05	3,56
Total	58	1,0757	,94401	,12395	,8275	1,3239	,01	3,56

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,066	2	,033	,036	,965
Within Groups	50,730	55	,922		
Total	50,796	57			

NORTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	4	,1200	,05033	,02517	,0399	,2001	,05	,17
type 2	7	,7971	,62954	,23794	,2149	1,3794	,09	1,68
type 3	8	1,1275	,98954	,34986	,3002	1,9548	,04	2,65
Total	19	,7937	,81469	,18690	,4010	1,1864	,04	2,65

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,707	2	1,353	2,344	,128
Within Groups	9,240	16	,577		
Total	11,947	18			

(cont. Table C.2.8.)

NORTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	8	1,1275	,98954	,34986	,3002	1,9548	,04	2,65
type 2	7	,7971	,62954	,23794	,2149	1,3794	,09	1,68
type 3	4	,1200	,05033	,02517	,0399	,2001	,05	,17
Total	19	,7937	,81469	,18690	,4010	1,1864	,04	2,65

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,707	2	1,353	2,344	,128
Within Groups	9,240	16	,577		
Total	11,947	18			

C.3. Surfaces A, B, C AND D

Table C.3.1. All dates, hours and orientations on Wall A, Wall B, Wall C and Floor (D) separately, by room type;

TYPE 1

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	65	1,8526	1,56171	,19371	1,4656	2,2396	,06	6,10
Wall B	25	,6232	,57522	,11504	,3858	,8606	,02	1,70
Wall C	15	1,0067	,50117	,12940	,7291	1,2842	,17	1,62
Floor	97	1,0111	,96740	,09822	,8162	1,2061	,01	3,64
Total	202	1,2336	1,21595	,08555	1,0649	1,4023	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39,795	3	13,265	10,204	,000
Within Groups	257,392	198	1,300		
Total	297,187	201			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) surfaes of the room	(J) surfaes of the room	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Wall A	Wall B	1,22942*	,26832	,000	,5342	1,9246
	Wall C	,84595	,32659	,050	-,0002	1,6921
	Floor	,84148*	,18276	,000	,3680	1,3150
Wall B	Wall A	-1,22942*	,26832	,000	-1,9246	-,5342
	Wall C	-,38347	,37237	,732	-1,3483	,5813
	Floor	-,38793	,25573	,429	-1,0505	,2747
Wall C	Wall A	-,84595	,32659	,050	-1,6921	,0002
	Wall B	,38347	,37237	,732	-,5813	1,3483
	Floor	-,00447	,31633	1,000	-,8241	,8151
Floor	Wall A	-,84148*	,18276	,000	-1,3150	-,3680
	Wall B	,38793	,25573	,429	-,2747	1,0505
	Wall C	,00447	,31633	1,000	-,8151	,8241

*. The mean difference is significant at the .05 level.

(cont. Table C.3.1)

TYPE 2

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	45	,7713	,71691	,10687	,5560	,9867	,02	2,87
Wall B	45	,7713	,71691	,10687	,5560	,9867	,02	2,87
Wall C	18	,9133	,53144	,12526	,6491	1,1776	,17	1,63
Floor	106	1,1101	,97630	,09483	,9221	1,2981	,02	3,34
Total	214	,9511	,85505	,05845	,8359	1,0663	,02	3,34

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5,614	3	1,871	2,618	,052
Within Groups	150,112	210	,715		
Total	155,726	213			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) surfaes of the room	(J) surfaes of the room	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Wall A	Wall B	,00000	,17824	1,000	-,4616	,4616
	Wall C	-,14200	,23579	,931	-,7526	,4686
	Floor	-,33876	,15043	,113	-,7283	,0508
Wall B	Wall A	,00000	,17824	1,000	-,4616	,4616
	Wall C	-,14200	,23579	,931	-,7526	,4686
	Floor	-,33876	,15043	,113	-,7283	,0508
Wall C	Wall A	,14200	,23579	,931	-,4686	,7526
	Wall B	,14200	,23579	,931	-,4686	,7526
	Floor	-,19676	,21554	,798	-,7549	,3614
Floor	Wall A	,33876	,15043	,113	-,0508	,7283
	Wall B	,33876	,15043	,113	-,0508	,7283
	Wall C	,19676	,21554	,798	-,3614	,7549

(cont. Table C.3.1)

TYPE 3

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	25	,6232	,57522	,11504	,3858	,8606	,02	1,70
Wall B	65	1,8528	1,56159	,19369	1,4658	2,2397	,06	6,10
Wall C	15	1,0067	,50117	,12940	,7291	1,2842	,17	1,62
Floor	97	1,0116	,96691	,09818	,8168	1,2065	,01	3,64
Total	202	1,2339	1,21570	,08554	1,0652	1,4025	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	39,785	3	13,262	10,206	,000
Within Groups	257,278	198	1,299		
Total	297,062	201			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) surfaes of the room	(J) surfaes of the room	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Wall A	Wall B	-1,22957*	,26826	,000	-1,9246	-,5345
	Wall C	-,38347	,37229	,732	-1,3481	,5811
	Floor	-,38845	,25568	,428	-1,0509	,2740
Wall B	Wall A	1,22957*	,26826	,000	,5345	1,9246
	Wall C	,84610*	,32652	,050	,0001	1,6921
	Floor	,84112*	,18272	,000	,3677	1,3145
Wall C	Wall A	,38347	,37229	,732	-,5811	1,3481
	Wall B	-,84610*	,32652	,050	-1,6921	-,0001
	Floor	-,00498	,31626	1,000	-,8244	,8144
Floor	Wall A	,38845	,25568	,428	-,2740	1,0509
	Wall B	-,84112*	,18272	,000	-1,3145	-,3677
	Wall C	,00498	,31626	1,000	-,8144	,8244

*. The mean difference is significant at the .05 level.

Table C.3.2. All dates and hours on Wall A, Wall B, Wall C and Floor (D) separately, of each room type, by orientation;

TYPE 1 – EAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	13	1,7338	1,66026	,46047	,7306	2,7371	,06	6,10
Wall C	4	1,1625	,49842	,24921	,3694	1,9556	,52	1,60
Floor	12	,8900	1,05505	,30457	,2197	1,5603	,04	3,32
Total	29	1,3059	1,34438	,24964	,7945	1,8172	,04	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,539	2	2,269	1,281	,295
Within Groups	46,067	26	1,772		
Total	50,606	28			

TYPE 1 – WEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	4	3,6100	,91338	,45669	2,1566	5,0634	2,68	4,58
Wall B	5	,7400	,70855	,31688	-,1398	1,6198	,04	1,70
Wall C	3	,8467	,67560	,39006	-,8316	2,5249	,27	1,59
Floor	16	1,0781	,95675	,23919	,5683	1,5879	,06	3,64
Total	28	1,3546	1,26765	,23956	,8631	1,8462	,04	4,58

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24,233	3	8,078	10,121	,000
Within Groups	19,155	24	,798		
Total	43,387	27			

(cont. Table C.3.2)

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) surfaes of the room	(J) surfaes of the room	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Wall A	Wall B	2,87000*	,59929	,000	1,2168	4,5232
	Wall C	2,76333*	,68232	,002	,8811	4,6456
	Floor	2,53188*	,49941	,000	1,1542	3,9095
Wall B	Wall A	-2,87000*	,59929	,000	-4,5232	-1,2168
	Wall C	-,10667	,65242	,998	-1,9064	1,6931
	Floor	-,33813	,45771	,880	-1,6008	,9245
Wall C	Wall A	-2,76333*	,68232	,002	-4,6456	-,8811
	Wall B	,10667	,65242	,998	-1,6931	1,9064
	Floor	-,23146	,56206	,976	-1,7820	1,3191
Floor	Wall A	-2,53188*	,49941	,000	-3,9095	-1,1542
	Wall B	,33813	,45771	,880	-,9245	1,6008
	Wall C	,23146	,56206	,976	-1,3191	1,7820

*. The mean difference is significant at the .05 level.

TYPE 1 – SOUTH

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	14	1,4743	1,22200	,32659	,7687	2,1798	,27	3,86
Wall B	6	,5567	,56010	,22866	-,0311	1,1445	,02	1,28
Floor	20	1,0805	1,06170	,23740	,5836	1,5774	,02	3,52
Total	40	1,1398	1,08693	,17186	,7921	1,4874	,02	3,86

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,677	2	1,838	1,604	,215
Within Groups	42,398	37	1,146		
Total	46,075	39			

(cont. Table C.3.2)

TYPE 1 – SOUTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	13	1,7500	1,71847	,47662	,7115	2,7885	,09	5,72
Wall B	5	,8900	,58609	,26211	,1623	1,6177	,22	1,70
Wall C	3	1,0567	,53725	,31018	-,2779	2,3913	,55	1,62
Floor	18	1,0294	,91496	,21566	,5744	1,4844	,05	3,56
Total	39	1,2538	1,21942	,19526	,8586	1,6491	,05	5,72

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,885	3	1,628	1,104	,360
Within Groups	51,621	35	1,475		
Total	56,506	38			

TYPE 1 – SOUTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	11	2,1209	1,59798	,48181	1,0474	3,1944	,56	6,10
Wall B	4	,1950	,11121	,05560	,0180	,3720	,09	,31
Wall C	3	,7233	,48952	,28263	-,4927	1,9394	,17	1,10
Floor	19	1,0795	,98977	,22707	,6024	1,5565	,01	3,51
Total	37	1,2646	1,26773	,20841	,8419	1,6873	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14,172	3	4,724	3,569	,024
Within Groups	43,685	33	1,324		
Total	57,857	36			

(cont. Table C.3.2)

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) surfaes of the room	(J) surfaes of the room	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Wall A	Wall B	1,92591*	,67178	,034	,1088	3,7430
	Wall C	1,39758	,74941	,262	-,6295	3,4247
	Floor	1,04144	,43591	,099	-,1377	2,2206
Wall B	Wall A	-1,92591*	,67178	,034	-3,7430	-,1088
	Wall C	-,52833	,87876	,931	-2,9053	1,8487
	Floor	-,88447	,63295	,510	-2,5966	,8276
Wall C	Wall A	-1,39758	,74941	,262	-3,4247	,6295
	Wall B	,52833	,87876	,931	-1,8487	2,9053
	Floor	-,35614	,71480	,959	-2,2896	1,5774
Floor	Wall A	-1,04144	,43591	,099	-2,2206	,1377
	Wall B	,88447	,63295	,510	-,8276	2,5966
	Wall C	,35614	,71480	,959	-1,5774	2,2896

*. The mean difference is significant at the .05 level.

TYPE 1 - NORTHEAST

Warnings

Post hoc tests are not performed for area of the sunlight patch because there are fewer than three groups.

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
Floor	4	,1200	,05033	,02517	,0399	,2001	,05	,17
Total	14	1,2286	1,54969	,41417	,3338	2,1233	,05	5,40

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6,882	1	6,882	3,393	,090
Within Groups	24,338	12	2,028		
Total	31,220	13			

(cont. Table C.3.2)

TYPE 1 – NORTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall B	5	,6620	,66364	,29679	-,1620	1,4860	,02	1,60
Wall C	2	1,2850	,47376	,33500	-2,9716	5,5416	,95	1,62
Floor	8	1,1275	,98954	,34986	,3002	1,9548	,04	2,65
Total	15	,9933	,83253	,21496	,5323	1,4544	,02	2,65

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,863	2	,432	,586	,572
Within Groups	8,840	12	,737		
Total	9,704	14			

TYPE 2 – EAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	9	,6567	,74485	,24828	,0841	1,2292	,06	2,21
Wall B	2	1,8800	1,40007	,99000	-10,6991	14,4591	,89	2,87
Wall C	4	,8675	,53910	,26955	,0097	1,7253	,32	1,61
Floor	14	1,2486	1,11714	,29857	,6036	1,8936	,02	3,30
Total	29	1,0559	,98105	,18218	,6827	1,4290	,02	3,30

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,454	3	1,151	1,225	,321
Within Groups	23,494	25	,940		
Total	26,949	28			

(cont. Table C.3.2)

TYPE 2 – WEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	2	1,8800	1,40007	,99000	-10,6991	14,4591	,89	2,87
Wall B	9	,6567	,74485	,24828	,0841	1,2292	,06	2,21
Wall C	4	,8675	,53910	,26955	,0097	1,7253	,32	1,61
Floor	14	1,2486	1,11714	,29857	,6036	1,8936	,02	3,30
Total	29	1,0559	,98105	,18218	,6827	1,4290	,02	3,30

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,454	3	1,151	1,225	,321
Within Groups	23,494	25	,940		
Total	26,949	28			

TYPE 2 – SOUTH

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	9	,6700	,65546	,21849	,1662	1,1738	,03	1,81
Wall B	9	,6700	,65546	,21849	,1662	1,1738	,03	1,81
Floor	22	1,1295	1,05184	,22425	,6632	1,5959	,05	3,34
Total	40	,9228	,90862	,14367	,6322	1,2133	,03	3,34

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,091	2	1,045	1,285	,289
Within Groups	30,107	37	,814		
Total	32,198	39			

(cont. Table C.3.2)

TYPE 2 – SOUTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	8	,4350	,35051	,12392	,1420	,7280	,03	,95
Wall B	7	1,0357	,73207	,27670	,3587	1,7128	,26	2,35
Wall C	3	1,0833	,59475	,34338	-,3941	2,5608	,45	1,63
Floor	21	1,1119	,97120	,21193	,6698	1,5540	,02	3,33
Total	39	,9572	,83387	,13353	,6869	1,2275	,02	3,33

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,775	3	,925	1,369	,268
Within Groups	23,648	35	,676		
Total	26,423	38			

TYPE 2 – SOUTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	7	1,0357	,73207	,27670	,3587	1,7128	,26	2,35
Wall B	8	,4350	,35051	,12392	,1420	,7280	,03	,95
Wall C	3	1,0833	,59475	,34338	-,3941	2,5608	,45	1,63
Floor	21	1,1119	,97120	,21193	,6698	1,5540	,02	3,33
Total	39	,9572	,83387	,13353	,6869	1,2275	,02	3,33

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2,775	3	,925	1,369	,268
Within Groups	23,648	35	,676		
Total	26,423	38			

(cont. Table C.3.2)

TYPE 2 – NORTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	10	,8280	,71551	,22626	,3162	1,3398	,02	2,27
Wall C	2	,7500	,82024	,58000	-6,6196	8,1196	,17	1,33
Floor	7	,7971	,62954	,23794	,2149	1,3794	,09	1,68
Total	19	,8084	,65277	,14975	,4938	1,1230	,02	2,27

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,012	2	,006	,012	,988
Within Groups	7,658	16	,479		
Total	7,670	18			

TYPE 2 – NORTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall B	10	,8280	,71551	,22626	,3162	1,3398	,02	2,27
Wall C	2	,7500	,82024	,58000	-6,6196	8,1196	,17	1,33
Floor	7	,7971	,62954	,23794	,2149	1,3794	,09	1,68
Total	19	,8084	,65277	,14975	,4938	1,1230	,02	2,27

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,012	2	,006	,012	,988
Within Groups	7,658	16	,479		
Total	7,670	18			

(cont. Table C.3.2)

TYPE 3 – EAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	5	,7400	,70855	,31688	-,1398	1,6198	,04	1,70
Wall B	4	3,6100	,91338	,45669	2,1566	5,0634	2,68	4,58
Wall C	3	,8467	,67560	,39006	-,8316	2,5249	,27	1,59
Floor	16	1,0819	,95319	,23830	,5740	1,5898	,06	3,64
Total	28	1,3568	1,26568	,23919	,8660	1,8476	,04	4,58

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24,200	3	8,067	10,161	,000
Within Groups	19,053	24	,794		
Total	43,252	27			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) surfaes of the room	(J) surfaes of the room	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Wall A	Wall B	-2,87000*	,59769	,000	-4,5188	-1,2212
	Wall C	-,10667	,65068	,998	-1,9016	1,6883
	Floor	-,34188	,45649	,876	-1,6012	,9174
Wall B	Wall A	2,87000*	,59769	,000	1,2212	4,5188
	Wall C	2,76333*	,68050	,002	,8861	4,6406
	Floor	2,52813*	,49808	,000	1,1541	3,9021
Wall C	Wall A	,10667	,65068	,998	-1,6883	1,9016
	Wall B	-2,76333*	,68050	,002	-4,6406	-,8861
	Floor	-,23521	,56057	,975	-1,7816	1,3112
Floor	Wall A	,34188	,45649	,876	-,9174	1,6012
	Wall B	-2,52813*	,49808	,000	-3,9021	-1,1541
	Wall C	,23521	,56057	,975	-1,3112	1,7816

*. The mean difference is significant at the .05 level.

(cont. Table C.3.2)

TYPE 3 – WEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall B	13	1,7338	1,66026	,46047	,7306	2,7371	,06	6,10
Wall C	4	1,1625	,49842	,24921	,3694	1,9556	,52	1,60
Floor	12	,8900	1,05505	,30457	,2197	1,5603	,04	3,32
Total	29	1,3059	1,34438	,24964	,7945	1,8172	,04	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,539	2	2,269	1,281	,295
Within Groups	46,067	26	1,772		
Total	50,606	28			

TYPE 3 – SOUTH

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	6	,5567	,56010	,22866	-,0311	1,1445	,02	1,28
Wall B	14	1,4743	1,22200	,32659	,7687	2,1798	,27	3,86
Floor	20	1,0800	1,06183	,23743	,5831	1,5769	,02	3,52
Total	40	1,1395	1,08700	,17187	,7919	1,4871	,02	3,86

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,678	2	1,839	1,605	,215
Within Groups	42,403	37	1,146		
Total	46,081	39			

(cont. Table C.3.2)

TYPE 3 – SOUTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	4	,1950	,11121	,05560	,0180	,3720	,09	,31
Wall B	11	2,1209	1,59798	,48181	1,0474	3,1944	,56	6,10
Wall C	3	,7233	,48952	,28263	-,4927	1,9394	,17	1,10
Floor	19	1,0795	,98977	,22707	,6024	1,5565	,01	3,51
Total	37	1,2646	1,26773	,20841	,8419	1,6873	,01	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14,172	3	4,724	3,569	,024
Within Groups	43,685	33	1,324		
Total	57,857	36			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) surfaes of the room	(J) surfaes of the room	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Wall A	Wall B	-1,92591*	,67178	,034	-3,7430	-,1088
	Wall C	-,52833	,87876	,931	-2,9053	1,8487
	Floor	-,88447	,63295	,510	-2,5966	,8276
Wall B	Wall A	1,92591*	,67178	,034	,1088	3,7430
	Wall C	1,39758	,74941	,262	-,6295	3,4247
	Floor	1,04144	,43591	,099	-,1377	2,2206
Wall C	Wall A	,52833	,87876	,931	-1,8487	2,9053
	Wall B	-1,39758	,74941	,262	-3,4247	,6295
	Floor	-,35614	,71480	,959	-2,2896	1,5774
Floor	Wall A	,88447	,63295	,510	-,8276	2,5966
	Wall B	-1,04144	,43591	,099	-2,2206	,1377
	Wall C	,35614	,71480	,959	-1,5774	2,2896

*. The mean difference is significant at the .05 level.

(cont. Table C.3.2)

TYPE 3 – SOUTHWEST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	5	,8900	,58609	,26211	,1623	1,6177	,22	1,70
Wall B	13	1,7508	1,71793	,47647	,7126	2,7889	,09	5,72
Wall C	3	1,0567	,53725	,31018	-,2779	2,3913	,55	1,62
Floor	18	1,0294	,91496	,21566	,5744	1,4844	,05	3,56
Total	39	1,2541	1,21929	,19524	,8589	1,6494	,05	5,72

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,895	3	1,632	1,107	,359
Within Groups	51,598	35	1,474		
Total	56,493	38			

TYPE 3 – NORTHEAST

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall A	5	,6620	,66364	,29679	-,1620	1,4860	,02	1,60
Wall C	2	1,2850	,47376	,33500	-2,9716	5,5416	,95	1,62
Floor	8	1,1275	,98954	,34986	,3002	1,9548	,04	2,65
Total	15	,9933	,83253	,21496	,5323	1,4544	,02	2,65

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,863	2	,432	,586	,572
Within Groups	8,840	12	,737		
Total	9,704	14			

(cont. Table C.3.2)

TYPE 3 – NORTHWEST

Warnings

Post hoc tests are not performed for area of the sunlight patch because there are fewer than three groups.

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Wall B	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
Floor	4	,1200	,05033	,02517	,0399	,2001	,05	,17
Total	14	1,2286	1,54969	,41417	,3338	2,1233	,05	5,40

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6,882	1	6,882	3,393	,090
Within Groups	24,338	12	2,028		
Total	31,220	13			

Table C.3.3. All dates, hours and orientations on Wall A, by room type.

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	65	1.8526	1.56171	.19371	1.4656	2.2396	.06	6.10
type 2	45	.7713	.71691	.10687	.5560	.9867	.02	2.87
type 3	25	.6232	.57522	.11504	.3858	.8606	.02	1.70
Total	135	1.2645	1.31113	.11284	1.0413	1.4877	.02	6.10

One-way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	43.708	2	21.854	15.456	.000
Within Groups	186.647	132	1.414		
Total	230.356	134			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	1.08128*	.23060	.000	.5347	1.6279
	type 3	1.22942*	.27985	.000	.5661	1.8928
type 2	type 1	-1.08128*	.23060	.000	-1.6279	-.5347
	type 3	.14813	.29662	.872	-.5550	.8512
type 3	type 1	-1.22942*	.27985	.000	-1.8928	-.5661
	type 2	-.14813	.29662	.872	-.8512	.5550

*. The mean difference is significant at the .05 level.

Table C.3.4. All dates, hours and orientations on Wall B, by room type.

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	25	.6232	.57522	.11504	.3858	.8606	.02	1.70
type 2	45	.7713	.71691	.10687	.5560	.9867	.02	2.87
type 3	65	1.8528	1.56159	.19369	1.4658	2.2397	.06	6.10
Total	135	1.2646	1.31110	.11284	1.0414	1.4878	.02	6.10

One-way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	43.720	2	21.860	15.462	.000
Within Groups	186.623	132	1.414		
Total	230.343	134			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	-.14813	.29660	.872	-.8512	.5549
	type 3	-1.22957*	.27983	.000	-1.8929	-.5663
type 2	type 1	.14813	.29660	.872	-.5549	.8512
	type 3	-1.08144*	.23058	.000	-1.6280	-.5348
type 3	type 1	1.22957*	.27983	.000	.5663	1.8929
	type 2	1.08144*	.23058	.000	.5348	1.6280

*. The mean difference is significant at the .05 level.

Table C.3.5. All dates and hours on Wall A, at each orientation, by room type;

TYPE1 – Wall A

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
east	13	1,7338	1,66026	,46047	,7306	2,7371	,06	6,10
west	4	3,6100	,91338	,45669	2,1566	5,0634	2,68	4,58
south	14	1,4743	1,22200	,32659	,7687	2,1798	,27	3,86
southeast	13	1,7500	1,71847	,47662	,7115	2,7885	,09	5,72
southwest	11	2,1209	1,59798	,48181	1,0474	3,1944	,56	6,10
northeast	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
Total	65	1,8526	1,56171	,19371	1,4656	2,2396	,06	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15,796	5	3,159	1,329	,265
Within Groups	140,296	59	2,378		
Total	156,092	64			

TYPE 2 – Wall A

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Minimum	Maximum
east	9	,6567	,74485	,24828	,0841	1,2292	,06	2,21
west	2	1,8800	1,40007	,99000	-10,6991	14,4591	,89	2,87
south	9	,6700	,65546	,21849	,1662	1,1738	,03	1,81
southeast	8	,4350	,35051	,12392	,1420	,7280	,03	,95
southwest	7	1,0357	,73207	,27670	,3587	1,7128	,26	2,35
northeast	10	,8280	,71551	,22626	,3162	1,3398	,02	2,27
Total	45	,7713	,71691	,10687	,5560	,9867	,02	2,87

(cont. Table C.3.5)

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,095	5	,819	1,725	,152
Within Groups	18,519	39	,475		
Total	22,614	44			

TYPE 3 – Wall A

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	5	,7400	,70855	,31688	-,1398	1,6198	,04	1,70
south	6	,5567	,56010	,22866	-,0311	1,1445	,02	1,28
southeast	4	,1950	,11121	,05560	,0180	,3720	,09	,31
southwest	5	,8900	,58609	,26211	,1623	1,6177	,22	1,70
northeast	5	,6620	,66364	,29679	-,1620	1,4860	,02	1,60
Total	25	,6232	,57522	,11504	,3858	,8606	,02	1,70

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,192	4	,298	,883	,492
Within Groups	6,750	20	,337		
Total	7,941	24			

Table C.3.6. All dates and hours on Wall B, at each orientation, by room type;

TYPE 1 – Wall B

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
west	5	,7400	,70855	,31688	-,1398	1,6198	,04	1,70
south	6	,5567	,56010	,22866	-,0311	1,1445	,02	1,28
southeast	5	,8900	,58609	,26211	,1623	1,6177	,22	1,70
southwest	4	,1950	,11121	,05560	,0180	,3720	,09	,31
northwest	5	,6620	,66364	,29679	-,1620	1,4860	,02	1,60
Total	25	,6232	,57522	,11504	,3858	,8606	,02	1,70

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,192	4	,298	,883	,492
Within Groups	6,750	20	,337		
Total	7,941	24			

TYPE 2 – Wall B

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	2	1,8800	1,40007	,99000	-10,6991	14,4591	,89	2,87
west	9	,6567	,74485	,24828	,0841	1,2292	,06	2,21
south	9	,6700	,65546	,21849	,1662	1,1738	,03	1,81
southeast	7	1,0357	,73207	,27670	,3587	1,7128	,26	2,35
southwest	8	,4350	,35051	,12392	,1420	,7280	,03	,95
northwest	10	,8280	,71551	,22626	,3162	1,3398	,02	2,27
Total	45	,7713	,71691	,10687	,5560	,9867	,02	2,87

(cont. Table C.3.6)

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,095	5	,819	1,725	,152
Within Groups	18,519	39	,475		
Total	22,614	44			

TYPE 3 – Wall B

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
east	4	3,6100	,91338	,45669	2,1566	5,0634	2,68	4,58
west	13	1,7338	1,66026	,46047	,7306	2,7371	,06	6,10
south	14	1,4743	1,22200	,32659	,7687	2,1798	,27	3,86
southeast	11	2,1209	1,59798	,48181	1,0474	3,1944	,56	6,10
southwest	13	1,7508	1,71793	,47647	,7126	2,7889	,09	5,72
northwest	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
Total	65	1,8528	1,56159	,19369	1,4658	2,2397	,06	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15,794	5	3,159	1,329	,265
Within Groups	140,274	59	2,378		
Total	156,068	64			

Table C.3.7. All dates and hours on Wall A of each room type, by orientation;

EAST – Wall A

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	13	1,7338	1,66026	,46047	,7306	2,7371	,06	6,10
type 2	9	,6567	,74485	,24828	,0841	1,2292	,06	2,21
type 3	5	,7400	,70855	,31688	-,1398	1,6198	,04	1,70
Total	27	1,1907	1,34367	,25859	,6592	1,7223	,04	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7,417	2	3,709	2,252	,127
Within Groups	39,524	24	1,647		
Total	46,942	26			

WEST - Wall A

Warnings

Post hoc tests are not performed for area of the sunlight patch because there are fewer than three groups.

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	4	3,6100	,91338	,45669	2,1566	5,0634	2,68	4,58
type 2	2	1,8800	1,40007	,99000	-10,6991	14,4591	,89	2,87
Total	6	3,0333	1,30027	,53083	1,6688	4,3979	,89	4,58

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,991	1	3,991	3,577	,132
Within Groups	4,463	4	1,116		
Total	8,454	5			

(cont. Table C.3.7)

SOUTH – Wall A

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	14	1,4743	1,22200	,32659	,7687	2,1798	,27	3,86
type 2	9	,6700	,65546	,21849	,1662	1,1738	,03	1,81
type 3	6	,5567	,56010	,22866	-,0311	1,1445	,02	1,28
Total	29	1,0348	1,02976	,19122	,6431	1,4265	,02	3,86

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5,273	2	2,637	2,808	,079
Within Groups	24,418	26	,939		
Total	29,692	28			

SOUTHEAST – Wall A

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	13	1,7500	1,71847	,47662	,7115	2,7885	,09	5,72
type 2	8	,4350	,35051	,12392	,1420	,7280	,03	,95
type 3	4	,1950	,11121	,05560	,0180	,3720	,09	,31
Total	25	1,0804	1,42349	,28470	,4928	1,6680	,03	5,72

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12,297	2	6,148	3,723	,040
Within Groups	36,335	22	1,652		
Total	48,631	24			

(cont. Table C.3.7)

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	1,31500	,57749	,080	-,1357	2,7657
	type 3	1,55500	,73481	,110	-,2909	3,4009
type 2	type 1	-1,31500	,57749	,080	-2,7657	,1357
	type 3	,24000	,78698	,950	-1,7369	2,2169
type 3	type 1	-1,55500	,73481	,110	-3,4009	,2909
	type 2	-,24000	,78698	,950	-2,2169	1,7369

SOUTHWEST – Wall A

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	11	2,1209	1,59798	,48181	1,0474	3,1944	,56	6,10
type 2	7	1,0357	,73207	,27670	,3587	1,7128	,26	2,35
type 3	5	,8900	,58609	,26211	,1623	1,6177	,22	1,70
Total	23	1,5230	1,30946	,27304	,9568	2,0893	,22	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7,598	2	3,799	2,522	,105
Within Groups	30,125	20	1,506		
Total	37,723	22			

(cont. Table C.3.7)

NORTHEAST – Wall A

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
type 1	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
type 2	10	,8280	,71551	,22626	,3162	1,3398	,02	2,27
type 3	5	,6620	,66364	,29679	-,1620	1,4860	,02	1,60
Total	25	1,1324	1,21868	,24374	,6294	1,6354	,02	5,40

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,945	2	2,472	1,772	,193
Within Groups	30,700	22	1,395		
Total	35,644	24			

NORTHWEST – Wall A

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Table C.3.8. All dates and hours on Wall B of each room type, by orientation;

EAST – Wall B

Warnings

Post hoc tests are not performed for area of the sunlight patch because there are fewer than three groups.

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 2	2	1,8800	1,40007	,99000	-10,6991	14,4591	,89	2,87
type 3	4	3,6100	,91338	,45669	2,1566	5,0634	2,68	4,58
Total	6	3,0333	1,30027	,53083	1,6688	4,3979	,89	4,58

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3,991	1	3,991	3,577	,132
Within Groups	4,463	4	1,116		
Total	8,454	5			

WEST – Wall B

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	5	,7400	,70855	,31688	-,1398	1,6198	,04	1,70
type 2	9	,6567	,74485	,24828	,0841	1,2292	,06	2,21
type 3	13	1,7338	1,66026	,46047	,7306	2,7371	,06	6,10
Total	27	1,1907	1,34367	,25859	,6592	1,7223	,04	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7,417	2	3,709	2,252	,127
Within Groups	39,524	24	1,647		
Total	46,942	26			

(cont. Table C.3.8.)

SOUTH – Wall B

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	6	,5567	,56010	,22866	-,0311	1,1445	,02	1,28
type 2	9	,6700	,65546	,21849	,1662	1,1738	,03	1,81
type 3	14	1,4743	1,22200	,32659	,7687	2,1798	,27	3,86
Total	29	1,0348	1,02976	,19122	,6431	1,4265	,02	3,86

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5,273	2	2,637	2,808	,079
Within Groups	24,418	26	,939		
Total	29,692	28			

SOUTHEAST – Wall B

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	5	,8900	,58609	,26211	,1623	1,6177	,22	1,70
type 2	7	1,0357	,73207	,27670	,3587	1,7128	,26	2,35
type 3	11	2,1209	1,59798	,48181	1,0474	3,1944	,56	6,10
Total	23	1,5230	1,30946	,27304	,9568	2,0893	,22	6,10

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7,598	2	3,799	2,522	,105
Within Groups	30,125	20	1,506		
Total	37,723	22			

(cont. Table C.3.8.)

SOUTHWEST – Wall B

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	4	,1950	,11121	,05560	,0180	,3720	,09	,31
type 2	8	,4350	,35051	,12392	,1420	,7280	,03	,95
type 3	13	1,7508	1,71793	,47647	,7126	2,7889	,09	5,72
Total	25	1,0808	1,42336	,28467	,4933	1,6683	,03	5,72

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12,310	2	6,155	3,729	,040
Within Groups	36,312	22	1,651		
Total	48,623	24			

Post Hoc Tests

Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	-,24000	,78674	,950	-2,2163	1,7363
	type 3	-1,55577	,73458	,109	-3,4011	,2895
type 2	type 1	,24000	,78674	,950	-1,7363	2,2163
	type 3	-1,31577	,57731	,080	-2,7660	,1345
type 3	type 1	1,55577	,73458	,109	-,2895	3,4011
	type 2	1,31577	,57731	,080	-,1345	2,7660

NORTHEAST – Wall B

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(cont. Table C.3.8.)

NORTHWEST – Wall B

Descriptives

Area of the sunlight patch

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
type 1	5	,6620	,66364	,29679	-,1620	1,4860	,02	1,60
type 2	10	,8280	,71551	,22626	,3162	1,3398	,02	2,27
type 3	10	1,6720	1,64419	,51994	,4958	2,8482	,17	5,40
Total	25	1,1324	1,21868	,24374	,6294	1,6354	,02	5,40

One-Way ANOVA

Area of the sunlight patch

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4,945	2	2,472	1,772	,193
Within Groups	30,700	22	1,395		
Total	35,644	24			

C.4. Room Types and Orientations

Table C.4.1. The effect of room types and orientations on the total areas

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
directions	1,00	east	86
	2,00	west	86
	3,00	south	120
	4,00	southeast	115
	5,00	southwest	115
	6,00	northeast	48
	7,00	northwest	48
opening type	1,00	type 1	202
	2,00	type 2	214
	3,00	type 3	202

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	812,589[a]	9	90,288	73,720	,000
direction	4,110	6	,685	,559	,763
type	10,757	2	5,378	4,392	,013
Error	745,865	609	1,225		
Total	1558,455	618			

a. R Squared = ,521 (Adjusted R Squared = ,514)

Post Hoc Tests

Opening Type - Multiple Comparisons

Dependent Variable: area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	,2825*	,10856	,026	,0274	,5376
	type 3	-,0003	,11012	1,000	-,2590	,2584
type 2	type 1	-,2825*	,10856	,026	-,5376	-,0274
	type 3	-,2828*	,10856	,025	-,5379	-,0277
type 3	type 1	,0003	,11012	1,000	-,2584	,2590
	type 2	,2828*	,10856	,025	,0277	,5379

Table C.4.2. The effect of room types and orientations on walls (A+B+C)

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
opening type	1,00	type 1	105
	2,00	type 2	108
	3,00	type 3	105
directions	1,00	east	44
	2,00	west	44
	3,00	south	58
	4,00	southeast	57
	5,00	southwest	57
	6,00	northeast	29
	7,00	northwest	29

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

opening type	directions	Mean	Std. Deviation	N
type 1	east	1,5994	1,47524	17
	west	1,7233	1,56095	12
	south	1,1990	1,13596	20
	southeast	1,4462	1,42462	21
	southwest	1,4600	1,51241	18
	northeast	1,6720	1,64419	10
	northwest	,8400	,65072	7
	Total	1,4390	1,38019	105
type 2	east	,8760	,83323	15
	west	,8760	,83323	15
	south	,6700	,63589	18
	southeast	,7767	,61686	18
	southwest	,7767	,61686	18
	northeast	,8150	,69351	12
	northwest	,8150	,69351	12
	Total	,7950	,68585	108
type 3	east	1,7233	1,56095	12
	west	1,5994	1,47524	17
	south	1,1990	1,13596	20
	southeast	1,4600	1,51241	18
	southwest	1,4467	1,42433	21
	northeast	,8400	,65072	7
	northwest	1,6720	1,64419	10
	Total	1,4391	1,38013	105
Total	east	1,3866	1,34151	44
	west	1,3866	1,34151	44
	south	1,0348	1,02069	58
	southeast	1,2391	1,27876	57
	southwest	1,2393	1,27868	57
	northeast	1,1166	1,14756	29
	northwest	1,1166	1,14756	29
	Total	1,2203	1,22555	318

(cont. Table C.4.2.)

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	508,230[a]	9	56,470	39,525	,000
type	29,557	2	14,778	10,344	,000
direction	5,063	6	,844	,591	,738
Error	441,476	309	1,429		
Total	949,706	318			

a. R Squared = ,535 (Adjusted R Squared = ,522)

Post Hoc Tests

Opening Type - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
type 1	type 2	,6440*	,16382	,000	,2582	1,0298
	type 3	-,0001	,16497	1,000	-,3886	,3884
type 2	type 1	-,6440*	,16382	,000	-1,0298	-,2582
	type 3	-,6441*	,16382	,000	-1,0299	-,2583
type 3	type 1	,0001	,16497	1,000	-,3884	,3886
	type 2	,6441*	,16382	,000	,2583	1,0299

Table C.4.3. The effect of room types and orientations on Wall A

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
directions	1,00	east	27
	2,00	west	6
	3,00	south	29
	4,00	southeast	25
	5,00	southwest	23
	6,00	northeast	25
opening type	1,00	type 1	65
	2,00	type 2	45
	3,00	type 3	25

Post Hoc Tests

Orientation - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) directions	(J) directions	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
east	west	-1,8426*	,51850	,007	-3,3430	-,3422
	south	,1559	,30723	,996	-,7331	1,0450
	southeast	,1103	,31886	,999	-,8124	1,0330
	southwest	-,3323	,32598	,911	-1,2756	,6110
	northeast	,0583	,31886	1,000	-,8644	,9810
west	east	1,8426*	,51850	,007	,3422	3,3430
	south	1,9985*	,51524	,002	,5075	3,4895
	southeast	1,9529*	,52226	,004	,4417	3,4642
	southwest	1,5103	,52664	,054	-,0136	3,0342
	northeast	1,9009*	,52226	,005	,3897	3,4122
south	east	-,1559	,30723	,996	-1,0450	,7331
	west	-1,9985*	,51524	,002	-3,4895	-,5075
	southeast	-,0456	,31353	1,000	-,9528	,8617
	southwest	-,4882	,32077	,651	-1,4164	,4400
	northeast	-,0976	,31353	1,000	-1,0048	,8097
southeast	east	-,1103	,31886	,999	-1,0330	,8124
	west	-1,9529*	,52226	,004	-3,4642	-,4417
	south	,0456	,31353	1,000	-,8617	,9528
	southwest	-,4426	,33192	,766	-1,4031	,5179
	northeast	-,0520	,32494	1,000	-,9923	,8883
southwest	east	,3323	,32598	,911	-,6110	1,2756
	west	-1,5103	,52664	,054	-3,0342	,0136
	south	,4882	,32077	,651	-,4400	1,4164
	southeast	,4426	,33192	,766	-,5179	1,4031
	northeast	,3906	,33192	,847	-,5699	1,3511
northeast	east	-,0583	,31886	1,000	-,9810	,8644
	west	-1,9009*	,52226	,005	-3,4122	-,3897
	south	,0976	,31353	1,000	-,8097	1,0048
	southeast	,0520	,32494	1,000	-,8883	,9923
	southwest	-,3906	,33192	,847	-1,3511	,5699

(cont. Table C.4.3.)

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	278,608[a]	8	34,826	26,387	,000
direction	19,033	5	3,807	2,884	,017
type	39,471	2	19,736	14,954	,000
Error	167,614	127	1,320		
Total	446,222	135			

a. R Squared = ,624 (Adjusted R Squared = ,601)

Post Hoc Tests

Opening Type - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	1,0813*	,22279	,000	,5529	1,6096
	type 3	1,2294*	,27036	,000	,5882	1,8706
type 2	type 1	-1,0813*	,22279	,000	-1,6096	-,5529
	type 3	,1481	,28657	,863	-,5315	,8277
type 3	type 1	-1,2294*	,27036	,000	-1,8706	-,5882
	type 2	-,1481	,28657	,863	-,8277	,5315

Table C.4.4. The effect of room types and orientations on Wall B

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
directions	1,00	east	6
	2,00	west	27
	3,00	south	29
	4,00	southeast	23
	5,00	southwest	25
	7,00	northwest	25
opening type	1,00	type 1	25
	2,00	type 2	45
	3,00	type 3	65

Post Hoc Tests

Orientation - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) directions	(J) directions	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
east	west	1,8426*	,51847	,007	,3423	3,3429
	south	1,9985*	,51521	,002	,5076	3,4894
	southeast	1,5103	,52661	,054	-,0136	3,0341
	southwest	1,9525*	,52223	,004	,4413	3,4637
	northwest	1,9009*	,52223	,005	,3897	3,4121
west	east	-1,8426*	,51847	,007	-3,3429	-,3423
	south	,1559	,30721	,996	-,7331	1,0449
	southeast	-,3323	,32596	,911	-1,2755	,6109
	southwest	,1099	,31884	,999	-,8127	1,0326
	northwest	,0583	,31884	1,000	-,8643	,9810
south	east	-1,9985*	,51521	,002	-3,4894	-,5076
	west	-,1559	,30721	,996	-1,0449	,7331
	southeast	-,4882	,32075	,651	-1,4164	,4399
	southwest	-,0460	,31351	1,000	-,9532	,8612
	northwest	-,0976	,31351	1,000	-1,0048	,8096
southeast	east	-1,5103	,52661	,054	-3,0341	,0136
	west	,3323	,32596	,911	-,6109	1,2755
	south	,4882	,32075	,651	-,4399	1,4164
	southwest	,4422	,33191	,766	-,5182	1,4027
	northwest	,3906	,33191	,847	-,5698	1,3511
southwest	east	-1,9525*	,52223	,004	-3,4637	-,4413
	west	-,1099	,31884	,999	-1,0326	,8127
	south	,0460	,31351	1,000	-,8612	,9532
	southeast	-,4422	,33191	,766	-1,4027	,5182
	northwest	-,0516	,32492	1,000	-,9918	,8886
northwest	east	-1,9009*	,52223	,005	-3,4121	-,3897
	west	-,0583	,31884	1,000	-,9810	,8643
	south	,0976	,31351	1,000	-,8096	1,0048
	southeast	-,3906	,33191	,847	-1,3511	,5698
	southwest	,0516	,32492	1,000	-,8886	,9918

Based on observed means.

(cont. Table C.4.4.)

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	278,640[a]	8	34,830	26,393	,000
direction	19,028	5	3,806	2,884	,017
type	39,482	2	19,741	14,959	,000
Error	167,595	127	1,320		
Total	446,234	135			

a. R Squared = ,624 (Adjusted R Squared = ,601)

Post Hoc Tests

Opening Type - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	-,1481	,28655	,863	-,8277	,5314
	type 3	-1,2296*	,27035	,000	-1,8707	-,5884
type 2	type 1	,1481	,28655	,863	-,5314	,8277
	type 3	-1,0814*	,22277	,000	-1,6097	-,5531
type 3	type 1	1,2296*	,27035	,000	,5884	1,8707
	type 2	1,0814*	,22277	,000	,5531	1,6097

Based on observed means.

*. The mean difference is significant at the ,05 level.

Table C.4.5. The effect of room types and orientations on Wall C

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
directions	1,00	east	11
	2,00	west	11
	4,00	southeast	9
	5,00	southwest	9
	6,00	northeast	4
	7,00	northwest	4
opening type	1,00	type 1	15
	2,00	type 2	18
	3,00	type 3	15

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	45,452[a]	8	5,681	19,262	,000
direction	,035	5	,007	,024	1,000
type	,111	2	,055	,188	,829
Error	11,799	40	,295		
Total	57,250	48			

a. R Squared = ,794 (Adjusted R Squared = ,753)

Table C.4.6. The effect of room types and orientations on floors (D)

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
directions	1,00	east	42
	2,00	west	42
	3,00	south	62
	4,00	southeast	58
	5,00	southwest	58
	6,00	northeast	19
	7,00	northwest	19
opening type	1,00	type 1	97
	2,00	type 2	106
	3,00	type 3	97

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	331,900[a]	9	36,878	38,763	,000
direction	2,830	6	,472	,496	,811
type	,702	2	,351	,369	,692
Error	276,848	291	,951		
Total	608,748	300			

a. R Squared = ,545 (Adjusted R Squared = ,531)

C.5. Room Types and Dates

Table C.5.1. The effect of room types and dates on the total areas

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
dates of simulation	1,00	21mar/sept	219
	2,00	21 june	225
	3,00	21 dec	174
opening type	1,00	type 1	202
	2,00	type 2	214
	3,00	type 3	202

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

dates of simulation	opening type	Mean	Std. Deviation	N
21mar/sept	type 1	1,1734	1,10764	71
	type 2	,9121	,85326	77
	type 3	1,1734	1,10762	71
	Total	1,0815	1,02827	219
21 june	type 1	1,1043	1,11552	75
	type 2	,9216	,76825	75
	type 3	1,1051	1,11488	75
	Total	1,0436	1,01201	225
21 dec	type 1	1,4830	1,44112	56
	type 2	1,0352	,95898	62
	type 3	1,4830	1,44112	56
	Total	1,3234	1,30041	174
Total	type 1	1,2336	1,21595	202
	type 2	,9511	,85505	214
	type 3	1,2339	1,21570	202
	Total	1,1358	1,11069	618

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	817,471[a]	5	163,494	135,255	,000
dates	8,992	2	4,496	3,719	,025
type	11,484	2	5,742	4,750	,009
Error	740,983	613	1,209		
Total	1558,455	618			

a. R Squared = ,525 (Adjusted R Squared = ,521)

(cont. Table C.5.1)

Post Hoc Tests

Dates - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) dates of simulation	(J) dates of simulation	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
21mar/sept	21 june	,0379	,10436	,930	-,2073	,2831
	21 dec	-,2419	,11165	,078	-,5043	,0204
21 june	21mar/sept	-,0379	,10436	,930	-,2831	,2073
	21 dec	-,2798*	,11099	,032	-,5406	-,0190
21 dec	21mar/sept	,2419	,11165	,078	-,0204	,5043
	21 june	,2798*	,11099	,032	,0190	,5406

Based on observed means.

*. The mean difference is significant at the ,05 level.

Opening type - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	,2825*	,10785	,024	,0291	,5359
	type 3	-,0003	,10940	1,000	-,2573	,2567
type 2	type 1	-,2825*	,10785	,024	-,5359	-,0291
	type 3	-,2828*	,10785	,024	-,5362	-,0294
type 3	type 1	,0003	,10940	1,000	-,2567	,2573
	type 2	,2828*	,10785	,024	,0294	,5362

Based on observed means.

*. The mean difference is significant at the ,05 level.

Table C.5.2. The effect of room types and dates on walls (A+B+C)

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
opening type	1,00	type 1	105
	2,00	type 2	108
	3,00	type 3	105
dates of simulation	1,00	21mar/sept	112
	2,00	21 june	96
	3,00	21 dec	110

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

opening type	dates of simulation	Mean	Std. Deviation	N
type 1	21mar/sept	1,3322	1,25033	37
	21 june	1,4922	1,32788	32
	21 dec	1,5017	1,57222	36
	Total	1,4390	1,38019	105
type 2	21mar/sept	,6958	,66836	38
	21 june	,8281	,77893	32
	21 dec	,8663	,62370	38
	Total	,7950	,68585	108
type 3	21mar/sept	1,3324	1,25017	37
	21 june	1,4922	1,32788	32
	21 dec	1,5017	1,57222	36
	Total	1,4391	1,38013	105
Total	21mar/sept	1,1163	1,12003	112
	21 june	1,2708	1,20324	96
	21 dec	1,2822	1,34596	110
	Total	1,2203	1,22555	318

(cont. Table C.5.2)

Post Hoc Tests

Opening type - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	,6440*	,16335	,000	,2594	1,0287
	type 3	-,0001	,16450	1,000	-,3875	,3873
type 2	type 1	-,6440*	,16335	,000	-1,0287	-,2594
	type 3	-,6441*	,16335	,000	-1,0288	-,2595
type 3	type 1	,0001	,16450	1,000	-,3873	,3875
	type 2	,6441*	,16335	,000	,2595	1,0288

Based on observed means.

*. The mean difference is significant at the .05 level.

Table C.5.3. The effect of room types and dates on Wall A

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
dates of simulation	1,00	21mar/sept	49
	2,00	21 june	40
	3,00	21 dec	46
opening type	1,00	type 1	65
	2,00	type 2	45
	3,00	type 3	25

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	262,917[a]	5	52,583	37,292	,000
dates	3,342	2	1,671	1,185	,309
type	45,799	2	22,899	16,240	,000
Error	183,305	130	1,410		
Total	446,222	135			

a. R Squared = ,589 (Adjusted R Squared = ,573)

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

dates of simulation	opening type	Mean	Std. Deviation	N
21mar/sept	type 1	1,6600	1,42351	23
	type 2	,6394	,67880	17
	type 3	,7411	,66949	9
	Total	1,1371	1,18541	49
21 june	type 1	1,6420	1,45022	25
	type 2	,8858	,87492	12
	type 3	,5033	,27099	3
	Total	1,3298	1,29984	40
21 dec	type 1	2,4229	1,82936	17
	type 2	,8256	,64916	16
	type 3	,5692	,57753	13
	Total	1,3435	1,45878	46
Total	type 1	1,8526	1,56171	65
	type 2	,7713	,71691	45
	type 3	,6232	,57522	25
	Total	1,2645	1,31113	135

(cont. Table C.5.3)

Post Hoc Tests

Dates - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) dates of simulation	(J) dates of simulation	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
21mar/sept	21 june	-,1926	,25304	,727	-,7925	,4073
	21 dec	-,2063	,24378	,675	-,7843	,3716
21 june	21mar/sept	,1926	,25304	,727	-,4073	,7925
	21 dec	-,0137	,25672	,998	-,6224	,5949
21 dec	21mar/sept	,2063	,24378	,675	-,3716	,7843
	21 june	,0137	,25672	,998	-,5949	,6224

Based on observed means.

Opening Type - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	1,0813*	,23028	,000	,5353	1,6272
	type 3	1,2294*	,27945	,000	,5669	1,8920
type 2	type 1	-1,0813*	,23028	,000	-1,6272	-,5353
	type 3	,1481	,29620	,871	-,5541	,8504
type 3	type 1	-1,2294*	,27945	,000	-1,8920	-,5669
	type 2	-,1481	,29620	,871	-,8504	,5541

Based on observed means.

*. The mean difference is significant at the ,05 level.

Table C.5.4. The effect of room types and dates on Wall B

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
dates of simulation	1,00	21mar/sept	49
	2,00	21 june	40
	3,00	21 dec	46
opening type	1,00	type 1	25
	2,00	type 2	45
	3,00	type 3	65

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	262,952[a]	5	52,590	37,302	,000
dates	3,341	2	1,670	1,185	,309
type	45,811	2	22,906	16,247	,000
Error	183,282	130	1,410		
Total	446,234	135			

a. R Squared = ,589 (Adjusted R Squared = ,573)

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

dates of simulation	opening type	Mean	Std. Deviation	N
21mar/sept	type 1	,7411	,66949	9
	type 2	,6394	,67880	17
	type 3	1,6604	1,42318	23
	Total	1,1373	1,18532	49
21 june	type 1	,5033	,27099	3
	type 2	,8858	,87492	12
	type 3	1,6420	1,45022	25
	Total	1,3298	1,29984	40
21 dec	type 1	,5692	,57753	13
	type 2	,8256	,64916	16
	type 3	2,4229	1,82936	17
	Total	1,3435	1,45878	46
Total	type 1	,6232	,57522	25
	type 2	,7713	,71691	45
	type 3	1,8528	1,56159	65
	Total	1,2646	1,31110	135

(cont. Table C.5.4)

Post Hoc Tests

Dates - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) dates of simulation	(J) dates of simulation	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
21mar/sept	21 june	-,1924	,25302	,728	-,7923	,4075
	21 dec	-,2061	,24377	,675	-,7841	,3718
21 june	21mar/sept	,1924	,25302	,728	-,4075	,7923
	21 dec	-,0137	,25670	,998	-,6223	,5949
21 dec	21mar/sept	,2061	,24377	,675	-,3718	,7841
	21 june	,0137	,25670	,998	-,5949	,6223

Based on observed means.

Opening Type - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) opening type	(J) opening type	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
type 1	type 2	-,1481	,29618	,871	-,8503	,5541
	type 3	-1,2296*	,27944	,000	-1,8921	-,5671
type 2	type 1	,1481	,29618	,871	-,5541	,8503
	type 3	-1,0814*	,23026	,000	-1,6274	-,5355
type 3	type 1	1,2296*	,27944	,000	,5671	1,8921
	type 2	1,0814*	,23026	,000	,5355	1,6274

Based on observed means.

*. The mean difference is significant at the ,05 level.

Table C.5.5. The effect of room types and dates on Wall C

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
dates of simulation	1,00	21mar/sept	14
	2,00	21 june	16
	3,00	21 dec	18
opening type	1,00	type 1	15
	2,00	type 2	18
	3,00	type 3	15

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	45,423[a]	5	9,085	33,029	,000
dates	,007	2	,003	,012	,988
type	,104	2	,052	,189	,828
Error	11,827	43	,275		
Total	57,250	48			

a. R Squared = ,793 (Adjusted R Squared = ,769)

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

dates of simulation	opening type	Mean	Std. Deviation	N
21mar/sept	type 1	,8880	,61467	5
	type 2	1,1750	,50229	4
	type 3	,8880	,61467	5
	Total	,9700	,55573	14
21 june	type 1	1,2975	,36207	4
	type 2	,6550	,48524	8
	type 3	1,2975	,36207	4
	Total	,9763	,52192	16
21 dec	type 1	,9117	,47935	6
	type 2	1,0833	,53196	6
	type 3	,9117	,47935	6
	Total	,9689	,47469	18
Total	type 1	1,0067	,50117	15
	type 2	,9133	,53144	18
	type 3	1,0067	,50117	15
	Total	,9717	,50385	48

Table C.5.6. The effect of room types and dates on floors (D)

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
dates of simulation	1,00	21mar/sept	107
	2,00	21 june	129
	3,00	21 dec	64
opening type	1,00	type 1	97
	2,00	type 2	106
	3,00	type 3	97

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	340,459[a]	5	68,092	74,871	,000
dates	11,389	2	5,695	6,261	,002
type	,499	2	,249	,274	,760
Error	268,289	295	,909		
Total	608,748	300			

a. R Squared = ,559 (Adjusted R Squared = ,552)

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

dates of simulation	opening type	Mean	Std. Deviation	N
21mar/sept	type 1	1,0006	,91541	34
	type 2	1,1228	,96374	39
	type 3	1,0003	,91546	34
	Total	1,0450	,92642	107
21 june	type 1	,8156	,83129	43
	type 2	,9912	,76188	43
	type 3	,8170	,83029	43
	Total	,8746	,80639	129
21 dec	type 1	1,4495	1,20687	20
	type 2	1,3025	1,30061	24
	type 3	1,4495	1,20687	20
	Total	1,3944	1,22526	64
Total	type 1	1,0111	,96740	97
	type 2	1,1101	,97630	106
	type 3	1,0116	,96691	97
	Total	1,0463	,96830	300

(cont. Table C.5.6)

Post Hoc Tests

Dates - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) dates of simulation	(J) dates of simulation	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
21mar/sept	21 june	,1705	,12470	,360	-,1233	,4642
	21 dec	-,3493	,15070	,055	-,7043	,0057
21 june	21mar/sept	-,1705	,12470	,360	-,4642	,1233
	21 dec	-,5198*	,14581	,001	-,8633	-,1763
21 dec	21mar/sept	,3493	,15070	,055	-,0057	,7043
	21 june	,5198*	,14581	,001	,1763	,8633

Based on observed means.

*. The mean difference is significant at the ,05 level.

C.6. Orientations and Dates

Table C.6.1. The effect of orientations and dates on the total areas

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
directions	1,00	east	86
	2,00	west	86
	3,00	south	120
	4,00	southeast	115
	5,00	southwest	115
	6,00	northeast	48
	7,00	northwest	48
dates of simulation	1,00	21mar/sept	219
	2,00	21 june	225
	3,00	21 dec	174

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

directions	dates of simulation	Mean	Std. Deviation	N
east	21mar/sept	1,2194	1,40192	31
	21 june	1,5639	1,18916	33
	21 dec	,7759	,68563	22
	Total	1,2381	1,19950	86
west	21mar/sept	1,2194	1,40192	31
	21 june	1,5621	1,19126	33
	21 dec	,7759	,68563	22
	Total	1,2374	1,20009	86
south	21mar/sept	,7962	,52858	47
	21 june	,3342	,17167	31
	21 dec	1,9119	1,22768	42
	Total	1,0673	1,02739	120
southeast	21mar/sept	1,3141	1,00371	39
	21 june	,6994	,43728	35
	21 dec	1,3973	1,48066	41
	Total	1,1567	1,12053	115
southwest	21mar/sept	1,3144	1,00354	39
	21 june	,6994	,43728	35
	21 dec	1,3973	1,48066	41
	Total	1,1568	1,12049	115
northeast	21mar/sept	,6663	,52994	16
	21 june	1,2472	1,20090	29
	21 dec	,2100	,03464	3
	Total	,9888	1,03159	48
northwest	21mar/sept	,6663	,52994	16
	21 june	1,2472	1,20090	29
	21 dec	,2100	,03464	3
	Total	,9888	1,03159	48
Total	21mar/sept	1,0815	1,02827	219
	21 june	1,0436	1,01201	225
	21 dec	1,3234	1,30041	174
	Total	1,1358	1,11069	618

(cont. Table C.6.1)

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	809,677[a]	9	89,964	73,170	,000
direction	3,690	6	,615	,500	,808
dates	7,844	2	3,922	3,190	,042
Error	748,778	609	1,230		
Total	1558,455	618			

a. R Squared = ,520 (Adjusted R Squared = ,512)

Post Hoc Tests

Dates - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) dates of simulation	(J) dates of simulation	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
21mar/sept	21 june	,0379	,10526	,931	-,2094	,2852
	21 dec	-,2419	,11261	,081	-,5065	,0226
21 june	21mar/sept	-,0379	,10526	,931	-,2852	,2094
	21 dec	-,2798*	,11194	,034	-,5428	-,0168
21 dec	21mar/sept	,2419	,11261	,081	-,0226	,5065
	21 june	,2798*	,11194	,034	,0168	,5428

Based on observed means.

*. The mean difference is significant at the ,05 level.

Table C.6.2. The effect of orientations and dates on walls (A+B+C)

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
dates of simulation	1,00	21mar/sept	112
	2,00	21 june	96
	3,00	21 dec	110
directions	1,00	east	44
	2,00	west	44
	3,00	south	58
	4,00	southeast	57
	5,00	southwest	57
	6,00	northeast	29
	7,00	northwest	29

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

dates of simulation	directions	Mean	Std. Deviation	N
21mar/sept	east	1,3375	1,63285	16
	west	1,3375	1,63285	16
	south	,6100	,51617	24
	southeast	1,4529	1,02892	17
	southwest	1,4535	1,02842	17
	northeast	,8264	,54052	11
	northwest	,8264	,54052	11
	Total	1,1163	1,12003	112
21 june	east	1,9277	1,40347	13
	west	1,9277	1,40347	13
	south	,3800	,21858	10
	southeast	,7587	,40671	15
	southwest	,7587	,40671	15
	northeast	1,5107	1,41995	15
	northwest	1,5107	1,41995	15
	Total	1,2708	1,20324	96
21 dec	east	,9700	,72245	15
	west	,9700	,72245	15
	south	1,7325	1,18915	24
	southeast	1,3820	1,67790	25
	southwest	1,3820	1,67790	25
	northeast	,2100	,03464	3
	northwest	,2100	,03464	3
	Total	1,2822	1,34596	110
Total	east	1,3866	1,34151	44
	west	1,3866	1,34151	44
	south	1,0348	1,02069	58
	southeast	1,2391	1,27876	57
	southwest	1,2393	1,27868	57
	northeast	1,1166	1,14756	29
	northwest	1,1166	1,14756	29
	Total	1,2203	1,22555	318

(cont. Table C.6.2)

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	480,318[a]	9	53,369	35,133	,000
dates	1,644	2	,822	,541	,583
direction	4,861	6	,810	,533	,783
Error	469,388	309	1,519		
Total	949,706	318			

a. R Squared = ,506 (Adjusted R Squared = ,491)

Table C.6.3. The effect of orientations and dates on Wall A

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
directions	1.00	east	27
	2.00	west	6
	3.00	south	29
	4.00	southeast	25
	5.00	southwest	23
	6.00	northeast	25
dates of simulation	1.00	21mar/sept	49
	2.00	21 june	40
	3.00	21 dec	46

Post Hoc Tests

Orientation - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) directions	(J) directions	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
east	west	-1.8426*	.56768	.018	-3.4853	-.1999
	south	.1559	.33637	.997	-.8174	1.1293
	southeast	.1103	.34910	1.000	-.8999	1.1205
	southwest	-.3323	.35689	.938	-1.3651	.7004
	northeast	.0583	.34910	1.000	-.9519	1.0685
west	east	1.8426*	.56768	.018	.1999	3.4853
	south	1.9985*	.56411	.007	.3662	3.6309
	southeast	1.9529*	.57179	.011	.2983	3.6075
	southwest	1.5103	.57658	.100	-.1582	3.1787
	northeast	1.9009*	.57179	.014	.2463	3.5555
south	east	-.1559	.33637	.997	-1.1293	.8174
	west	-1.9985*	.56411	.007	-3.6309	-.3662
	southeast	-.0456	.34326	1.000	-1.0389	.9477
	southwest	-.4882	.35119	.733	-1.5045	.5280
	northeast	-.0976	.34326	1.000	-1.0909	.8957
southeast	east	-.1103	.34910	1.000	-1.1205	.8999
	west	-1.9529*	.57179	.011	-3.6075	-.2983
	south	.0456	.34326	1.000	-.9477	1.0389
	southwest	-.4426	.36340	.827	-1.4942	.6089
	northeast	-.0520	.35575	1.000	-1.0814	.9774
southwest	east	.3323	.35689	.938	-.7004	1.3651
	west	-1.5103	.57658	.100	-3.1787	.1582
	south	.4882	.35119	.733	-.5280	1.5045
	southeast	.4426	.36340	.827	-.6089	1.4942
	northeast	.3906	.36340	.890	-.6609	1.4422
northeast	east	-.0583	.34910	1.000	-1.0685	.9519
	west	-1.9009*	.57179	.014	-3.5555	-.2463
	south	.0976	.34326	1.000	-.8957	1.0909
	southeast	.0520	.35575	1.000	-.9774	1.0814
	southwest	-.3906	.36340	.890	-1.4422	.6609

Based on observed means.

(cont. Table C.6.3)

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	245.310[a]	8	30.664	19.383	.000
direction	28.192	5	5.638	3.564	.005
dates	6.174	2	3.087	1.951	.146
Error	200.912	127	1.582		
Total	446.222	135			

a. R Squared = .550 (Adjusted R Squared = .521)

Table C.6.4. The effect of orientations and dates on Wall B

Univariate Analysis of Variance

Between-Subjects Factors

		Value Label	N
directions	1.00	east	6
	2.00	west	27
	3.00	south	29
	4.00	southeast	23
	5.00	southwest	25
	7.00	northwest	25
dates of simulation	1.00	21mar/sept	49
	2.00	21 june	40
	3.00	21 dec	46

Post Hoc Tests

Orientation - Multiple Comparisons

Dependent Variable: Area of the sunlight patch
Tukey HSD

(I) directions	(J) directions	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
east	west	1.8426*	.56767	.018	.1999	3.4853
	south	1.9985*	.56410	.007	.3662	3.6308
	southeast	1.5103	.57657	.100	-.1581	3.1787
	southwest	1.9525*	.57178	.011	.2980	3.6071
	northwest	1.9009*	.57178	.014	.2464	3.5555
west	east	-1.8426*	.56767	.018	-3.4853	-.1999
	south	.1559	.33636	.997	-.8174	1.1293
	southeast	-.3323	.35689	.938	-1.3650	.7004
	southwest	.1099	.34910	1.000	-.9002	1.1201
	northwest	.0583	.34910	1.000	-.9518	1.0685
south	east	-1.9985*	.56410	.007	-3.6308	-.3662
	west	-.1559	.33636	.997	-1.1293	.8174
	southeast	-.4882	.35118	.733	-1.5044	.5280
	southwest	-.0460	.34326	1.000	-1.0393	.9473
	northwest	-.0976	.34326	1.000	-1.0909	.8957
southeast	east	-1.5103	.57657	.100	-3.1787	.1581
	west	.3323	.35689	.938	-.7004	1.3650
	south	.4882	.35118	.733	-.5280	1.5044
	southwest	.4422	.36340	.828	-.6093	1.4938
	northwest	.3906	.36340	.890	-.6609	1.4422
southwest	east	-1.9525*	.57178	.011	-3.6071	-.2980
	west	-.1099	.34910	1.000	-1.1201	.9002
	south	.0460	.34326	1.000	-.9473	1.0393
	southeast	-.4422	.36340	.828	-1.4938	.6093
	northwest	-.0516	.35575	1.000	-1.0810	.9778
northwest	east	-1.9009*	.57178	.014	-3.5555	-.2464
	west	-.0583	.34910	1.000	-1.0685	.9518
	south	.0976	.34326	1.000	-.8957	1.0909
	southeast	-.3906	.36340	.890	-1.4422	.6609
	southwest	.0516	.35575	1.000	-.9778	1.0810

Based on observed means.

*. The mean difference is significant at the .05 level.

(cont. Table C.6.4)

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	245.327[a]	8	30.666	19.385	.000
direction	28.187	5	5.637	3.564	.005
dates	6.169	2	3.085	1.950	.147
Error	200.907	127	1.582		
Total	446.234	135			

a. R Squared = .550 (Adjusted R Squared = .521)

Table C.6.5. The effect of orientations and dates on Wall C

Univariate Analysis of Variance

Between Subject Factors

		Value Label	N
directions	1.00	east	11
	2.00	west	11
	4.00	southeast	9
	5.00	southwest	9
	6.00	northeast	4
	7.00	northwest	4
dates of simulation	1.00	21mar/sept	14
	2.00	21 june	16
	3.00	21 dec	18

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	45.366[a]	8	5.671	19.086	.000
direction	.047	5	.009	.032	.999
dates	.025	2	.013	.042	.959
Error	11.884	40	.297		
Total	57.250	48			

a. R Squared = .792 (Adjusted R Squared = .751)

Table C.6.6. The effect of orientations and dates on floors (D)

Univariate Analysis of Variance

Between Subject Factors

		Value Label	N
dates of simulation	1,00	21mar/sept	107
	2,00	21 june	129
	3,00	21 dec	64
directions	1,00	east	42
	2,00	west	42
	3,00	south	62
	4,00	southeast	58
	5,00	southwest	58
	6,00	northeast	19
	7,00	northwest	19

Descriptive Statistics

Dependent Variable: Area of the sunlight patch

dates of simulation	directions	Mean	Std. Deviation	N
21mar/sept	east	1,0933	1,14974	15
	west	1,0933	1,14974	15
	south	,9904	,47789	23
	southeast	1,2068	,99434	22
	southwest	1,2068	,99434	22
	northeast	,3140	,31166	5
	northwest	,3140	,31166	5
	Total	1,0450	,92642	107
21 june	east	1,3275	,99409	20
	west	1,3245	,99757	20
	south	,3124	,14546	21
	southeast	,6550	,46415	20
	southwest	,6550	,46415	20
	northeast	,9650	,87692	14
	northwest	,9650	,87692	14
	Total	,8746	,80639	129
21 dec	east	,3600	,36258	7
	west	,3600	,36258	7
	south	2,1511	1,27116	18
	southeast	1,4213	1,15791	16
	southwest	1,4213	1,15791	16
	Total	1,3944	1,22526	64
Total	east	1,0826	1,02324	42
	west	1,0812	1,02446	42
	south	1,0977	1,04102	62
	southeast	1,0757	,94401	58
	southwest	1,0757	,94401	58
	northeast	,7937	,81469	19
	northwest	,7937	,81469	19
	Total	1,0463	,96830	300

(cont. Table C.6.6)

Tests of Between-Subjects Effects

Dependent Variable: Area of the sunlight patch

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	340,897[a]	9	37,877	41,151	,000
dates	9,700	2	4,850	5,269	,006
direction	,937	6	,156	,170	,985
Error	267,851	291	,920		
Total	608,748	300			

a. R Squared = ,560 (Adjusted R Squared = ,546)

CURRICULUM VITAE

Name & surname: Sezin Tanriöver

Date & place of birth: 12 September, 1974; Ankara

Post-secondary education:-

- Baccalaureate degree: B. in Interior Architecture and Environmental Design, 1998; Bilkent University
- Graduate degree: MFA. in Interior Architecture and Environmental Design, 1998; Bilkent University

Work experience:-

- Worked in Formart Interior Architecture and Design Company as one of the establishing member (1996-2001).
- Part-time instructor in Bilkent University, Department of Interior Architecture and Environmental Design (1999-2001).
- Full-time instructor in Bilkent University, Department of Interior Architecture and Environmental Design (2001-present).

Courses: 4th Year Interior Design Studio, Technical Drawing and Lettering I & II, (1st Basic Design Studio - 1999-2006)

Academic/professional conventions attended:-

- International Gazimagusa Symposium 2004, Medi-Triology: Momentum, Metamorphosis, Manifesto. Eastern Mediterranean University, Gazimagusa, North Cyprus, 12-16 April 2004. "Mediterranean: Space - 5 Senses - Memory"

- The project “Çocuk Çekim Merkezi (Child Attraction Center)” which was developed for the competition by the World Bank and its partners, that tests new approaches to Social Progress and Inclusion on the way to Europe, was chosen to be within 23 successful projects and awarded start-up funds to implement the project within 12 months ahead.

  Name of the Project: Child Attraction Center
  Contributors: Dr. Nilgün Çuha, Nerkis Kural, Serpil Özaloglu, **Sezin Tanriöver**, Dr. Sibel Ertez Ural, Dr. Semiha Yilmazer

Publications:-

- Paper noted above published in symposium proceedings, May, 2004
- Paper, “Sunlight in Patient Rooms: Areas and Locations of Sun-patches” is being evaluated by the journal, Building and Environment.
- Deniz Hasirci, Nerkis Kural, Serpil Özaloglu, **Sezin Tanriöver**. “A Participatory Design Process: Defining Urban Public Space for Children” in the proceedings of the 1st International Multidisciplinary Conference on Children and Young People in Everyday Environment. Universite Rennes, Rennes, France, 16-17 November 2006.