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DISSERTATION THESIS

"THERMAL COMFORT AND HYPNOSIS"

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ABSTRACT

The specific study forms part of an effort to investigate the extent of the psychological aspects of thermal comfort with respect to the physiological effects. The idea was about examining the thermoregulatory mechanism of human, and how this can be combined with his psychology and mind, in order to change, if possible, his perception of thermal comfort. For this, it was decided to use the method of hypnotism, in an attempt to lead his mind through suggestions, to pleasant states of comfort, when the conditions of temperature and humidity around him, should cause him discomfort.

The basic concept was to run an experiment inside a climate chamber, where the basic variables of temperature and humidity could be changed. In the same time, a number of subjects would enter the chamber, in order to be hypnotized by a hypnotist, while the temperatures would be altered, to reach uncomfortable values. The hypnotist would give them suggestions of thermal comfort and pleasantness. In this way, it could be examined if those who were hypnotized could be convinced to accept uncomfortable temperatures, depending on their hypnotizability degree (or suggestibility score). In addition, while being inside the chamber, the subjects would have to give thermal comfort votes known as PMV.

As a result, the thermal comfort votes could be compared with the hypnotizability of the subjects, in order to see if this last can change the thermal comfort of people. Thus, according to the initial thought, if someone is a highly hypnotizable person he can accept different degrees of discomfort.

However, the results of these experiments indicated that this method could not convince people of the steadiness of the environmental conditions, and almost all of them responded to the thermal changes, regardless of their hypnotizability degree. This study was a pretty much new idea which could help new steps in this field to be done, by giving some first clues on how hypnosis could be related with thermal comfort. If someday, these studies could demonstrate that hypnosis could contribute in ameliorating the thermal comfort of people, then this could have important results on the buildings as well as on human's psychology.

CONTENTS

1. INTRODUCTION

From the beginning of our existence on this planet, humans have tried to protect themselves from the outdoor conditions and so have used numerous strategies to create acceptable indoor conditions in order to achieve thermal comfort. Among the means used, were and continue to be, geographical and physical locations suitable for habitation, the choice of building site, the choice of the design and construction of the building, the choice of clothing suitable to the climate and the operation of sometimes unconscious changes of posture and activity. In recent years, the choice of adequate heating or cooling systems and the use of controls in these systems gave a new opportunity to people to control their environment.

However, these last centuries, due to the increasing urbanization and industrialization of society, more and more people are spending the greater part of their lives indoors. Almost 90% of their time is spent in different artificial climates such as dwellings, workplaces, and means of transportation (cars, trains, airplanes and ships) [2, 35]. It is natural, therefore, that in line with this development, a growing understanding and interest has been shown for studying the conditions creating thermal comfort for humans. Thus, a great number of studies have been realized during the last decades, with most important being Fanger's work [6] on thermal comfort which proposed a scale, within which the majority of occupants are comfortable, no condition exists such that all are satisfied at any one time.

Thermal comfort is a term which is used to define a condition of mind, which expresses satisfaction with the thermal environment [36]. So, the emphasis is on the condition of mind and therefore it is mostly a psychological phenomenon rather than a physiological state [9, 11, and 10]. It will be influenced by individual differences in mood, personality culture and other individual, organizational and social factors. As it is known, except for these psychological factors, thermal comfort also depends on factors related with the environment and the human. These factors, along with other issues related with thermal comfort will be discussed in the second chapter. At the same time, the influence of other variables such as the gender or the nationality of people will be examined.

The human related factors, as it will be discussed in chapter 2, include the clothing and the activity levels. Therefore, the conditions for thermal comfort will be different during the state of sleep, as they will be different for the waking state. During sleep the human body becomes relaxed and the heart rate becomes lower. The same observations have been made during the hypnosis of different individuals, in studies realized in order to examine the interrelationship between the thermoregulatory system of man and the possibility of influencing this by hypnosis [15, 16]. Hence, if the thermoregulatory system and the thermal balance of man are influenced by the hypnosis, then the conditions for thermal comfort during the hypnosis state will be different from those in a waking state.

As a result, in this study, there will be an effort to determine the relationship between hypnosis and thermal comfort, and how the one can interact with the other. The basic concept was to investigate the extent of the psychological aspects of thermal comfort with respect to the physiological effects. To do this, the idea of using hypnosis, to see if it is possible to influence someone's perception of thermal comfort by suggestion and hypnosis, was tested in a thermally controlled environment.

The specific field of research is not well developed since the majority of studies concerning hypnosis and man, are related with pain and the cure of different diseases. Thus, in this study, hypnosis will be used for a different purpose. Usually, the procedure of hypnosis is utilized to aid in the cure or healing of physical, psychosomatic or psychological diseases, or in order to help individuals to become more self confident and to develop characteristics which will ameliorate their behaviour. It is also used to help us face our fears and free us from depressions, obsessions and other psychiatric situations. All these issues along with the definition of the term hypnosis will be given in the third chapter of this study.

In this study, hypnosis will be used in order to examine the relationship of psychology with the thermal comfort of man, and how the hypnotic suggestions can affect or differentiate his sensation and perception of cold or heat.

In the fourth chapter, there will be a presentation of the methodology used and of the reasons for choosing it, followed by the description of the

equipment and the experiments made, in order to examine the response to cold or heat of different individuals during the hypnosis state. The use of questionnaires along with the results recorded by the mechanical equipment inside the chamber, led to a small statistical analysis, the results of which are presented in chapter five.

Finally, in the sixth chapter, the conclusions of this research will be presented, supported by other similar studies on thermal comfort and hypnosis, taking place in climate chambers. Then a short discussion will follow, in order to examine the aspects of applying the results in the real life and in order to suggest improvements or ideas for future studies, taking into account what went well and what wrong in the current study (see also appendix E).

2. THERMAL COMFORT FUNDAMENTALS

2.1 WHAT IS THERMAL COMFORT?

As mentioned before thermal comfort is a condition of mind which expresses satisfaction with the thermal environment, but there can be significant individual variation in responses to the thermal environment. Alternatively, it could be defined as the state where the person is entirely unaware of their surroundings - neither considering the space to be too hot or too cold. It is not the same concept as thermal sensation of temperature, which difference will be stated later. On the other hand, dissatisfaction with the thermal environment may be caused by the body as a whole being too cold or hot, or by unwanted heating or cooling of a particular part of the body (local discomfort) when one or more of the above variables is suddenly changed.

The reason for creating thermal comfort is first and foremost to satisfy the man's desire to feel thermally comfortable, in line with his desire for comfort in other directions. Moreover, thermal comfort can be related with human performance and behaviour and with optimal human health in general. In this connection, many investigations have been carried out in the laboratory, as well as in the field, which demonstrated that there is a significant influence of the thermal environments on performance. The results from these studies seem to show a clear tendency for hot or cold discomfort to reduce a person's performance [6, 11]. Man's intellectual, manual and perceptual performance is in general highest, when he is in thermal comfort. However, whether thermal comfort is a necessary condition for human health is difficult to say with certainty, as there is no specific result from the studies. Yet, extreme cold or hot conditions for a long period of time would obviously be unfavorable and could cause health problems [6, 11, and 37].

2.1.1 *CONDITIONS FOR THERMAL NEUTRALITY AND DEFINITION OF VARIABLES*

The basic processes with which the human body exchanges heat with the environment are evaporation, convection, radiation, conduction and gains from the metabolic heat production.

The conditions required for thermal neutrality or thermal comfort can be categorized under two main factors, namely, environmental and human. The environmental factors include air temperature, mean radiant temperature, relative humidity and air movement. The human related factors include the metabolic heat generated by human activity and the clothing worn by a person. The fundamental point is that it is the interaction of those six factors to which humans respond.

Air temperature can be defined as the temperature of the air surrounding the human body which is representative of that aspect of the surroundings which determines heat flow between the human body and the air. Mean radiant temperature, on the other hand, can be defined as the uniform blackbody temperature of an imaginary enclosure with which a person exchanges the same heat by radiation as he would in the actual complex environment. The air temperature and the mean radiant temperature affect the heat exchange of the body by convection and radiation. The rate of the heat exchange depends on the air movement. Air movement across the body can influence heat flow to and from the body and hence can influence body temperature. The air velocity can be considered to be the mean air velocity intensity over an exposure time of interest and integrated over all directions [1, 11].

Finally, as far as humidity is concerned this becomes significant when the body attempts to lose heat by evaporative cooling. If water or sweat is heated by the human body, evaporates to a vapour, and is lost to the surroundings, then heat has been transferred from the body to the environment and so the body is cooled. So, the degree of discomfort can be influenced by air humidity only at very high ambient temperatures or hot conditions where high humidity levels increase discomfort by making it more difficult to evaporate perspiration into the air, since in that case air is already saturated with moisture. On the other hand, when the air is too dry and the relative humidity too low, a

sensation of dryness can be caused by the drying out of the mucous membranes in the upper respiratory tract (see figure 1, with limits of the optimal relative air humidity).

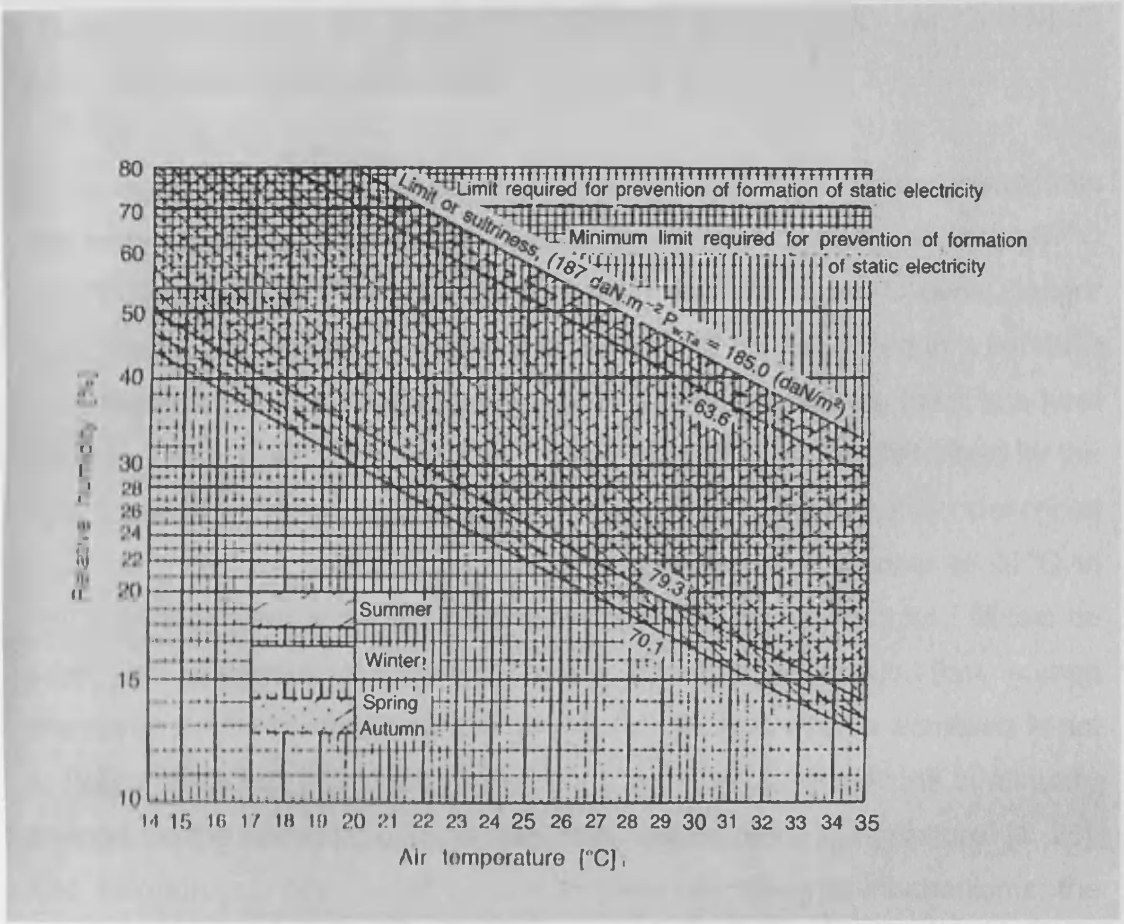

Figure 1: Diagram for determination of the acceptable limits of the optimal relative air humidity.

The human factors that affect thermal neutrality are clothing and bodily activity levels. The amount of clothing on the body insulates against heat losses or gains, whereas the bodily activity, as measured by the metabolic rate, will determine the amount of heat generated internally in the metabolic process which oxidize food into energy. This energy is partly converted into mechanical work while the rest is released as internal body heat. The heat generated is transported from the warm body core to the body surface partly by conduction and partly by blood flow to the skin. The units usually used for

the metabolic heat output are the met[1]. Finally, the thermal resistance of clothing is given by the clo[2]-value.

2.2 THEORIES OF HUMAN THERMOREGULATORY MECHANISM AND HEAT BALANCE EQUATION

The human body continuously generates and loses heat in order to maintain the energy balance, keeping the body core remarkably stable at about 37°C (this ranges from 36.5°C to 37.5°C), to avoid discomfort and to avoid danger from heat or cold stress. Consequently, heat must be dissipated in a carefully controlled manner for a body to stay within this range. Hence, there is a heat balance between the body and its environment which can be described by the heat balance equation developed by Fanger [1, 6]. This equation describes how the body can maintain an internal body temperature near to 37°C in terms of heat generation and heat exchange with the environment (it can be seen in appendix B, where more information about the human thermoregulatory mechanisms are given). "In practice, what is achieved is not a steady state but a dynamic equilibrium: as external conditions continually change, so the body responds to "regulate" internal body temperature" [1, 20]. The thermoregulatory control system involves two types of mechanisms: the autonomic system which involves physiological responses and the behavioural regulation, which is related with changes in behaviour and posture (see also appendix B).

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[1] 1 met = 58.2 W/m^2 (SI units) and it corresponds to the metabolic rate of a seated person at rest.

[2] 1 clo = 0.18°C m^{2}hr/kcal or 1 clo = 0.155 °Cm^2/W, equivalent to the insulation required to keep a seated person comfortable at an air temperature of 21°C in an air movement of 0.1m/s.

2.2.1 THERMAL COMFORT, THERMAL SENSATION AND PSYCHOLOGICAL RESPONSES

Thermal sensation and thermal comfort are different terms which are sometimes used interchangeably, as well as thermal acceptance and preferred temperature. Thermal sensation is an expression of the sensation of warmth or its lack. It is related to a rational experience that is probably not influenced by any factors other than physiological and environmental, including the activity and clothing levels. It is expressed by the 7-point thermal sensation psycho-physical scale of ASHRAE [11]. Also, ISO 7730 [9] provides a method for predicting the thermal sensation and the degree of discomfort of people, by using the Predicted Mean Vote index (PMV). This is an index developed by Fanger [6] which predicts the mean vote (thermal sensation) of a large group of people exposed to the same thermal condition (see also appendix A for more information on thermal indices).

Predicted Mean Vote

- +3 Hot
- +2 Warm
- +1 Slightly warm
- 0 Neutral
- -1 Slightly cool
- -2 Cool
- -3 Cold

On the other hand as it is stated in the British Standard, thermal comfort is a condition of mind, something which implies that psychological as well as physiological factors are involved. It is also possible that emotional factors can affect thermal comfort, thus, it is more of a non-objective expression when compared to thermal sensation.

Thermal acceptability is defined as any condition in which 80% or more of the people express satisfaction with a given environment [10]. As for the preferred temperature, it is the temperature at which a respondent requests

no change in temperature or at which the greatest percentage of a group of people request no change in temperature. Thus, it is important to distinguish thermal sensation from affective or value judgments that are related to how a person would like to feel, for example, comparative judgments such as warmer or cooler. Questions of thermal preference and acceptability were also included on the questionnaires used during the experimental procedure explained later, in order to examine the thermal sensation of people and their preference and acceptance (appendix J).

Thermal conditions will directly affect thermal sensation and comfort and can also influence the general "psychological state" of the body, for example, a person's mood and behaviour [11]. Different studies realized in this field [11], suggest that climatic factors influence anxiety which affects rates of suicide, psychosis, alcoholism and caloric intake. However, this will depend upon an interaction of stimuli and psychological factors, as well as upon the general conditions of the environment.

2.3 DO OTHER VARIABLES LIKE GENDER, AGE AND NATIONAL-GEOGRAPHIC LOCATION INFLUENCE THERMAL COMFORT?

Fanger had conducted lots of research and field studies examining if the requirements for thermal comfort are the same for all people [6]. Thus, he concluded that, there are other influential factors, but they have no effect of sufficient magnitude to be of practical engineering significance. The factors that he examined in order to test their influence were the national – geographic location of a man, the gender and the age, the state of acclimatization, and other less important factors which can be seen in appendix C.

The most important factor for our study was the ethnicity of the participants. However, from comparisons conducted between Americans and Danish people and from results of field studies from different geographical locations in the tropics, it was observed that there is no significant difference in the thermally neutral conditions between temperate and tropical locations, neither between temperate and cold locations [6]. Or, if a difference does exist

between the comfort conditions, then it is slight, and probably not of engineering significance. These differences, especially reported in earlier studies, probably reflect differences in clothing habits and not adaptation arising from differences in outdoor climate, way of life, etc.

Even for acclimatized[3] persons living in the tropics, who can better endure hot environments and have become used to accepting the discomfort, the thermal conditions and the preferred temperature (if they had the choice) have proved to be the same as for other non-acclimatized persons.

2.3.1 ADAPTIVE THERMAL COMFORT

People have a natural tendency to adapt to changing conditions in their environment. This natural tendency is expressed in the adaptive approach to thermal comfort. The fundamental assumption of the adaptive approach is expressed by the adaptive principle: "if a change occurs such as to produce discomfort, people react in ways which tend to restore their comfort" [18]. According to this approach, provided there are adequate possibilities for selection and adjustment, people will make themselves comfortable if they wish, by changing their behaviour, adjusting clothing, changing posture or opening windows. Thermal comfort, then, is not to be seen primarily as a matter of the physiology of heat regulation and the science of clothing, but rather as a wide-ranging and intelligent behavioural response to climate [9]. Thus, comfort-temperatures are flexible rather than fixed, and may be more conveniently specified by climate and culture than by physics and physiology.

On the other hand, one other form of adaptation which was discussed in the previous section is the acclimatization which is mostly referred to the substantial physiological changes that take place after prolonged exposure to heat or cold [11].

[3] The term acclimatization is referred to the capacity of human subjects to change their physiological responses to heat and to sweat earlier and more in response to a given heat stimulus, when systematically exposed to hot environments, over a number of days.

3. ESSENTIALS OF HYPNOSIS

Hypnosis as a word has been overused to the point of its being robbed of any real meaning. When one word comes to describe as many different experiences as "hypnosis" has, there is ample opportunity for misunderstanding, mislabeling, misconception, and, ultimately, confusion. Thus, there is no single unifying theory to account for all the various meanings of hypnosis, nor a commonly accepted definition. However, prominent theorists, researchers and practitioners, have noted this and asked that more attention be paid to the need for greater clarity as to the nature of hypnosis [12].

3.1 DEFINITIONS FOR HYPNOSIS

In this subsection, there will be an effort to define the term of hypnosis, by introducing different definitions utilized in the past, whereas in the same time, there will be a presentation of other important facts related to hypnosis, such as the physical characteristics and variables associated to the hypnotic state.

3.1.1 HYPNOSIS, A STATE OF MIND?

Ostensive definition of a word indicates that we make its meaning clear by giving various examples which illustrate the correct usage of the term. So it is with hypnosis, and perhaps its nature can be best illustrated by describing the various procedures that are used to induce a state of hypnosis, assuming that hypnosis can correctly be designated as a "state". "In a strict semantic sense, hypnosis is neither a modality of treatment nor a tool" [17]. It is a state of mind and if it is conceived like that, then by hypnotism we mean the processes adopted to enable a subject to achieve that state [17].

A different definition could be that hypnosis is a natural state of consciousness. The person enters a hypnotic state, a state distinctly different from the person's "normal" state, through a natural process not involving ingestion of any substances or other physical treatments [12]. Or otherwise,

hypnosis is a relaxed state of mind and body, and subsequently is more responsive to suggestion [12].

Hypnosis is also the resultant of a psychodynamic interaction between two individuals. This leads to an alteration or disassociation of awareness in the hypnotized, who then suspends reality testing to a certain degree. In the hypnotic state hallucination and illusion may be experienced as true perception. The critical ego functions become lessened to a varying degree and a suggestion, even though it may be illogical, may be accepted as valid provided it is not too threatening to the individual [17].

3.1.2 ENVIRONMENTAL AND PHYSICAL VARIABLES NEEDED FOR DOING HYPNOSIS

There are certain environmental and physical conditions that are most desirable for doing hypnosis, but they are not absolutely essential. Firstly, working in a relatively quiet atmosphere, free of intruding or obnoxious noise is more helpful and less distracting for the patient. Soft lighting can help create a comfortable atmosphere and facilitate comfort, while the choice of the appropriate furniture will help the client to relax.

As for the physical conditions, they are also worthy of consideration, when doing hypnosis. Physically, it helps if the patient is comfortable, the body is adequately supported, clothing is not restrictive or binding, the temperature is comfortable (there was an effort to follow this proposition on the experiments), and mentally the subject isn't feeling rushed or distracted by other things demanding immediate attention [12].

3.2 WHERE HYPNOSIS CAN BE USED AND WHAT SORTS OF PROBLEMS CAN BE TREATED BY HYPNOSIS?

Hypnosis is not itself a therapy but is an adjunctive procedure, applicable to a wide range of therapies and also applicable in order to help human to deal with specific conditions or problems. As mentioned before, it can be used in the treatment of a considerable number of psychological and medical problems, depending on the personal characteristics of the patient and the

exact nature of the problem. The personal characteristics could include the rate at which someone can be hypnotized or the patient's history and the details of his or her problem [8, 14].

In most of the cases hypnosis is used just in the terms of induction and deepening procedures, and so as a result there is not a great deal of difference between hypnosis and relaxation procedures [8]. In most instances, the subject is mentally and physically deeply relaxed; attention is focused inwardly on sensations, feelings and images and there is the implicit or explicit use of suggestion (like in our case as it will be presented later). Where hypnosis differs from a simple relaxation is probably in the emphasis on verbal suggestion and imagery as a means of directly altering the subjects' mode of responding to and experience of both their inner and external worlds [8, 17].

Hypnosis may prove useful in most problems in which the control of excessive anxiety and tension has been identified as an important goal. It is also an effective procedure in the treatment of many problems commonly termed "psychosomatic", such as migraine and asthma, dermatological ailments and gastrointestinal problems. Additionally it is conceivable that hypnotic suggestions can be effective in promoting therapeutic change in specific autonomic functions including cardiovascular, respiratory, and gastrointestinal activity, as well as altering the experience of pain and discomfort [14]. In these features of hypnosis we were based from the beginning of this study, in order to examine how the discomfort of people and their response to extreme temperatures can be altered by the help of hypnotic suggestions.

Other uses of hypnosis can be found in the modification of the patients' attitudes and reactions in a given situation, as well as in the manipulation of the patient in cases of stressful treatment procedures which may occasion anxiety, discomfort, pain or bleeding, such as surgical operations, dental extractions and childbirth. Finally, hypnosis can be used in psychodynamic treatment and psychotherapy, but in these cases the results can be variable and need further examination [8, 17].

3.3 SUSCEPTIBILITY TO HYPNOSIS

The issue of who can be hypnotized or who can respond better to the hypnotic suggestions, is one of the most controversial issues in the entire field of hypnosis. It has been researched and written about in numerous publications, both scientific and otherwise, by some of the most respected people in the field [12]. Such research has described personality types and other characteristics of subjects that predispose them to favorable or unfavorable responses to hypnotic suggestions.

The basic idea of all induction techniques is the same, namely, the reduction and narrowing of the incoming sensory stimuli to one channel of input. The so-called suggestions are semantic manipulations to induce the subject to pay exclusive attention to a visual stimulus (such as a spot on their hand or on the ceiling) or to an auditory stimulus [17]. After, this phase and as soon as the subject closes his eyes and relaxes, other suggestions of comfort and pleasantness are introduced in order to make the subject face its discomfort or pain. However, whether the subject will favorable these suggestions, depends on its personality and other factors discussed later.

It is a reasonable conjecture that the more hypnotically susceptible a patient is the more successful the outcome of any hypnotherapeutic intervention. In their influential review of the clinical research, some researchers [8] concluded that on balance hypnotic susceptibility is positively related to outcome in the treatment of pain, warts and asthma, while for the self-initiated problems such as smoking, there is no clear relationship. However, since during hypnosis, the suggestion procedure is the one that makes the difference, it could be also logical to talk about hypnotic suggestibility instead of hypnotic susceptibility of the patient.

3.3.1 FACTORS WHICH CAN AFFECT SUGGESTIBILITY

There are many factors which can affect the hypnotic suggestibility of a person and such factors can include age, intelligence, mental status and others.

In general, age is a relatively minor consideration in assessing capacity for hypnosis. Age is a factor in determining the best methods for induction and utilization because of the need to use procedures that are appropriate to the age and background of the patient, regardless of his age. However, more research is needed to be done concerning children, who are sometimes found to be highly suggestible by some researchers, because of their active imaginations, while others contradict this, claiming that children's lesser ability to concentrate leads them to be poorer subjects [12].

Other studies in hypnotic suggestibility have often suggested that the more intelligent the person, the better the hypnotic subject he or she will be [12]. If there is a relationship between intelligence and hypnotizability, it is believed to be because of the positive relationship between intelligence and ability to concentrate. Another factor which affects the ability of the patient to respond to the hypnotist's communications is his self-esteem and how developed this can be. Also, the relationship between the therapist and the client is of great importance and especially the trust which should be created between them, in order to make the subject feel more comfortable.

Other factors related could be the imagination of the patient and his ability to fantasize, as well as his way of thinking and his ability to process information. Thus, how concrete or abstract one is in his or her thinking is a factor of responsiveness to hypnosis, because of the subjective nature of the experience.

The mental status of the subject plays an important role, since for psychotic subjects it is difficult to treat them, as they may be unable to attend to the hypnotist's guidance due to their hallucinations, delusions, confusion, etc.

Finally, another factor which seemed to affect people's suggestibility during the experiments was the environment in which the hypnosis took place. As mentioned before, if there is too much noise or light or if the subjects do not feel comfortable, then it may not be possible for them to be hypnotized.

3.3.2 HYPNOTIC SUSCEPTIBILITY TESTS AND WHAT WE EXPECT FROM THESE

In order to examine which part of the population is high suggestible and which one is low suggestible, there were established a number of hypnotic susceptibility scales which are commonly used to formally test the responsiveness of a patient. Most of these scales attempt to standardize hypnotic behaviour by first inducing hypnosis in a person, and then giving him or her tests in order to determine the degree of depth and responsiveness [12]. In this case, the patient must pass and fail the various tests and the administrator of the susceptibility scale records the test results in order to establish a profile of the person's hypnotic capacities. There are many different tests which can be used for this purpose, and as it will be needed to use such a test for the selection of the study's subjects, one test which can be easy to use since it has the form of a questionnaire, is the "Harvard Group Scale of Hypnotic Susceptibility" (it can be seen in appendix H).

As it will be stated in the next chapters, the proposed study will be based on the suggestibility of the subjects, since there will be a comparison of the thermoregulatory responses of the high suggestible persons with the responses of the medium or low suggestible persons. In this way, it will be examined if the high suggestible ones can be convinced to accept extreme temperatures when having suggestions.

Other studies were also conducted in this field during the past, to examine the relationship between hypnotic suggestibility and thermal comfort. For example, it has been demonstrated that there is an apparent relationship of the hypnotic state to suppression of the shivering response in very cold conditions [15]. Other studies have shown that hypnosis increases heat perception and heat pain threshold [16]. There is evidence of responsivity of the peripheral vasomotor mechanism to hypnotic suggestion, whereas reactivity of other aspects of the vasomotor mechanism, such as thermal and tactile receptors, may also be affected by hypnotic suggestions As a conclusion, hypnosis alone will not affect the thermal comfort of the subjects, except maybe for their activity level, but it is the suggestion part that can make the difference.

4. METHODOLOGY AND EXPERIMENTAL APPARATUS

In this chapter, there will be a presentation of the methodology followed and of the equipment used, in order to realize the experiments and to measure all the variables needed. The basic idea of the methodology remained the same throughout the experimental procedure however, many changes and new ideas have altered the initial proposed methodology, due to practical and other reasons. All these changes and the problems that came up will be discussed in the next paragraphs.

4.1 INTRODUCTION TO THE EXPERIMENT

The aim of this study is the examination of human perception of cold or hot conditions during a state of hypnosis. Basically, it will be examined how the human can respond to the suggestions of a hypnotist, during the change of the ambient temperatures. In parallel, a comparison between the response of highly suggestible people (or easy hypnotizable persons) and the response of medium or low suggestible people will be made. This could give an idea on how human's perception and mind can be adjusted, when suggestions of comfort or pleasantness are made.

Thus, the basic idea is that a number of persons (4-8 people) will be put in a climate chamber, where the air temperature (as well as the mean radiant) can be adjusted (for this study it is proposed that the relative humidity remains constant), while the hypnotist will make suggestions that the temperature remains constant and that they continue to feel neutral or comfortable.

So, the most important factor which should be measured is the PMV (see chapter 2 and appendix A) of the people inside the chamber, other variables such as the air temperature, the mean radiant temperature, the relative humidity and the air velocity are also measured. Clothing and activity level are also considered.

The equipment used for the measurement of these variables is described in the next section.

4.2 DESCRIPTION OF THE EQUIPMENT AND CONTROL OF VARIABLES

As mentioned before, the basic facility which was used for the whole period of the experiments was the climate chamber in which the environment can be controlled independently. The chamber was programmed by specific software called "Contour", which is a software package ideally suited to regulators, programmers, recorders and electronic safety devices [13]. It is used to determine the air temperature and humidity required in the chamber and it takes recordings of these values for every second.

This chamber is situated at the basement of Wates House in University College London, and its dimensions are 6780mm of width, 3800mm of depth and 2600mm of height. The temperature range that the specific room can give us is from -10°C to 40°C. The dimensions of the chamber, as well as the plan and the materials of the walls can be seen in figure 2.

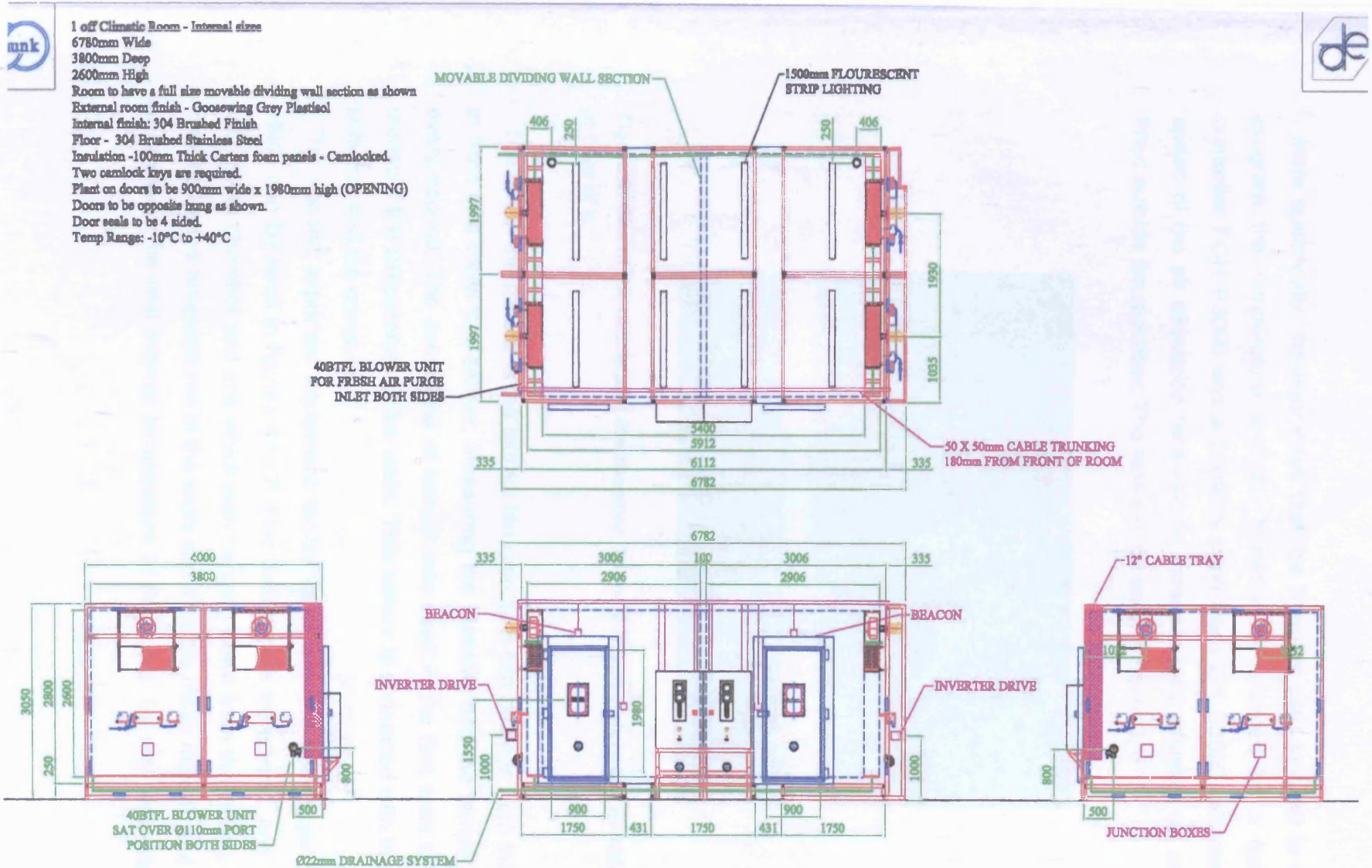


Figure 2: Plan of the environmental chamber, dimensions and materials.

More specifically, the equipment that the chamber uses in order to control or program the temperature and the humidity is consisted by a temperature controller FGH P3000 and a humidity controller FGH S3000, whereas the air speed of the air circulation fans can be independently adjusted via an invertor fitted outside the chamber. The fans can be seen in figure 3.

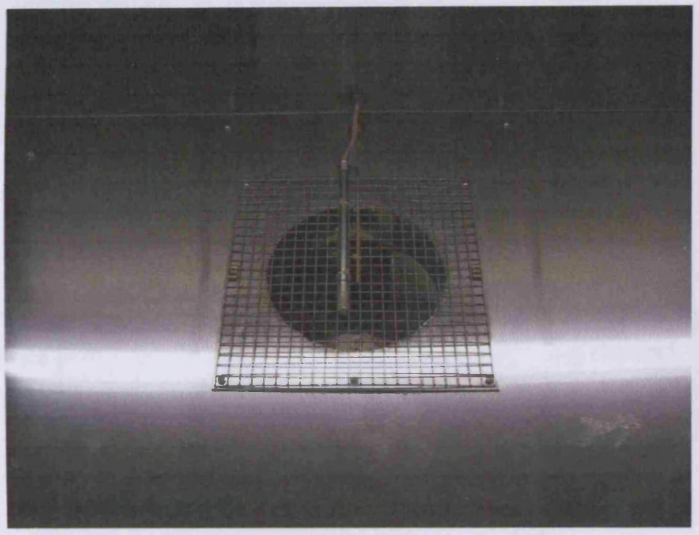


Figure 3: One of the two fans of the chamber. There is a temperature and humidity sensor in front of it.

The fan of the picture is the extract fan, and as it can be seen from this picture in front of it there is a sensor, measuring the humidity and the temperature for every second. The same kind of sensor was used in the first tests in order to measure the temperature of the walls. This sensor is connected with the contour software and the computer.

The second important equipment facility used was the datalogger or Hobo which can be seen in figures 4 to 7. Five dataloggers were used, one for each wall of the chamber and one which was hanging down from the ceiling, in order to measure the temperatures of the walls and thus the mean radiant, and in order to measure the real internal temperature of the room. By real temperature we

mean the internal temperature measured inside the chamber by the Hobo which is different of that indicated by the contour program, something which is logical since the chamber is adjusting the variables all the time, in order to keep the internal temperature and humidity at a specific value. In fact, great divergences were observed between the Hobo's temperatures and the recorded by the contour software temperatures, but this will be discussed later.

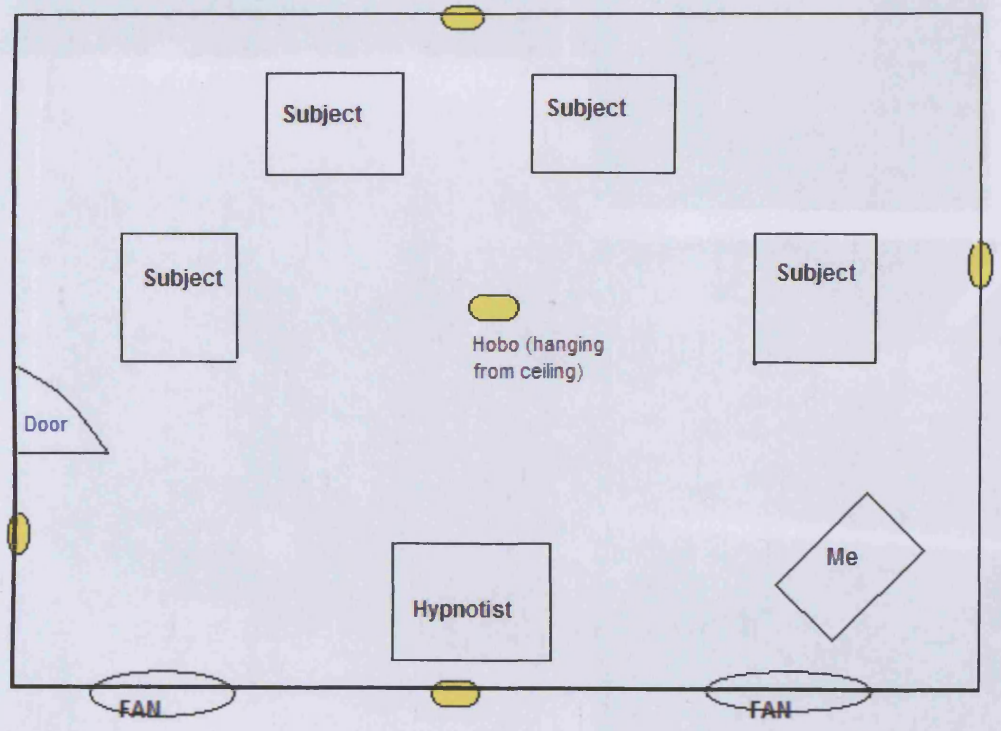
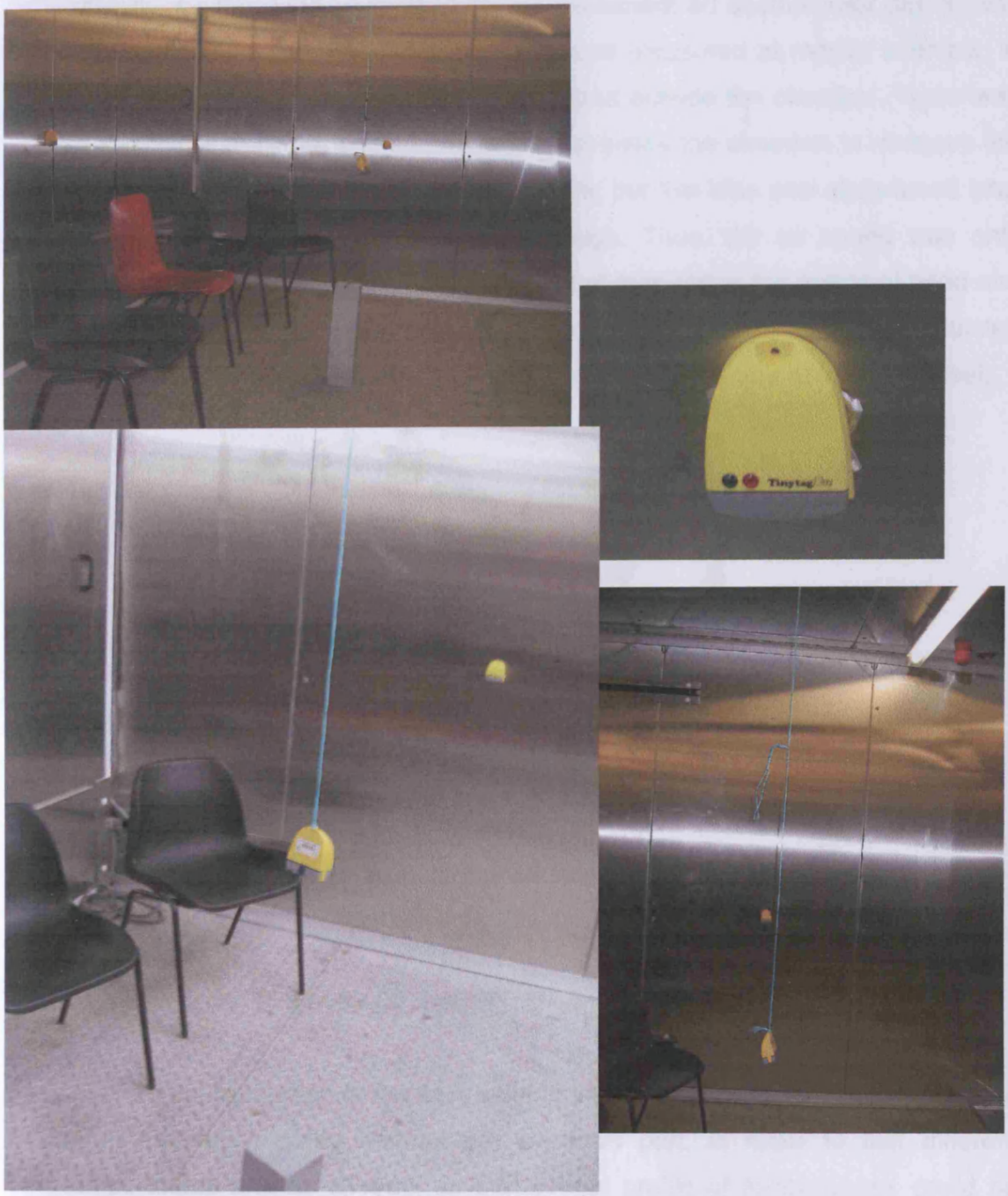


Diagram 1: A simple plan of the climate chamber. The seats of the subjects and of the hypnotist are marked. Also, the location of the fans and of the Hobos is marked. The Hobos are represented by the yellow color.



Figures 4-7: In these pictures, the dataloggers or Hobos can be seen, as well as their location inside the chamber. As it can be seen the hung Hobo is placed at the centre of the room. The picture at the top shows the arrangement of the chairs inside the room, at that point.

Finally, for the measurement of the air movement an anemometer (fig. 8) was used, with which the velocity of air in m/s was measured at regular intervals, in order to adjust the speed via the invertor fitted outside the chamber. There was also an effort to fix the anemometer in a wall inside the chamber to measure the air speed at all times during the experiments, but this idea was abandoned later as the results would not be reliable enough. Thus, the air speed was only measured at specific intervals, at the height of feet and at the height of head and in different points inside the room in order to get an idea of how the air circulates around the room (it enters at the level of feet and is extracted at the head level).

Figure 8: The anemometer used for the measurement of the air movement inside the chamber.

4.3 PILOT TESTING OF THE EXPERIMENTAL PROCEDURE

Before the realization of the final experiment, a series of other tests (11 in their total) had taken place, without the hypnosis part, in order to test different temperatures and air speeds, so that a final profile of temperatures could be derived. In each of these tests four persons were participating and they were asked to fill in some questionnaires similar to those of the final experiment. The questionnaires were consisted of 60 questions of many different topics with a high number of irrelevant questions, in order to disorientate them from the subject of thermal comfort, so that their answers would be more naïve. The

thermal comfort questions included votes of their thermal sensation of the environment, or if they feel that the temperature changes etc.

A big range of temperatures was tested, whereas the relative humidity was kept stable at around 50%. However, as it was observed in most of the tests, the relative humidity went many times above the value of 50%, and sometimes reached the maximum of 60%. This could not be avoided since the chamber was programmed to change the temperatures and thus those fluctuations affected the humidity too. Also, the fact that there were people inside the chamber could be a second reason for these deviations in the humidity's value.

The initial idea of the experimental procedure was about testing the subjects in both rising and falling temperatures. For each case the temperature profile should need to start from a comfortable temperature which should last for half an hour, in order to give time to the hypnotist to hypnotise them. After the first half hour, the temperatures would change every ten minutes in order to test three different temperatures for each case (higher and lower temperatures). The PMV vote would be taken randomly and once in each ten minute period. The one hour period of the experiment was decided after considering the full time schedule of the hypnotist and the availability of the students taking part.

So, the first concern was to decide about the starting temperature, thus the temperature that the chamber would have for the first half hour of the experiment, when the hypnosis would take place. As mentioned before, in order the subjects to be more easily hypnotized, the temperature should be comfortable and the environment steady. For this reason the temperature of 23°C, 24°C and 25°C were tested, and the results from the PMV votes were observed (the clo value of people was about 0.6 and their activity sedentary, as they were sitting quietly, so it corresponded to 1.0 met). After the three first tests, it was concluded that a temperature of about 24-25°C would be more comfortable for the subjects. Also, in these first tests the temperature was kept steady for the first half an hour and then, for the second half an hour it was altered every ten minutes (some of the temperatures tested can be seen in table 1).

		Temperature Range	Time Period in Minutes	Average PMV vote
	Starting Temperature	25°C	30'	Neutral
		27°C	10'	Neutral
Rising Temperatures (1st test)		29°C	10'	Neutral
		31°C	10'	Slightly Warm
	Starting Temperature	25°C	30'	Neutral
		29°C	10'	Neutral
Rising Temperatures (2nd test)		31°C	10'	Slightly Warm
		33°C	10'	Warm
	Starting Temperature	25°C	30'	Neutral
		21°C	10'	Slightly Cool
Falling Temperatures (3rd test)		19°C	10'	Cool
		17°C	10'	Cold

Table 1: The temperature ranges tested in the first three tests, along with the PMV votes taken in these temperatures.

The next three tests showed that 23°C is a very low temperature to be considered as neutral, as well as the 17°C which was considered as really low, since the subjects were really cold during the experiment (table 2). The temperature was altered again every 10 minutes, and the PMV vote was asked once in each 10 minute period. However, the fact that the PMV vote was not taken at specific times, but randomly within the period of ten minutes, led us to the decision of having an experimenter (it was me in this case) inside the chamber in order to give instructions for when to start each section and when to answer the PMV vote. In this way, the PMV vote would be taken at a specific minute and this could be compared with the temperature measured inside the room at this minute, by the Hobo.

		Temperature Range	**Time Period in Minutes**	**Average PMV vote**
	Starting Temperature	23°C	30'	Slightly Cool
		21°C	10'	Slightly Cool
Falling Temperatures (4^{th} test)		19°C	10'	Cool
		17°C	10'	Cold

	Starting Temperature	23°C	30'	Slightly Cool
		25°C	10'	Neutral
Rising Temperatures (5^{th} test)		27°C	10'	Neutral
		29°C	10'	Neutral

Table 2: The temperature ranges tested in the next tests, along with the PMV votes taken in these temperatures.

In these first tests, the recordings of the contour software showed that the temperature cannot be stabilized within the short period of 10 minutes, and that, led us to the thought of maybe increasing the alteration period from ten minutes to twenty or to thirty minutes. This would also have as a result the temperature to be changed just once and not three times, within the period of 30 minutes.

As noted before, the Hobos were only put onto the four walls of the chamber to measure wall surface temperature, so there was no hobo on the ceiling neither on the floor. The fifth Hobo was hanging down from the ceiling (see figures 4-7, diagram 1). Thus, the mean radiant temperature was assumed to be derived only from these four Hobos fixed on the walls. As it was observed, there was a time lag of about one degree between the walls' temperature and the internal air temperature (diagram 10). In addition all our observations and decisions about the temperatures relied on the Hobos' recordings and not on the contour's recordings. However, there was a comparison between the two different recordings in order to produce a relationship between them.

Finally, from all the trial experiments, consistent dissatisfaction with the air movement was observed by the participants, who noted that the air movement inside the chamber was really high, especially for those seated in front of the fans, and especially during the times that the fans blew air in, to condition the

space. Thus, it was decided, to decrease the initial air speed (which is adjusted from the external invertor in terms of frequencies) from 50Hz to 33Hz, and to rearrange the chairs inside the room, so that there will be no people in front of the fans (see figure 4).

At this point, another important observation was made which led us make four new tests in order to find a relationship between the internal temperature measured by the Hobo and the temperature scheduled and recorded by the contour software. Despite the fact that the room had been set to be at 29°C, and the contour software showed that the value of 29°C was actually reached, the Hobos inside the room showed that the maximum temperature inside the room was 25,4°C, and that is why people felt neutral almost all of the time (see diagrams 2-3 and 6-7). So, a difference of about three degrees was observed between the temperature scheduled outside and the one measured inside. Also, when the temperature was set to be the same for 30 minutes, an easier stabilization of temperatures was observed.

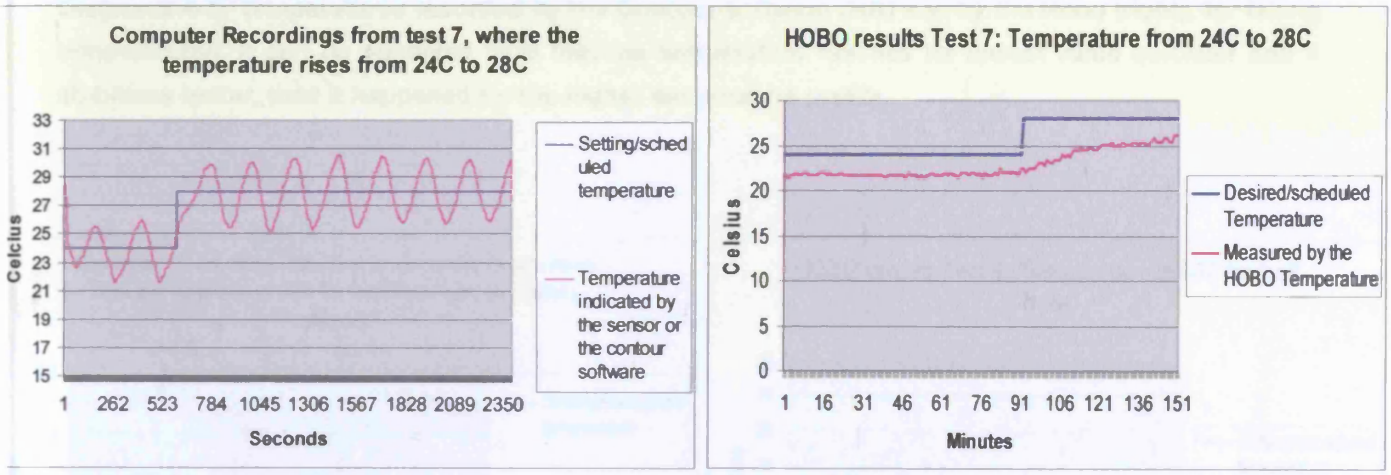
All these observations and conclusions led to the final decisions about the temperature profiles and the time periods. Thus, it was decided not to change three different temperatures within the second half hour, but only decrease or increase once the temperature directly, by three or four degrees, so that it could be stabilized within the thirty minutes period. So, for the first half hour of the experiment the temperature will be steady at 24°C, so that the hypnosis will take place and in order the subjects to be in a neutral condition. At the end of the first half hour they will begin to fill in the questionnaire, at the specific time announced by the experimenter, in order to take a first PMV vote at the end of these first 30 minutes. Then, for the next 30 minutes the temperature either will be increased to 28°C or decreased to 20°C (as it will be explained later, it was finally decided to be only increased). In the questionnaire, we will try to get two other PMV votes at the times indicated in table 3.

Temperature	Time Period	When PMV vote was asked
24°C	30'	1st PMV vote: 2' before the end of the first 30 minutes period.
28°C	30'	2nd PMV vote: 5' after the alteration of the temperature, at the beginning of the second half hour.
		3rd PMV vote: 2' before the end of the experiment and their dehypnotisation, when logically the temperature should take its higher value.

Table 3: Decisions about when to ask a PMV vote, in each thirty minute period.

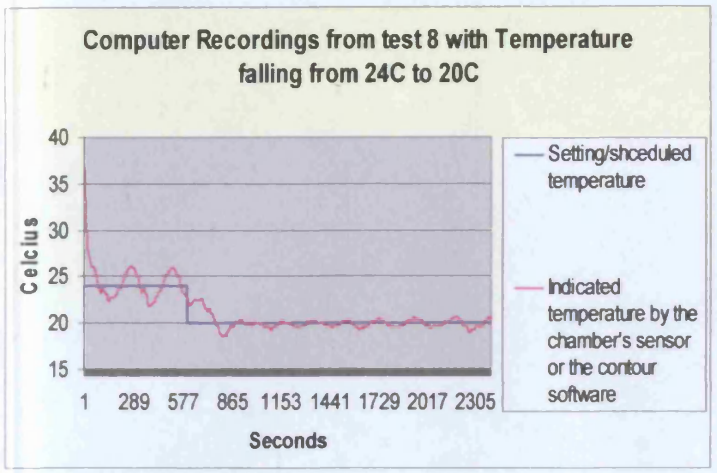
This final temperature profile was tested again, in order to find out what temperatures should be set in the contour software to get the desired temperatures inside the chamber. In these final tests the rotational speed of the fan was decreased to 30Hz, so that the conditions would be more comfortable for the subjects. The 30Hz setting corresponds to about 0.4m/s (maximum) at the level of feet and to about 0.15m/s at the level of head. This velocity is quite high for the specific study however, it was not possible to decrease it further, as according to the technician, the chamber would not run properly if the speed was decreased below 25Hz.

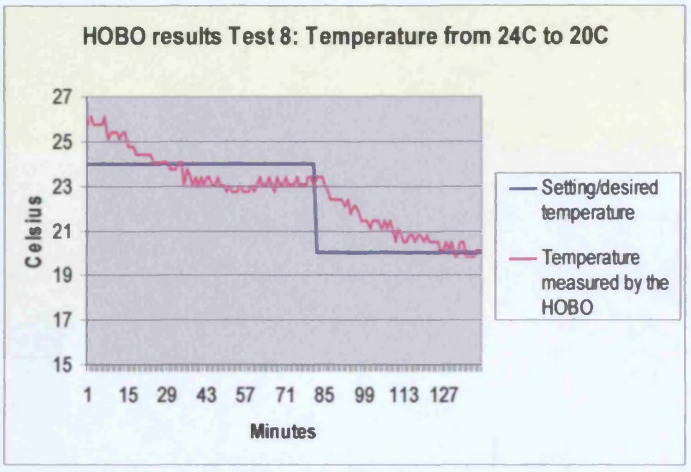
By observing the results of this final test, when the temperature was set for 24°C it actually reached the value of 22°C and when it was set for 28°C it was only reaching the 26°C (diagrams 2-3). Later on, it was concluded that there is a four degree difference for the higher temperatures, and that if we wanted to get 24°C we should schedule for 26°C, and if we wanted to get 28°C or 29°C we should schedule for 33°C. (This was also affected by the starting temperature; for example it was more difficult to reach 28°C from a starting temperature of 20°C than from a starting temperature of 24°C). The next diagrams indicate some of these fluctuations[4].



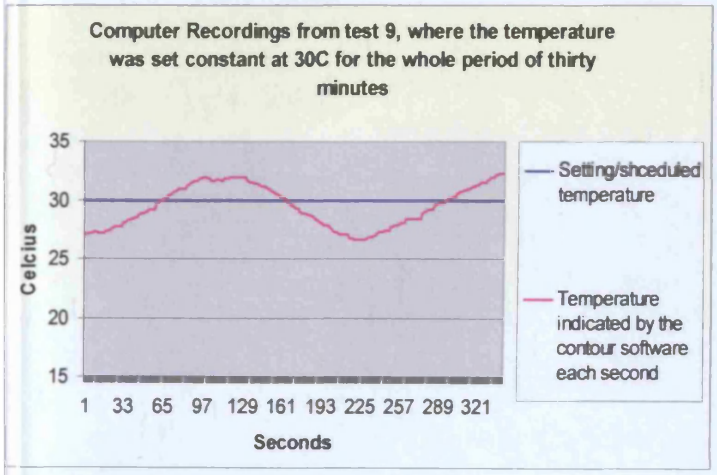
Diagrams 2-3: The temperatures as recorded by the contour software (left) and as recorded by the Hobo (right) (rising temperature). As it can be seen the temperatures measured by the Hobo are extremely different than those measured by the chamber sensors.

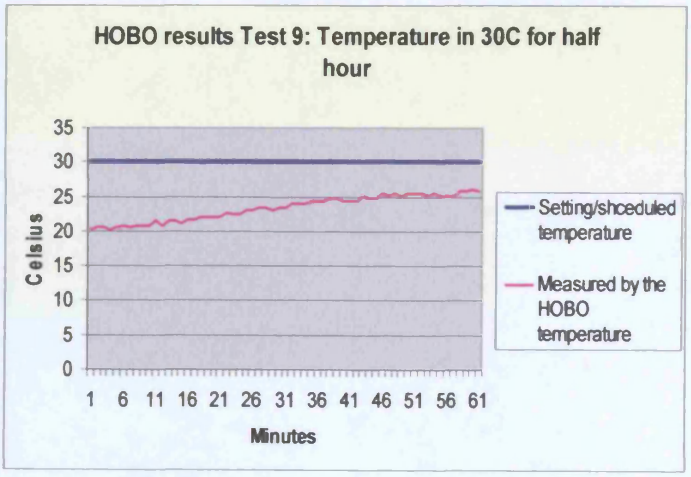
[4] These temperature fluctuations presented by the contour software and the sensor of the chamber are probably due to the fact that the thermostat of the chamber is set to reach specific temperatures and in order to achieve that it either heats the room or it cools it down, trying to condition the space and keep it in the specific temperature. So it may blow in cold or hot air, in order to condition the space in the required value, but the real temperature inside the room cannot be changed so quickly and that is how the differences between the Hobos and the sensors can be explained.





Diagrams 4-5: Temperatures recorded by the Contour software (left) and by the Hobo (right), for falling temperatures. It can be observed here that the temperature reaches its lowest value quicklier and it stabilises better, than it happened for the higher temperature profile.





Diagrams 6-7: Same again, recordings by the contour and the Hobos. Here the temperature never reaches the 30°C, within the period of 30 minutes.

In the next diagram, it can be seen the temperature recorded by the contour software, during the three last tests, whereas in diagram 9 it can be seen the real temperatures measured inside the chamber by the Hobos during these tests, as well as the mean radiant temperature during the whole period. As it can be observed, the contour software and thus, the sensor which is fixed inside the chamber, indicate a large variation of temperatures, and in fact it shows that the temperatures reach values even higher than those set. On the other hand, the real temperatures measured by the Hobos do not exceed the value of 26.6°C even when the higher temperature is set to 30°C. As for the mean radiant, there was always a time lag of about one degree Celsius for all the tests.

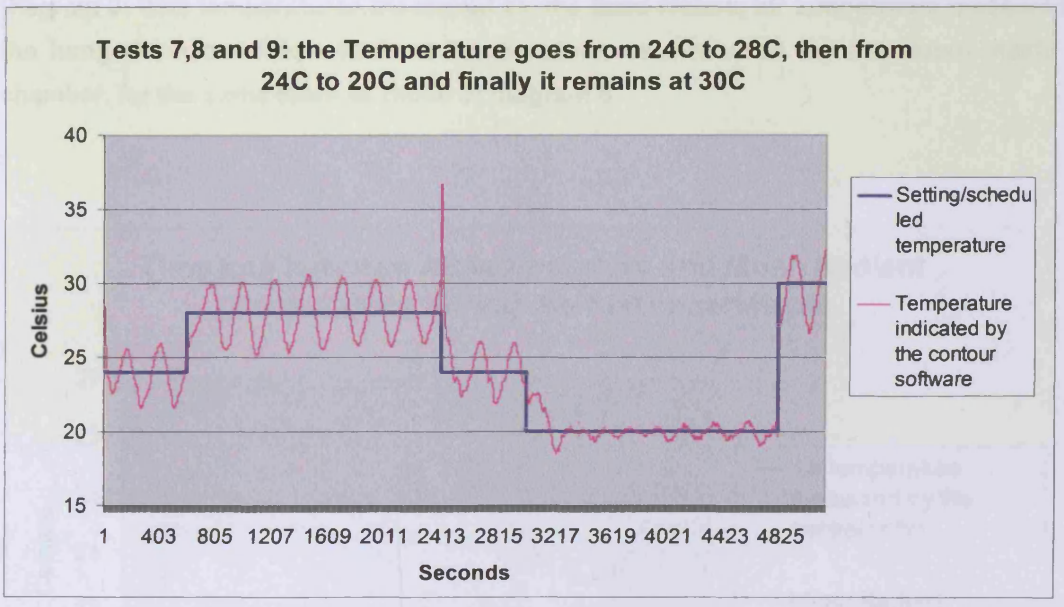


Diagram 8: The temperatures recorded by the contour software for three different tests, where the starting temperature is 24°C, the lower value is 20°C and the higher is 30°C.

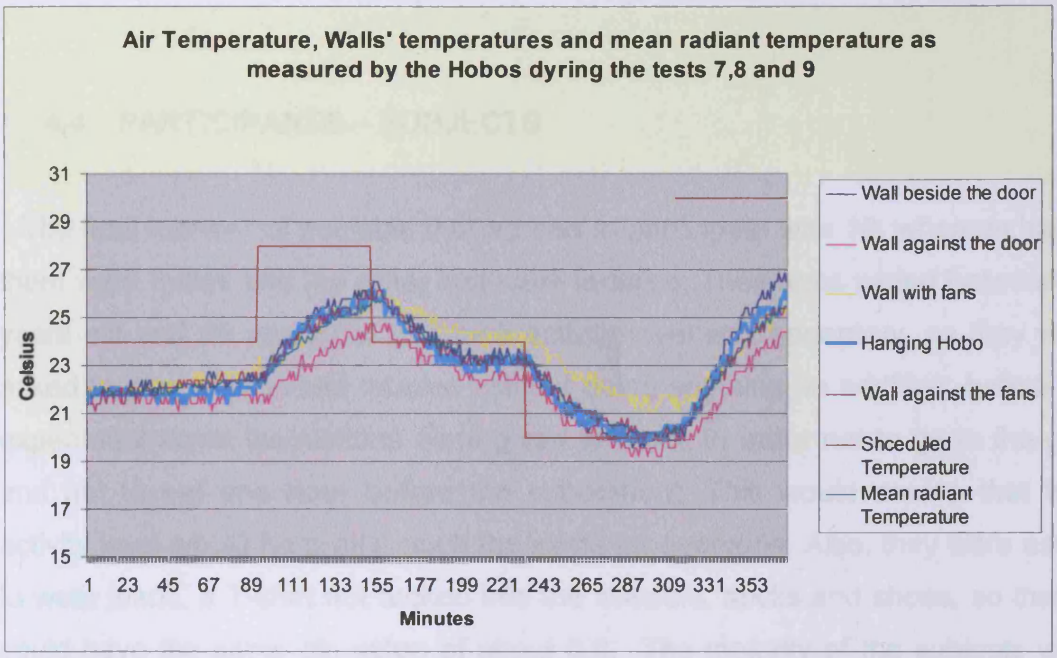


Diagram 9: Wall temperatures measured by the fixed Hobos, air temperature measured by the hung Hobo and Mean Radiant Temperature, as measured (by the Hobo) inside the chamber, for the same tests as those of diagram 8.

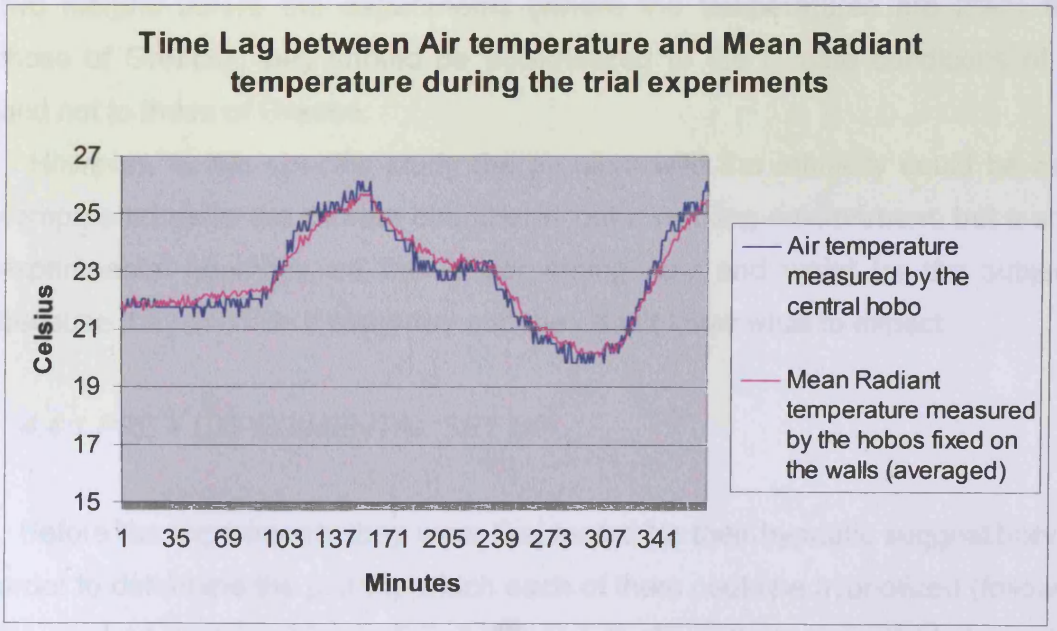


Diagram 10: Time lag between air temperature and wall temperatures, as recorded by the Hobos during the trial experiments.

4.4 PARTICIPANTS – SUBJECTS

The final number of subjects that agreed to participate was 16, whereas half of them were males and the other half were females. Their ages varied between 24 years old and 38 years old and their activity level was sedentary, as they were asked to stay seated and relaxed without doing anything. In addition, before the experiment some instructions were given to them, in order not to go to the gym and not to eat one hour before the experiment. This would assure that their activity level would be pretty much the same for everyone. Also, they were asked to wear jeans, a T-shirt not tucked into the trousers, socks and shoes, so that all could have the same clo value of about 0.6. The majority of the subjects were Greek in their ethnicity (11 from the 16) and so some of them could be more acclimatized to high temperatures than other subjects from different countries. Nevertheless, according to Fanger's studies and to the adaptive theory, ethnicity is not an influential factor, and since the subjects were already in UK for about two months before the experiments (where the temperatures are lower than those of Greece), they should be acclimatized to the climate conditions of UK and not to those of Greece.

However, in this specific study the problem with the ethnicity could be more complicated since the climate chamber is not a working environment, but a small experimental chamber, so this is something new and weird for the subjects, because they don't do it everyday and they don't know what to expect.

4.4.1 PRE – EXPERIMENTAL SET UP

Before the experiments they were first tested for their hypnotic suggestibility, in order to determine the point to which each of them could be hypnotized (following the method explained in section 3.3 and 4.1). Then they were divided into four groups of four people, because the chamber could only fit 6 seated persons in

maximum. This division was not depending on their suggestibility scores, as it was decided to test all the subjects – irrespective of suggestibility – to the same conditions (increasing temperatures), in order to be able to get a considerable number of results and to statistically analyze them. Since the sample of subjects was quite small, no statistical analysis would be possible to realize, if half of people was tested in rising temperatures and the other half in falling temperatures (see appendix E for detailed information).

During the suggestibility tests a camera was recording the whole procedure, in order to have some proofs of what was happening during these tests, in case any of the subjects had the curiosity to ask or to watch it.

4.4.2 EXPERIMENTAL PREPARATION OF SUBJECTS

The four groups were invited at different times, so that the one group would not run into the other and exchange opinions about the experiment. The subjects were not aware of what is going to happen inside the chamber, as they were told that they will be hypnotized and then the air quality will change. Thus, they were not told that it's a thermal comfort study, in order to distract them, so that the hypnotist could convince them about the steadiness of the temperatures. As for the PMV vote and the questionnaires, it was decided for me to enter with them in the chamber, in order to give them instructions for when to fill in each section of the questionnaire. In this way, the PMV vote could be asked in specific moments and be compared with the measured temperature at these moments.

5. DESCRIPTION OF THE FINAL EXPERIMENT AND RESULTS

In this chapter, there will be a description of the final experiment, and then there will be an effort to analyse the results and to compare the subjects' suggestibility scores with their PMV votes.

As a start, the groups were randomly created and were put in the same conditions (rising temperatures), because as the hypnotist noticed during the suggestibility tests, it would be difficult to divide them into two groups of high suggestibles and two groups of low ones, since only 4 of them seemed to be highly hypnotised. Each group was asked to come at a different time, in order to avoid any discussions between the groups. They were also asked not to give information about the experiment if they accidentally met any member of the other groups.

The chairs inside the chamber were arranged in such way, so that the one subject could not see the other's face, in order not to be distracted from grimaces and smiles between them (the arrangement of the chairs can be seen in figure 9).

The subjects entered the chamber, and for the first ten minutes a sudoku and crossword task was given to them in order to relax them. Then, the hypnosis part took place and lasted for 15 minutes. For this first half an hour, the temperature was kept steady and at about 24.5°C. At the end of the first half an hour they were asked to fill in the first section of the questionnaire which contained the first PMV vote. During the second half an hour, they were asked to fill in the next sections at specific times, while the temperature was rising till the value of 28.8°C. During the last 5 minutes of the experiment (which totally lasted one hour), the hypnotist dehypnotized the subjects and brought them back to the waking state. Inside the chamber, there were 6 persons each time: the four subjects, the hypnotist and me. This procedure was followed for four times. At the end of each experiment, the subjects were interviewed for five minutes in order to have a personal contact with them, so that opinions about their

experience could be recorded and conclusions about their reactions to be derived.

Figure 9: The arrangement of the chairs during the final experiment (after the apposite remark of the hypnotist).

5.1 RESULTS CONCERNING THE CHAMBER TEMPERATURES

As mentioned in the previous chapters, many tests were carried out before the final experiment, in order to find the appropriate temperatures which should be set in the contour software in order to get the preferred temperatures inside the chamber.

Two days before the final experiment the exact same temperature profile was tested for the same time periods as those of the experiment, in order to be sure of the temperatures that would be measured inside the chamber the day of the experiment. For this reason, the chamber was set to start running at the same time as for the final experiment and to alter the temperatures at the same intervals of times. By studying the results of this test, as measured by the Hobo, the decision about when to ask for a PMV vote was made. Thus, the PMV vote should be asked at three different temperatures which should be the same for each group of subjects. One vote was asked during the comfortable state of 25°C, one vote during the alteration of the temperature, the first minutes that it

begins to change (26°C), and the last one was asked, two minutes before the end of the experiment, when the temperature was pretty much stabilized and had took its higher value (29°C). The time periods during which the PMVs were asked as well as the time periods of each experiment can be seen in the next diagram (diagram 11).

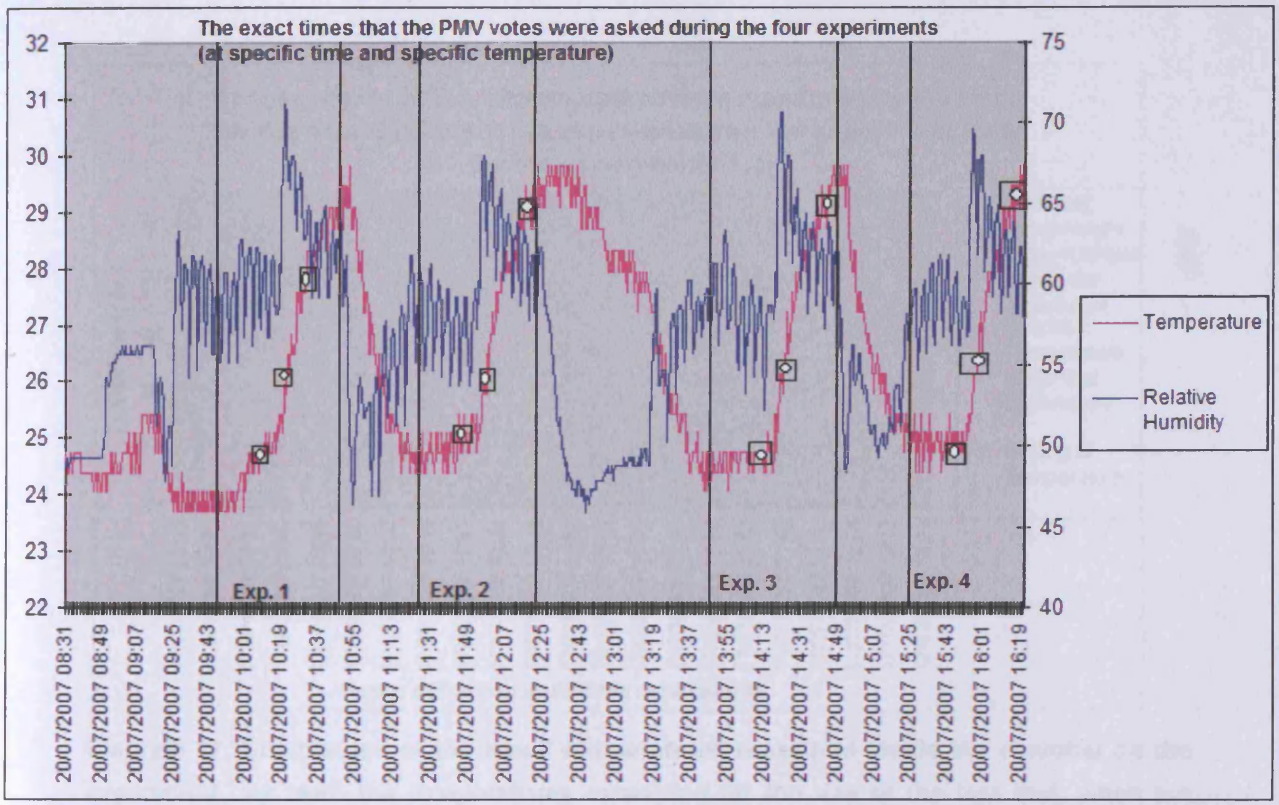


Diagram 11: The time period that each experiment lasted and the exact times that the PMV votes were asked. The circles inside the diagram show the exact times during which a PMV vote was taken.

However, the results measured by the Hobo, during the experiment day, had some differences compared to those taken from the previous test, which took place two days before. This was not expected, but however, the differences were not too high and either way the climate chamber had already showed us that it is

very difficult to take the exact same temperatures each time, even when it is set to take the same values. Thus, the fact that the temperatures of the final experiments were a little bit higher than those expected from the last test, led us to take PMV votes at a little higher temperatures than those decided two days before at the last test (where the PMV votes were decided to be asked at 24°C, 25°C and 28°C).

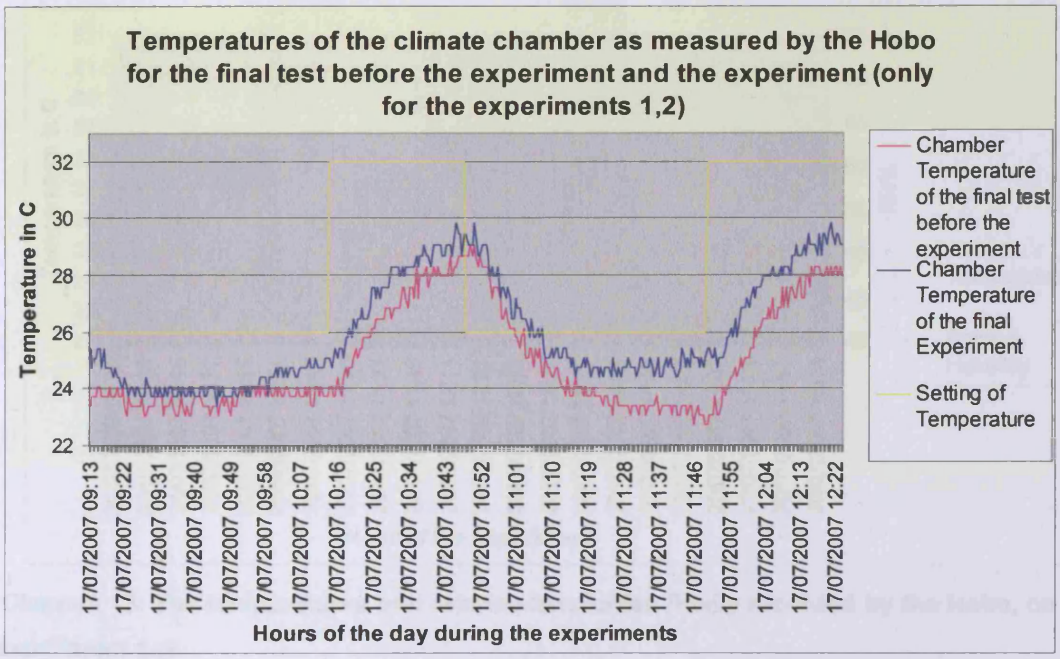


Diagram 12: Comparison of the result temperatures measured inside the chamber on the experiment day, with the temperatures measured on the day of the last test, when the setting on the contour software was the same for both cases.

As it can be seen from diagram 12, there is a difference of about one degree between the temperatures of the previous last test and of the final experiment. It can also be seen that the room can not reach the setting temperature at least during the period of one hour.

From these observations, it is concluded that as many tests as someone makes with the specific chamber, he can never be certain of the final temperatures he will actually take (at least when the time periods are as short as those tested in

this study). He can only make observations, assumptions and guessing in order to end up with temperatures close to those required.

The temperatures and relative humidities finally recorded inside the chamber can be seen in the next diagram (diagram 13).

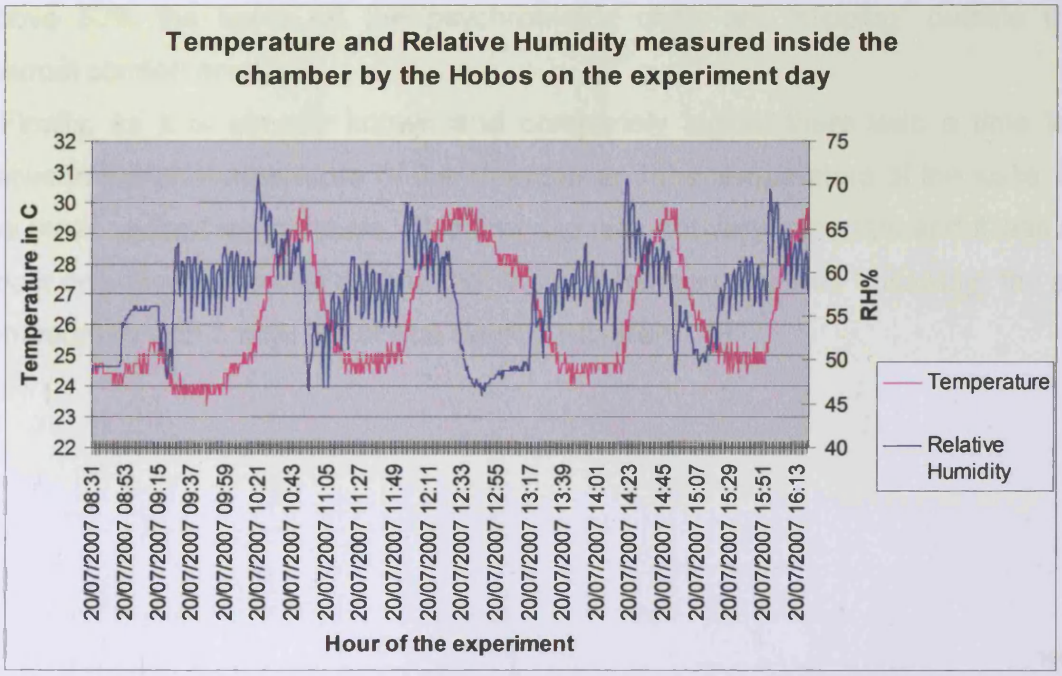


Diagram 13: The temperatures and relative humidities finally recorded by the Hobo, on the experiment day.

As mentioned before, the relative humidity was set to be kept at about 50%, however this was not possible, as it went up and down during the whole time of the experiments, and there were times that it reached the value of 70%. The values that are below 50% were measured when the chamber was at rest, when the break between the experiments took place. It is of great importance the fact that almost every subject, noticed that the humidity was uncomfortable and sometimes unacceptable, and almost everyone described the atmosphere as stuffy. The lack of fresh air, in combination with the fact that the room is on the basement kept almost always closed, and in addition with the latent gains from the people inside it, were probably the reasons for this stuffy atmosphere.

On the psychrometric chart seen below (diagram 14), it is observed that most of the time the subjects should be uncomfortable, not only because of the temperature but also because of the humidity. In fact, it is the combination of those two variables that causes these uncomfortable conditions inside the chamber. As the temperature increases above 26°C and the humidity increases above 50% the spots on the psychrometric chart are "slipping" outside the thermal comfort area.

Finally, as it is already known and completely logical there was a time lag between the air temperature of the chamber and the temperature of the walls, or the mean radiant temperature. This time lag was not very important and it was of about one degree, so that means that the wall temperature was "following" the air temperature with a time lag of one degree (diagram 15).

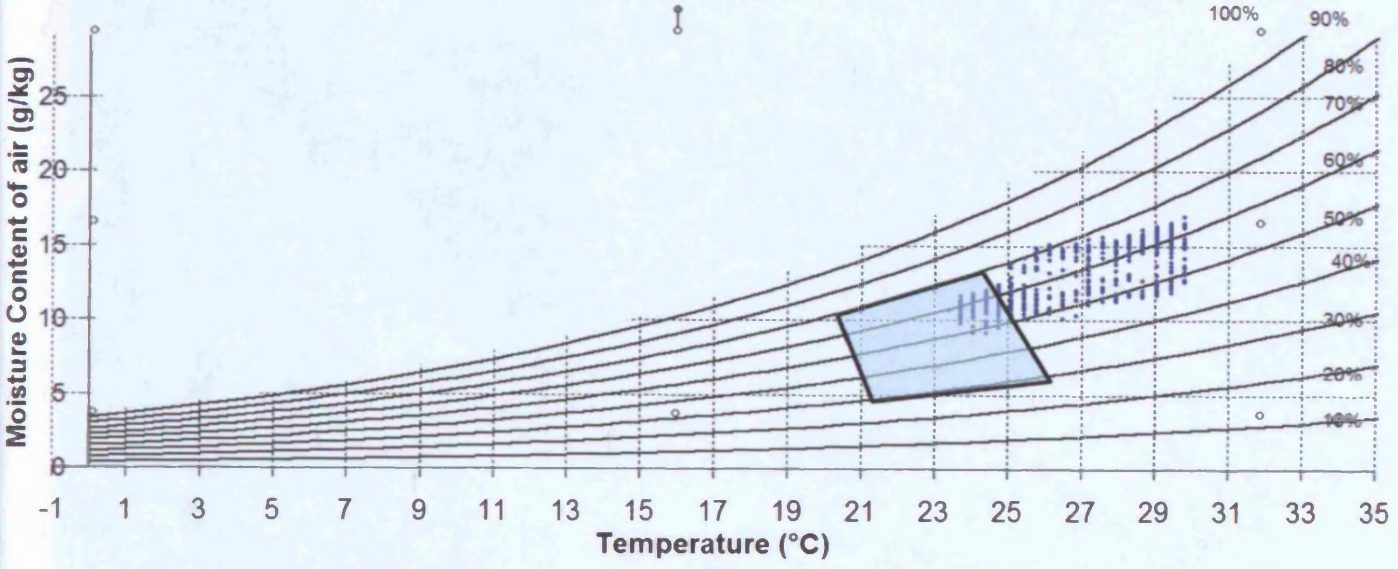


Diagram 14: Psychrometric chart showing the thermal comfort area of the subjects and the temperatures and humidities recorded inside the chamber (on the experiment day). It is observed that the majority of the spots are outside the thermal comfort area.

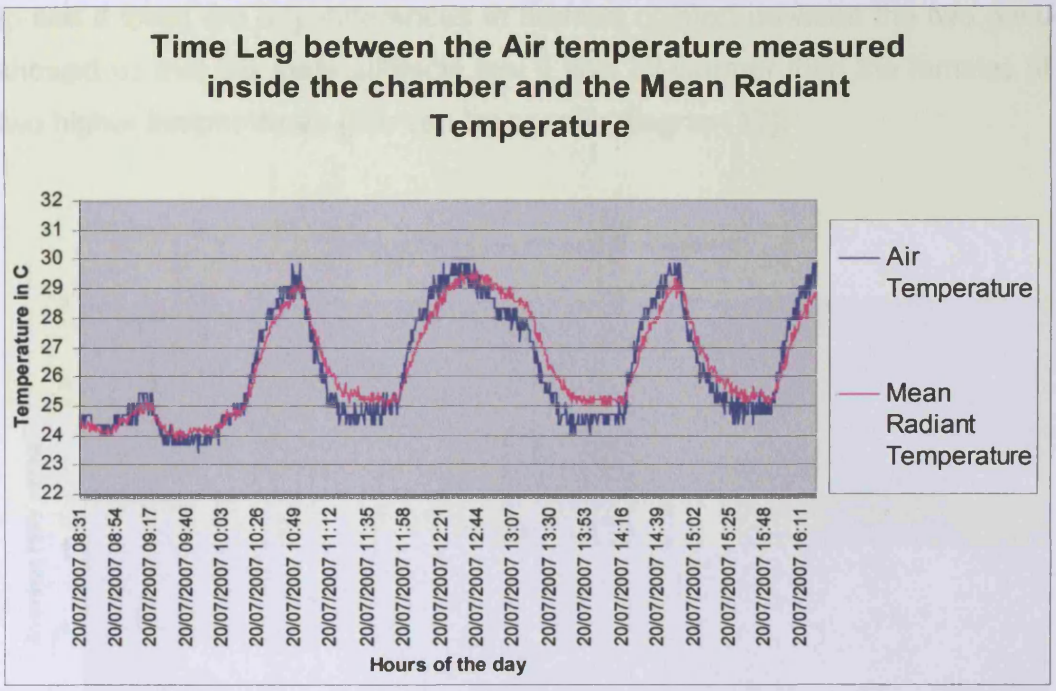


Diagram 15: This is the time lag between the air temperature and the mean radiant temperature as measured by the Hobos, on the day of the experiments.

5.2 ANALYSIS OF THE THERMAL COMFORT VOTES AND COMPARISON WITH THE SUBJECTS' HYPNOTIC SUGGESTIBILITY SCORES

As a start it would be quite important to see the distribution of the PMV votes and the average PMV's for each temperature. So, one first interesting clue is the average PMV vote for each temperature. As it can be observed in diagram 16, the average PMV for the temperature of 25°C is zero, or neutral, something which was expected, whereas the PMV votes for the 26°C and 29°C are between slightly warm and warm. Basically, the average PMV is higher for the temperature of 26°C and not for the temperature of 29°C. This can be explained by the fact, that when the temperature begins to rise, hot air enters into the room,

and thus at that point the conditions inside the room are more uncomfortable than later, when the conditions are stabilized. Another diagram created in order to see if there are any differences in thermal comfort between the two genders, showed us that the male subjects feel a little bit warmer than the females at the two higher temperatures (this can be seen in diagram 17).

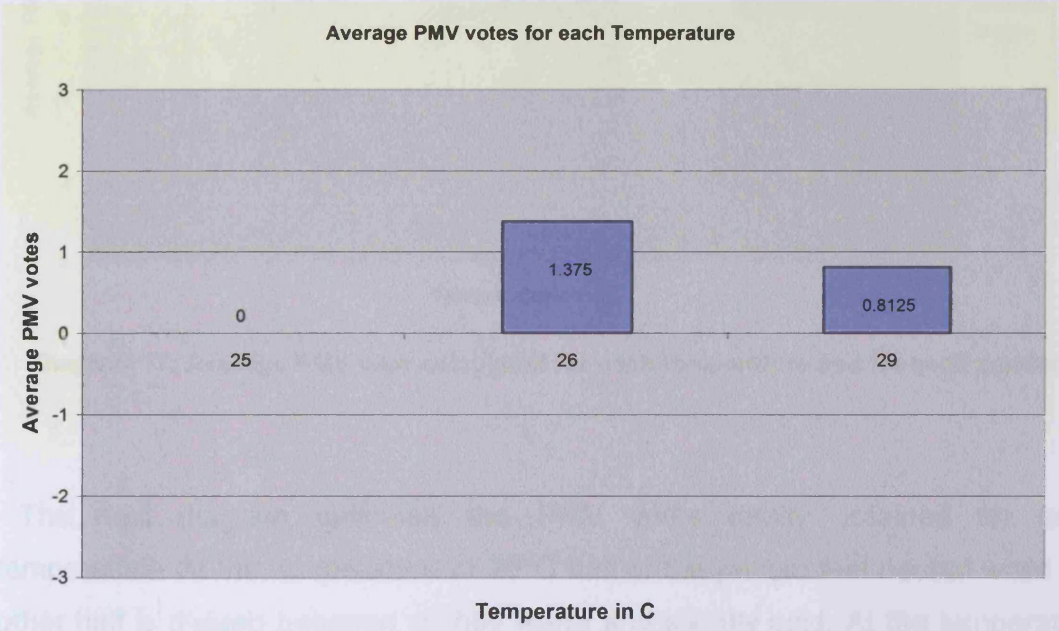


Diagram 16: Average PMV vote calculated for each temperature.

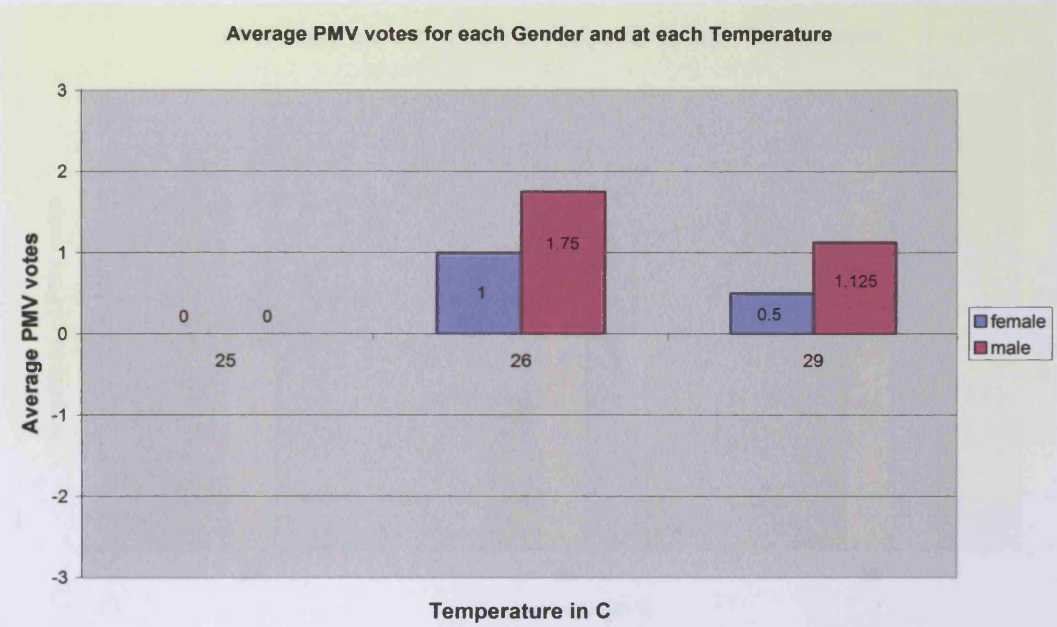


Diagram 17: Average PMV vote calculated for each temperature and for each gender.

The next diagram indicates the PMV votes totally obtained for each temperature. At the temperature of 25°C half of the people feel neutral while the other half is divided between slightly warm and slightly cold. At the temperature of 26°C and at the time that alterations are happening, the majority of people feel warm, slightly warm or hot, while only three persons feel neutral at this condition. This shows that almost everyone is aware of the increase of the temperature and almost everyone has respond to these thermal changes (this is in accordance with the interviews' results where all the people had declared that they were aware of the temperature rise). Thus, at this point, only three persons seem to be convinced that the temperature and their thermal comfort remain constant.

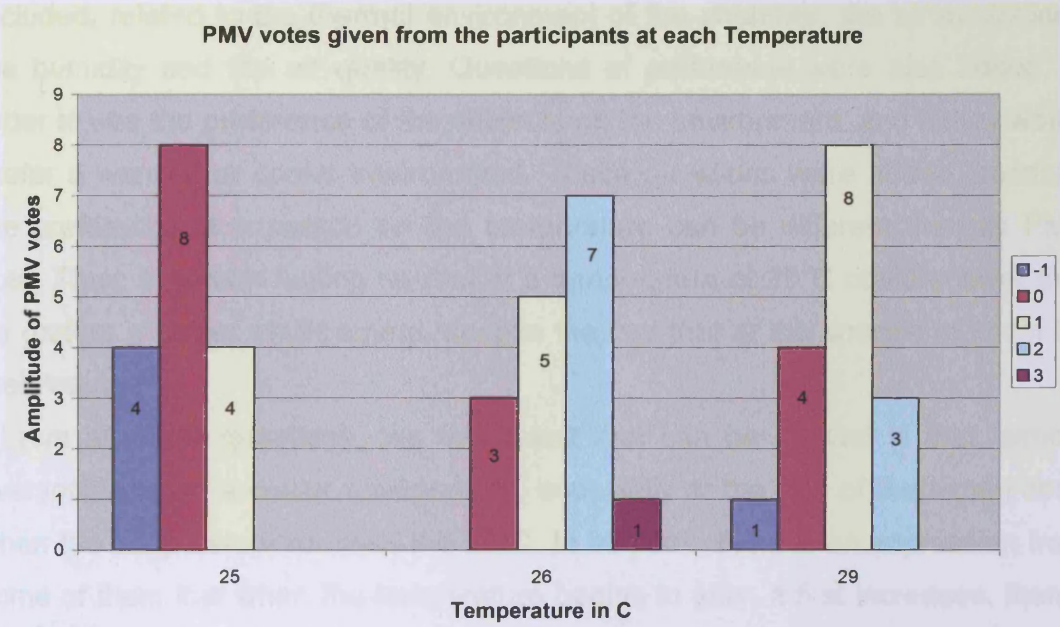


Diagram 18: The distribution of PMV votes at each temperature or otherwise, the PMV votes given from all the participants at each temperature.

Finally, at the condition of 29°C, 11 persons from the 16 feel slightly warm to warm and only four of them feel neutral. However, as it will be seen later in another diagram, only one person feels neutral at all conditions, and even those that feel neutral at 29°C, they felt slightly warm or warm during the alteration of the temperature, at 26°C. This probably shows, that these answers of neutral thermal comfort are mostly related to the stabilization of the temperature inside the room, at the end of the experiment, and to the fact that at the end of the time, there was no other hot air entering in the room. Thus, the majority of people notice that the temperature is rising and only one person feels neutral the whole time. Nevertheless, this person is not a high hypnotizable person, so these observations give us a first clue about whether the hypnotic suggestions convinced the people to stay comfortable at temperatures higher than the usual ones.

As it can be observed in the questionnaires attached in the appendix, except for the questions of thermal comfort and PMV vote, there were also other questions

included, related to the thermal environment of the chamber, the air movement, the humidity and the air quality. Questions of preference were also added, in order to see the preference of the subjects on the environment, and if they would prefer a warmer or cooler environment. These questions were added, because the preference of a person on the temperature can be different than its PMV vote. Thus, a person feeling neutral at a temperature of 29°C could answer that he prefers a cooler environment, despite the fact that at the specific moment he feels neutral[5].

From all these questions, the first result that can be derived is that, almost everyone prefers a cooler environment, especially at the end of the experiment, when the temperature reaches the 29°C. In addition, there is an impression from some of them that when the temperature begins to alter, it first increases, then it falls and finally it rises again. This is quite logical, since when the temperature begins to change, large amounts of hot air enter into the chamber to condition the space and at that time, it is inevitable to understand the temperature alteration. Then the room, in order to stabilize the temperature, blows in either hot or cold air, so that the specific temperature set, could be reached. That is why, many of the subjects thought that the temperature goes up and down, but in its total it increases.

Another conclusion from the answers of subjects is that they feel that there is a lack of fresh air inside the room, and that there is an odor of mold and humidity (this came from their answers on page 6 of the questionnaire, where questions of air quality are included). As for the air movement, which (according to the actual measurements and to the opinions of the participants of the pre-experiment tests) comprised a problem during the tests before the final experiment, it can be noticed from the corresponding questions that the subjects are pretty much divided, while 9 of them are unsatisfied and 7 of them are satisfied. There was an effort to correlate these answers for the air movement with everyone's sitting point inside the chamber, but no such correlation was possible. The mark of the

[5] This also explains how people of warm climates feel; they can accept higher temperatures and feel neutral, but their preference would be that they want a cooler environment. This also stands for people of colder climates.

seat was also combined with the average PMV vote for each side of the room, and the results can be seen in diagram 19.

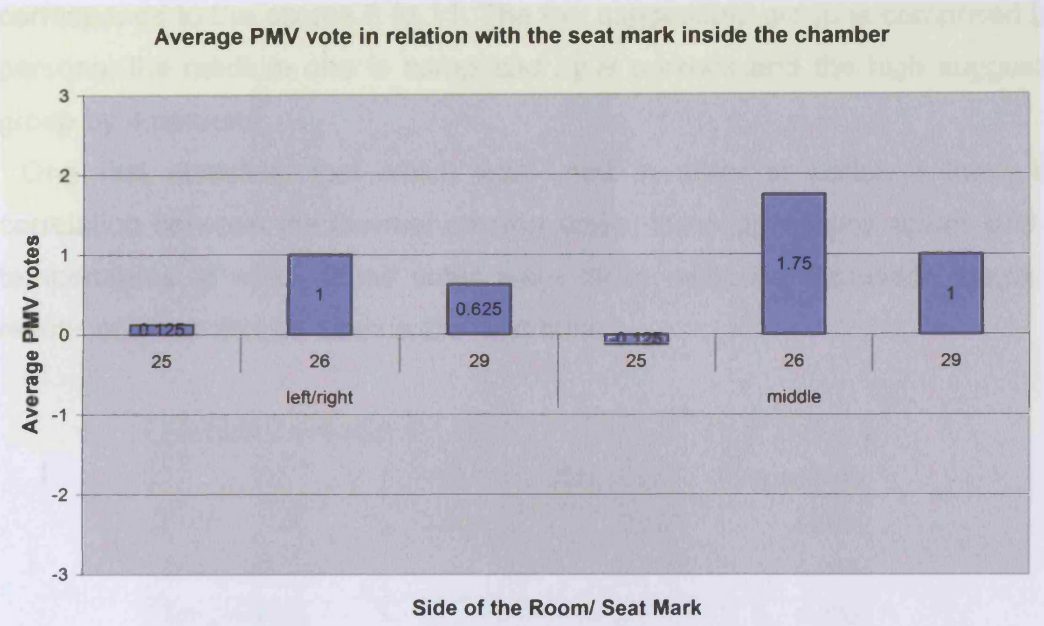


Diagram 19: Average PMV votes at each temperature, depending on the seat of the subjects inside the room.

This diagram indicates that for the temperatures of 26°C and 29°C those seated at the middle of the room feel warmer than those seated at the left or right of the room. This is probably because those seated at the left or at the right are almost in front of the chamber's fans, and so when the temperature begins to change, the air which blows in can directly affect them, whereas those seated at the middle are not affected since the air is not directly reaching them. As a result, these last might feel a little bit warmer.

The following diagrams are including the hypnotic suggestibility scores of the subjects in an effort to combine these scores with the PMV votes and find if there are any correlations between these variables. As mentioned before the suggestibility scores were derived from the "Harvard Group Scale of Hypnotic Susceptibility" and with the precious help of the hypnotist. In their total these suggestibility scores are responsible for the division of our sample into three

groups of people, one group of low suggestible persons which corresponds to number 4 of the suggestibility scale, one group of medium ones which includes the scores from 5 to 8, and one group of high suggestible ones which corresponds to the scores 9 to 11. The low suggestible group is comprised by 3 persons, the medium one is comprised by 9 persons and the high suggestible group by 4 persons.

One first statistical tool which was used in order to define if there is a correlation between the thermal comfort votes, the suggestibility scores and the temperatures at which these votes were taken, was the correlation matrix the results of which can be seen in the next table.

Pearson Correlations			
	PMV	Sugges. Score	Temperature
PMV	1.000	0.157	0.000
Suggestib. Score		1.000	0.000
Temperature			1.000
Pearson Probabilities			
	PMV	Sugges. Score	Temperature
PMV	-	0.561	1.000
Suggestib. Score		-	1.000
Temperature			-

Table 4: The correlation matrix created in order to see the relationships between the different variables.

As it is observed the only variables related to each other are the PMV votes and the suggestibility scores. However, this correlation is not strong enough, as it only corresponds to 0.157, which means that those two variables have a quite low positive correlation.

One first diagram created in order to see the average PMV votes for each suggestibility score and at each temperature, indicated that the only temperature at which the subjects feel neutral on average, is the 25°C. Nevertheless, the 25°C is not neutral for everyone, but for the majority. In addition, these average

PMV's for the score 4 are corresponding to 3 persons, while for the scores 11, 9 or 7 they represent the pmv' s of one person, so, they can not be considered as averages (see diagram 20).

The following diagram (diagram 21) was created in order to better understand the distribution of the average votes between the different suggestibility groups. As it can be seen the high suggestibility group varies between 0.25 and 1, which means that the subjects of this group are always between the condition of "almost neutral" and the slightly warm condition. The medium and the low suggestible subjects are feeling warmer in both temperatures of 26°C and 29°C, comparing to the high suggestible group. It is also worth to notice that the higher average PMV votes for the three groups are observed for the medium temperature of 26°C, something which was not expected since they should feel warmer at the temperature of 29°C. However, this can be explained by the fact that at the moment they answered the PMV vote of the 26°C, the temperature inside the room was just starting to change, and so, the hot air entering into the room to condition the space was creating uncomfortable and maybe at some times unacceptable conditions for the participants.

The most important clue at this point is the fact that the high suggestible group has a lower average PMV vote compared to the other groups, at almost all temperatures, which shows that maybe the hypnotist's suggestions led them to feel more comfortable in relation to the other "normal" subjects.

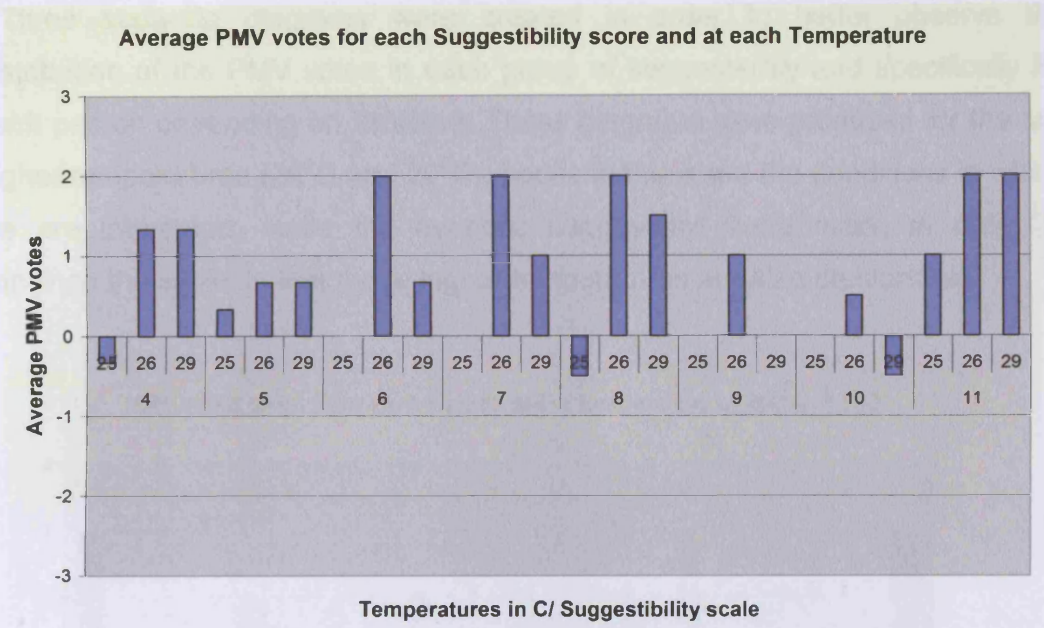


Diagram 20: Average PMV votes calculated for each suggestibility score and at each temperature.

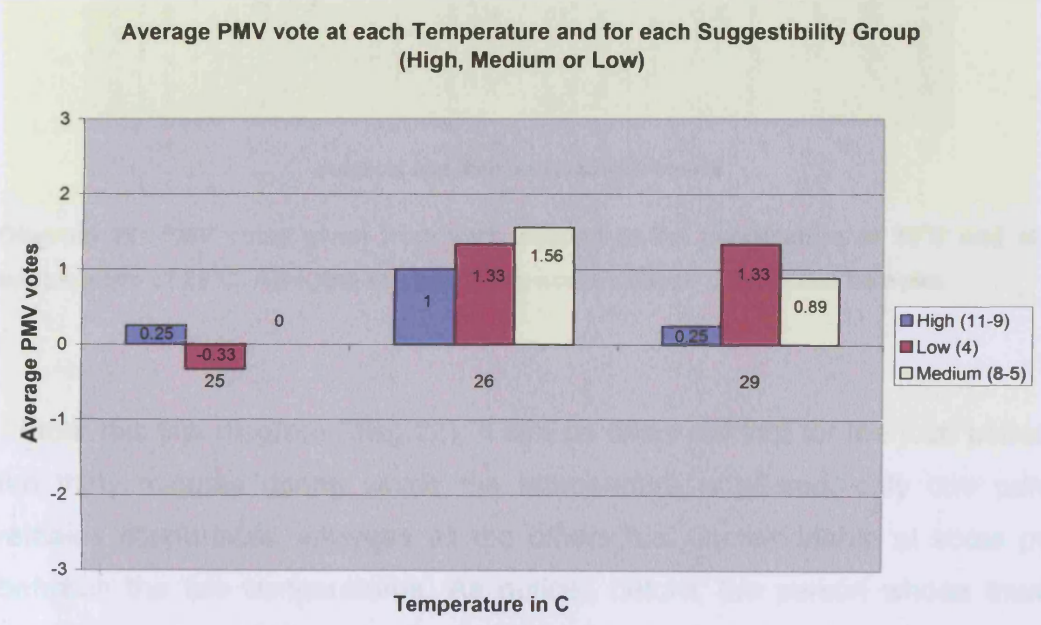


Diagram 21: Average PMV vote calculated for each suggestibility group (high, medium and low) at each temperature. Suggestibility groups were divided depending on the scores of the subjects.

Three separate diagrams were created in order to better observe the distribution of the PMV votes in each group of suggestibility and specifically for each person depending on its score. These diagrams were produced for the two higher temperatures (26°C and 29°C), because these are the conditions in which we are interested, since the hypnotic suggestions were made in order to convince the subjects that these higher temperatures are also comfortable.

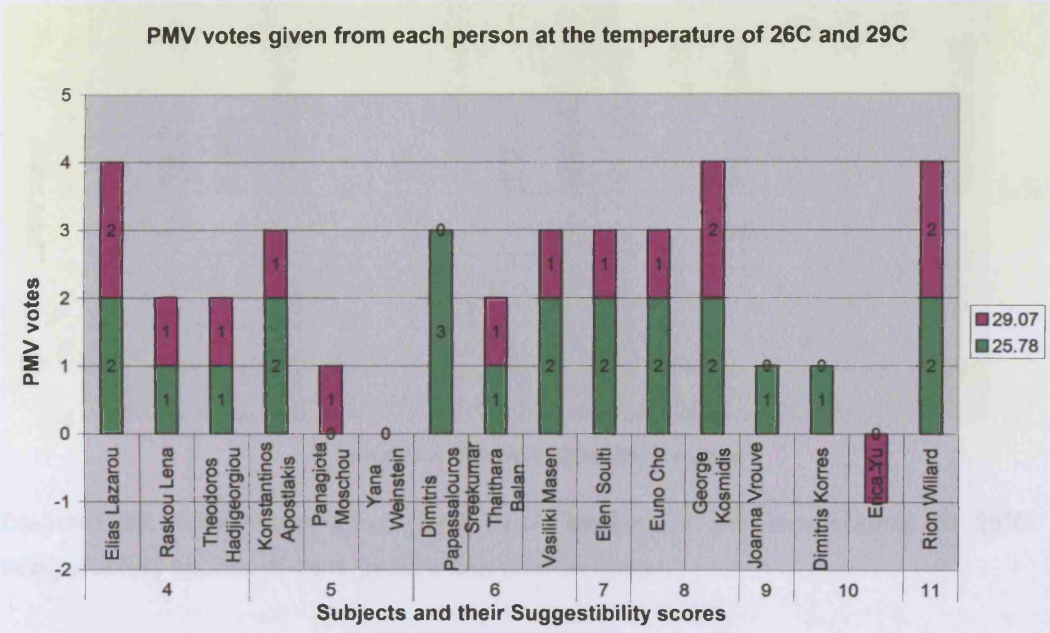


Diagram 22: PMV votes given from each subject at the temperature of 26°C and at the temperature of 29°C. Also, the suggestibility score of each person can be seen.

From this first diagram (diag.22), it can be observed that for the total period of the thirty minutes during which the temperature is altered, only one person remains comfortable, whereas all the others feel uncomfortable at some point between the two temperatures. As noticed before, the person whose thermal comfort remains steady all the time is not a high suggestible person.

The second diagram is corresponding to the 26°C and it can be observed that only three persons are comfortable at this condition. It is worth to notice that

these persons have a different suggestibility score and they are not belonging to the high suggestible group.

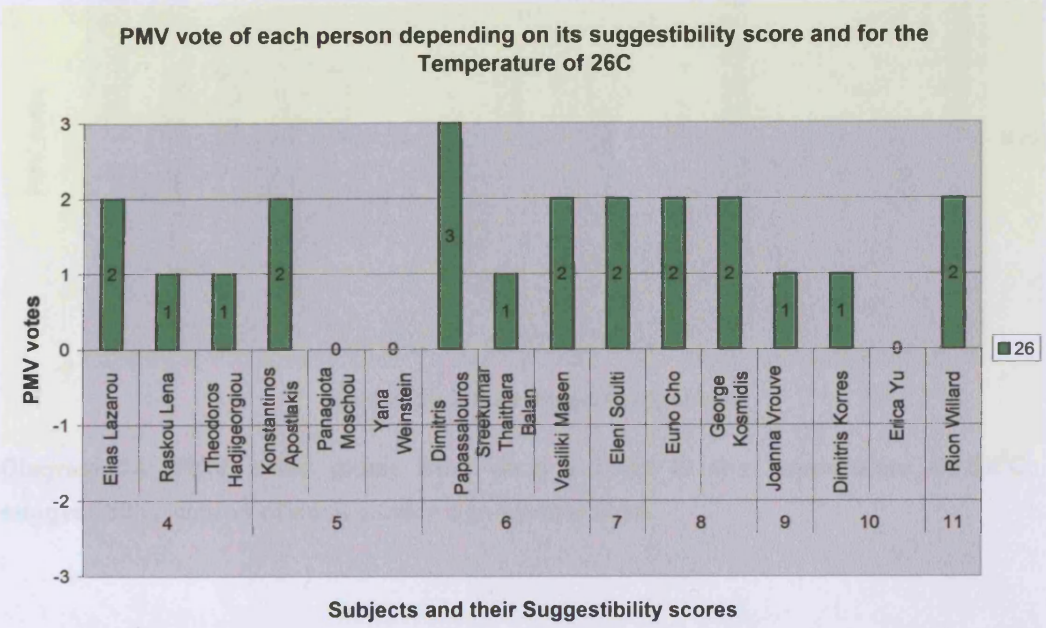


Diagram 23: PMV votes given from each subject at the temperature of 26°C. The suggestibility scores of each person can also be seen.

The third diagram (diag.24) corresponds to the temperature of 29°C. At this temperature there are four persons who feel neutral and these are divided between the high suggestible group and the medium suggestible one. The majority of people are slightly warm in this temperature and only three of them are warm. This is in contrast with the previous diagram of 26°C where half of the people feel warm or hot. As mentioned before, the conditions inside the room during the first alteration of the temperature were quite uncomfortable because of the hot air that suddenly blew in.

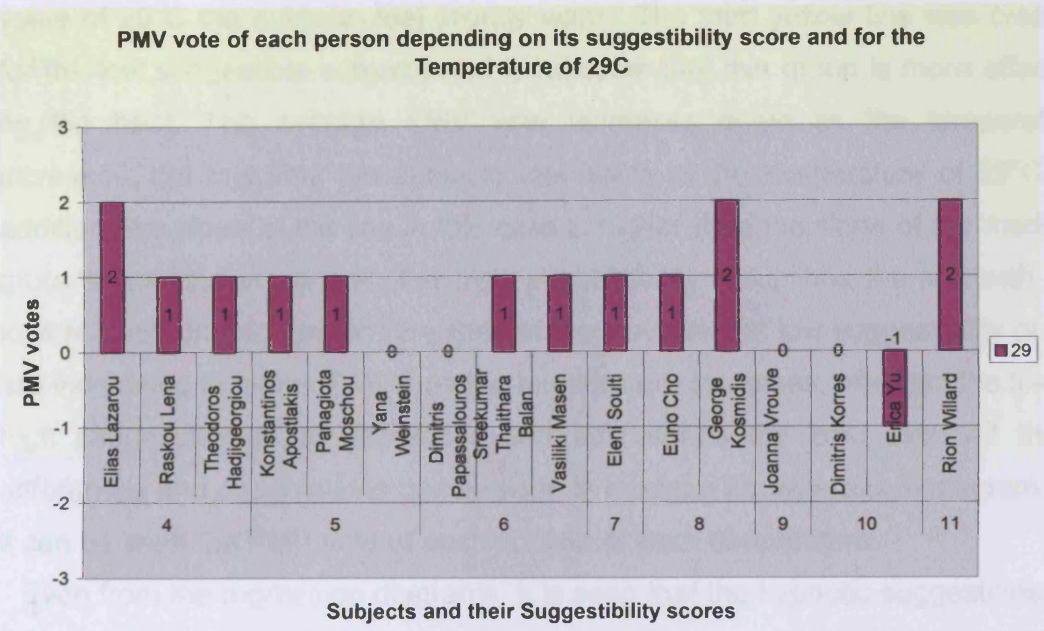


Diagram 24: PMV votes given from each subject at the temperature of 29^{0}C. The suggestibility scores of each person can also be seen.

There was also an effort to plot the above variables in a scatterplot, in an attempt to find the line that best describes the relationship between the variables, having as independent variable the temperature and as dependent the average PMV vote of each suggestibility group. Thus, the first regression line (blue line of diagram 25) was created for the high suggestible group. It was assumed that the variables' relationship is represented by a linear regression, however, this line is not as representative as expected. According to our expectations, and if someone takes into account that the high suggestible group should feel comfortable the whole time (since it responds to the hypnotic suggestions), this line should be constant and should fall upon the zero axis, in order for the subjects to be comfortable all the time and to be sure that the suggestions have convinced them. However, this line is very close to zero and converges to zero when the temperature increases till a specific value.

The pink line is concerning the medium suggestible group, where it can be seen that as the temperature increases the average vote increases, and at the

value of 29°C the subjects feel slightly warm. The third yellow line was created for the low suggestible subjects and it indicates that this group is more affected by the heat. The average PMV vote increases again as the temperature increases, but this time the subjects feel warm at the temperature of 29°C. In addition, the slope of the line in this case is higher than the slope of the medium group's line and in general, the high suggestibility group has the line with the lowest slope. In this diagram the lines of the medium and low suggestibility group are increasing to higher PMV's as the temperature increases, whereas the line of high suggestible group decreases and approaches the zero axis. All these differences and observations can be seen in diagram 25, whereas in diagram 26, it can be seen the PMV vote of each subject at each temperature.

Even from the regression diagrams, it is seen that the hypnotic suggestions did not succeed to keep the subjects in a comfortable condition and to convince them that the temperature is remaining constant.

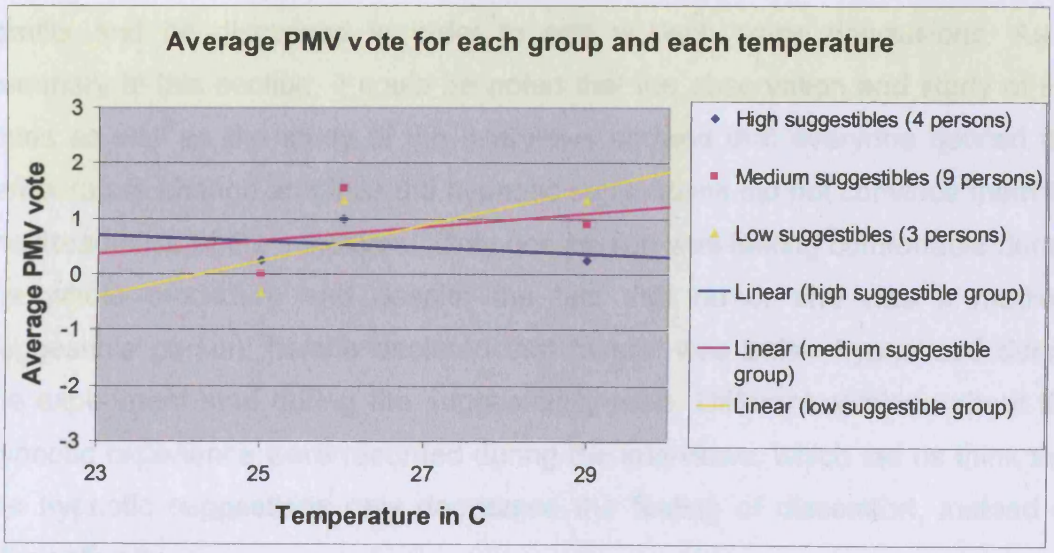


Diagram 25: Regression lines showing the relationship between the average PMV votes of each suggestibility group and the temperatures at which the votes were taken.

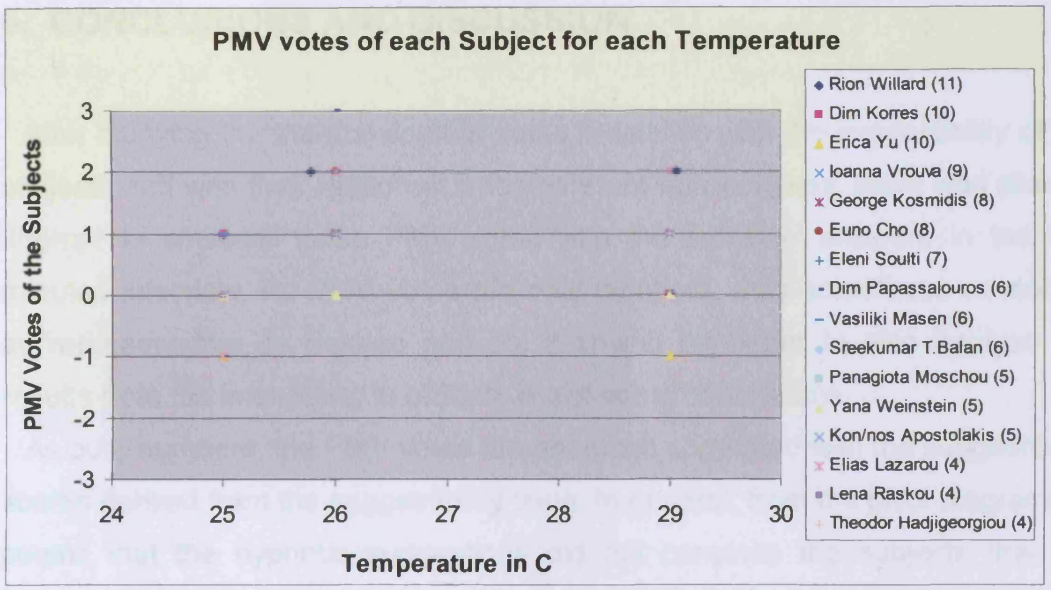


Diagram 26: PMV votes given from each person at each temperature.

In the next chapter these results are going to be combined with the interviews' results and be discussed in order to end up with some conclusions. As a summary in this section, it could be noted that the observation and study of the clues as well as the study of the interviews showed that everyone noticed the temperature change and thus the hypnotic suggestions did not convince them for the steadiness of the conditions. Only one person was feeling comfortable during the whole procedure and despite the fact that he or she was a medium suggestible person, he/she declared that he/she was better hypnotized during the experiment than during the suggestibility tests. Different opinions about the hypnotic experience were recorded during the interviews, which led us think that the hypnotic suggestions only decreased the feeling of discomfort, instead of eliminating it.

6. CONCLUSIONS AND DISCUSSION

After studying the thermal comfort votes in relation with the suggestibility of the subjects and with their response in the different temperatures, there was also an attempt to combine these PMV votes with the subjects' answers in the five minutes interview. As PMV votes are only numbers, they sometimes cannot be as representative as desired and so, it should be better to also analyse the results from the interviews, in order to make some conclusions.

As pure numbers, the PMV votes are not much correlated with the suggestibility scores derived from the suggestibility tests. In general, from the pivot diagrams, it seems that the hypnotic suggestions did not convince the subjects that the temperature remained the same, as almost everyone was feeling slightly warm or warm at some point of the experiment and only one person was comfortable for the whole period. This was also concluded from the study of the interviews, where everyone answered that they felt the temperature increasing and that they already knew that the temperature would be altered from the suggestions of the hypnotist (during the induction state).

As mentioned before, the person who felt neutral during the whole time of the experiment had a suggestibility score of 5, which means that it was a medium suggestible person. Such a response would be expected by a high suggestible person, however, there was a great number of persons that stated in the interviews that they were more or better hypnotized during the experiment than during the suggestibility tests, whereas others stated that they were better hypnotized during the suggestibility tests, and not at all during the experiments. Thus, the conditions and the environment of the climate chamber could have differentiated at some point, the reactions and the responses of people to hypnosis, and consequently their suggestibility too.

Another conclusion noted before, is the fact that when the temperature begins to rise (at 26°C) and hot air blows in, 14 to 16 persons feel slightly warm to warm, and the four persons who feel neutral are divided between the high suggestible and the medium suggestible group. This shows that maybe their neutrality is not

a result of their hypnotic suggestibility and that their suggestibility scores are not related with the PMV votes. In addition, at the end of the experiment at 29°C, where the last PMV vote was asked, the temperature inside the room is more stabilized and there is no other hot air entering the chamber. That is why most of them feel better in the condition of 29°C than in the condition of 26°C (when the hot air enters).

Finally, as observed from the regression diagrams, the high suggestible persons feel most of the time, better than the others, which means that they are not feeling as warm as the medium or low suggestibles. Also, there were many people who answered that the hypnosis did not help them to feel neutral but it helped them in feeling less warm than they would be without hypnosis. So, maybe the high suggestible persons felt uncomfortable or warm at some point, but this was a less strong feeling than that of the medium or low suggestibles.

The majority of people also answered that they would prefer a cooler environment and that they all were aware that the temperature was changing, and in fact rising. This can be also related with the previous studies realized in this specific field, which, as mentioned in the literature review, had showed that hypnosis can increase the heat detection of people [16]. These studies were performed for both the waking and hypnotic state of people in order to compare their detection to heat in both states.

Nevertheless, in this study it is difficult to produce statistically significant results, since the sample is too small and only four of the people are high suggestible persons. In the other hand, those that seemed to be convinced by the suggestions were not high suggestibles, so that leads to another thought, that maybe any kind of suggestion, and not only a hypnotic suggestion, could convince some people, depending on their personality. For example if someone is told that the temperature inside a room is different than the real one, and this difference between the real temperature and the one "told" is small, then this last could be disorientated and believe that the temperature is the one told and so, this could help him to feel more comfortable. However, when the temperature is altered and the alteration is sensible, then the person will notice the difference

even if he is told that the temperature remains steady. And this is due to the fact that a person's thermoregulatory mechanism is more susceptible to deviations from the optimum.

To end up, all these results led us to the conclusion that for the specific small sample and for the specific number of high suggestibles, the hypnotic suggestions did not succeed to convince that the temperature and thus their thermal comfort remained steady. For this reason, and in order for the next experimenters to overcome all the problems that came up, it would be useful to suggest some developments or improvements for the next studies and some new ideas as a start for future steps in this field:

- Firstly, the same experiment should be revised with a larger sample of say 50 people and for this sample a greater number of high suggestible persons should be present. Only if the sample is greater and the people are equally distributed between the three groups of suggestibility, a more generalized result could be derived.

- Another proposition would be to try and test lower temperatures too, in order to find the response of subjects in the decrease of temperature. This could be done for one group which should be tested in both rising and falling temperatures, so as to have the responses of the same subjects (either high or low suggestibles) to these changes.

- Also, the tests should be done for the waking and the hypnotic state of the same group of people, in order to compare the differences in their responses either to cold or to heat.

- The periods of the experiment should be extended, in order to give a chance to the room to stabilize the temperature and to condition the space, whereas the PMV votes should be asked only when the conditions inside the chamber are stabilized. Thus, a proposed time period would be

a two hour experiment, since it seems that the temperature begins to stabilize after one hour and a half.

- Another problem met was the air movement, which should be lower in the next experiments and it should be supplemented by the use of air purge, in order to avoid the phenomenon of stuffy atmosphere.

- As for the climate chamber, as mentioned before it is difficult to create the conditions required, especially when there is people inside it. However, one suggestion could be a better calibration of the chamber, in order to be able to further decrease the air speed without reducing its good operation.

To conclude, if in the future the studies indicated that the hypnosis could convince people to accept higher temperatures in their internal environments, then this could have remarkable results in our life. Firstly, the energy savings inside the buildings would be of great importance[6] [44, 45], as the people would not need to use the air conditioning units as much as they do now (appendix F and references 41-46). Thus, if they felt neutral at 29°C or 30°C then the air conditions would run less. This would have a great importance for the future, since the higher temperatures will be a common phenomenon in the next years, because of the climate change. In addition, if hypnosis could make people feel better with higher temperatures, then this could be used to make easier their adaptation to climate changes and global warming.

[6] Each 1degC increase in cooling temperature setpoint will reduce energy use by 2-4% [44].
In addition, lowering a thermostat's heating setpoint from 70 degrees to 65 degrees (Fahrenheit) for 8 hours per day will reduce the total heating bill by about 5% [45].

APPENDICES

APPENDIX A: "THERMAL COMFORT INDICES"

Many thermal indices have been developed over the years in an attempt to combine some or all of the environmental variables into a single index that would uniquely define thermal comfort. ASHRAE [1, 11] classifies the indices into three types: direct, rationally derived and empirically derived.

Direct indices are measurements taken on a simple instrument that responds to similar environmental components to those to which humans respond. These are the simplest of the indices and they can be measured directly in an environment, such as, dry-bulb temperature, wet-bulb temperature, relative humidity and air velocity.

The rational indices are based on the body's thermal balance equation, namely, Mean Radiant Temperature, Predicted Mean Vote (PMV), Index of Thermal Stress and others. Predicted Mean Vote is an index developed by Fanger which predicts the mean vote (thermal sensation) of a large group of people exposed to the same thermal condition. It is derived from the physics of heat transfer combined with an empirical fit to sensation. PMV establishes a thermal strain based on steady-state heat transfer between the body and the environment and assigns a comfort vote to that amount of strain. As a measure, the 7-point thermal sensation psycho-physical scale of ASHRAE is used, which can be seen in section 2.2.1 [6, 9]. Finally, it takes into account the environmental parameters together with heat production due to activity level and thermal resistance due to clothing.

The Index of Thermal Stress which was developed by Givoni [1], is the cooling rate produced by sweating which would maintain the person's thermal balance under the given condition.

The empirical indices are related to experimentation with people. Some examples of these kinds of indices are the Effective Temperature, the Corrected Effective Temperature and the Predicted Percentage Dissatisfied (PPD).

The Effective Temperature (ET) is the temperature of the still, saturated condition which would, in the absence of radiation, produce the same effect as the given condition. It integrates three variables, namely, air temperature, humidity and air movement. The Corrected Effective Temperature (CET) is similar to the Effective but includes the radiative effect, where the dry-bulb temperature is replaced by the globe temperature. This is useful in cases where the condition is not uniform like when the walls are not at the same temperature as the air.

On the other hand, PPD is the predicted percentage of dissatisfied people at each PMV. As PMV changes away from zero in either the positive or negative direction, PPD increases. Unlike PMV, which gives the average response of a large group of people, PPD is indicative of the range of individual responses. The PPD is related to PMV by the following graph [20].

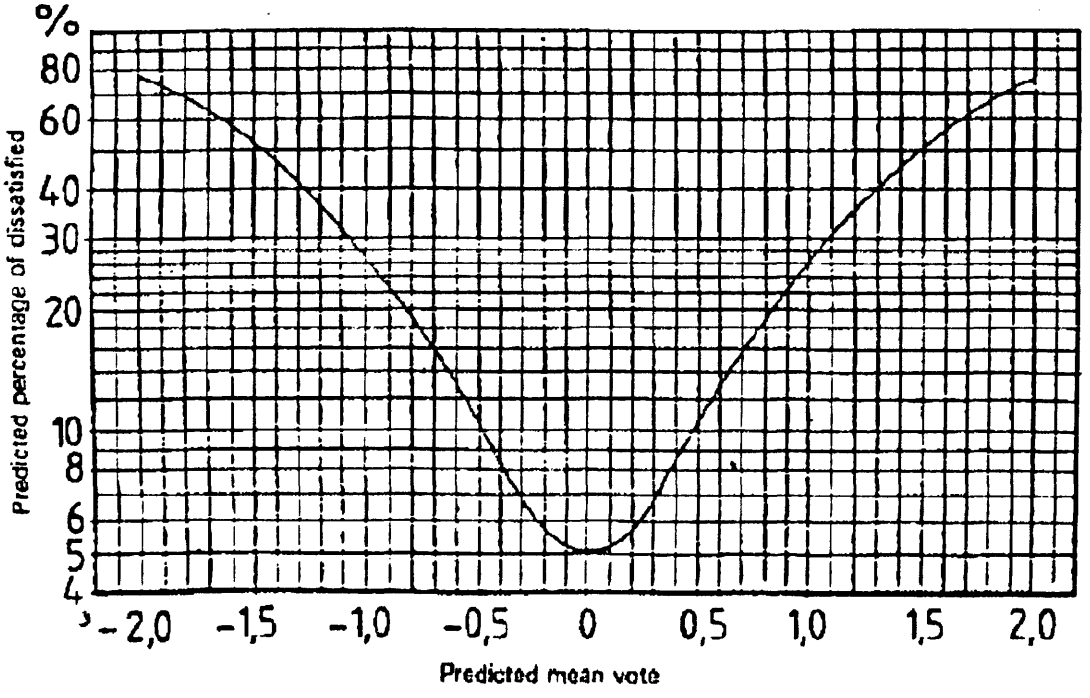


Figure 10: Relationship between PMV and PPD.

APPENDIX B: "HEAT BALANCE EQUATION AND HUMAN THERMOREGULATORY MECHANISMS"

According to Fanger and to its studies on thermal comfort of human, there is a heat balance between the body and its environment which can be described by the heat balance equation [1, 6]. This equation describes how the body can maintain an internal body temperature near to 37°C in terms of heat generation and heat exchange with the environment.

In addition, the thermoregulatory control system involves two types of mechanisms: the autonomic system which involves physiological responses and the behavioural regulation.

The autonomic system involves physiological responses such vasodilation which enhances blood flow to the skin enabling a higher rate of heat dissipation. Vasoconstriction reduces blood flow thus reducing the rate of heat dissipation. When the body temperature cannot be maintained by these mechanisms, other physiological responses like shivering and sweating are activated, in order to produce heat when it is cold or to release heat when external conditions are too hot. Physiological thermal comfort occurs, when the net heat produced equals the total heat dissipated, and the body temperature and sweat rates are appropriate. In this case and according to the definition of Fanger's equation [6, 11], there is no significant heat storage within the body and the heat balance for this condition is given below:

$$M - W - E - R - C - K = 0$$

Where M = rate of metabolic energy production

W= rate of mechanical work and H= M – W

E= heat transfer by evaporation, R=heat transfer by radiation, C=heat transfer by convection and K=heat transfer by conduction.

Another way of expressing the above equation is the following:

$$H - E_{dif} - E_{sw} - E_{res} - C_{res} = R + C = K$$

Where H = metabolic heat production, E_{dif} = heat loss by vapour diffusion through skin, E_{sw} = heat loss by evaporation of sweat, E_{res} = latent respiration heat loss and C_{res} =dry respiration heat loss.

In addition to the autonomic system or active physiological system of thermoregulation, there is an important behavioural response. This is also related to the autonomic response where rapid changes in the environment can cause rapid physiological responses. Behavioural responses greatly affect the human thermal environment. A simple change in posture, orientation towards a heat source, putting on of clothes or movement within the environment can all have significant effects [11].

So, it can be noted that Fanger's steady state model, has constituted the basis in thermal comfort research and practice [1].

APPENDIX C: "OTHER VARIABLES WHICH COULD AFFECT THERMAL COMFORT"

Fanger had conducted lots of research and field studies examining if the requirements for thermal comfort are the same for all people and thus, if the heat balance equation or the Predicted Mean Vote and the other indices could be used for everyone. In this direction he tried to find if there are any other influential factors which could affect the thermal comfort of humans. Thus, he concluded that, there are other influential factors (such as gender, age, or ethnicity), but they have no effect of sufficient magnitude to be of practical engineering significance.

Concerning the ethnicity, from studies conducted between Americans and Danish, or even between Americans and people from tropical climates, it was indicated that there is no significant difference in the thermally neutral conditions between temperate and tropical locations, neither between temperate and cold locations.

As for the age, it is generally considered that older people may prefer higher air temperatures for comfort than do younger people, because of the fact that the basal metabolic rate decreases slightly with age. However, by a comparison made between elderly and college-age subjects, it was concluded that the neutral temperatures for the two groups were identical and that age has no significant effect on the ambient temperatures preferred by man. Thus, the only reason why elderly people would prefer higher temperatures would be their lower metabolic rate, along with their lifestyle, activity and clothing habits. Yet, further work is still required on the responses of children [6, 11].

Concerning the gender of people, the results from different studies [11] show no significant differences between preferred temperatures of male and female subjects. There is evidence though, that females are more sensitive to deviations from the optimum and that they tend to be cooler than males in cool conditions [11]. The effects of the menstrual cycle on their responses were also found to be

insignificant despite the associated changes in internal body temperature over the month.

Finally, the effects on thermal comfort conditions of body build, ethnic differences, circadian rhythm, food, crowding and air pressure are all considered in detail by Fanger [11]. He concludes that none of the above factors have an influence which is not accounted for in the six basic parameters or which is of practical engineering significance and so, the PMV index and his heat balance equation have universal practical application.

APPENDIX D: "PHYSICAL AND PSYCHOLOGICAL CHARACTERISTICS OF HYPNOTIC STATE"

a. Physical Characteristics:

There are some physical characteristics which may be used as general indicators of hypnosis. However, no one sign alone can tell what the hypnotized person is actually experiencing internally. As mentioned before there are some characteristics which are similar with those of the sleeping state. These characteristics include muscular relaxation and muscular twitching. As the body and mind relax, often there are spasms that are wholly involuntary and are related to the neurological changes that take place with relaxation. Another sign of hypnosis could be a change in the breathing rate, which can be either speeding up or slowing down. Some people's breathing becomes shallower, some deeper, some breathe from the chest and some from the diaphragm. A change, either speeding up but usually slowing down of the pulse, is also typical. Thus, it is useful to observe the pulsing of a subject during states of hypnosis and waking states in order to compare the different responses of the body. Finally, it is observed quite often that the person's lower jaw drops and seems subjectively to weigh so much that it takes conscious effort to close it.

b. Psychological Characteristics:

During hypnosis, there are three basic psychological characteristics which can be observed. The first of them is the "selective attention" which is an instrumental factor in the hypnotic interaction and it is defined as the ability to deliberately focus on one portion of an experience while "tuning out" the rest [12, 7]. The second important characteristic is the fact that while the person in hypnosis has his or her attention selectively focused on the suggestions of the clinician, there is a division occurring between the conscious and unconscious minds. The

conscious mind is occupied with the hypnotic procedures, while the unconscious is searching for symbolic meanings, past associations and appropriate responses. This separation of conscious and unconscious is called "dissociation" [12]. Finally, the attentional and dissociational factors described above typically lead to an increased responsiveness to suggestions, which is evidenced as a greater willingness in the client to be guided by those suggestions [17, 12].

APPENDIX E: "REFLEXIONS ABOUT METHODOLOGY"

At the end of this study it is important to note some thoughts about the methodology and about the whole experimental procedure, in order to find out what worked well and what not. Questions such as "which were the factors that led us change different methodology parts?" or "did hypnosis succeed to convince people during the experiments?" will be answered in this chapter. In addition, some new supplementary information will be given about the thoughts and opinions of the participants.

At the conclusions of this dissertation, the general idea with which we ended up was the fact that the hypnosis did not have the results expected and did not succeed to convince people to remain comfortable at all times. Of course, this was concluded for the small sample of people that finally took part in this study. Thus, one first factor which brought changes in the methodology was the number of people participating. The initial idea of the experiment was to take a sample of about 28 people and test them about their hypnotic suggestibility. Two groups would be selected from this larger group: one group of high suggestible persons (8-10 people) and one of low suggestible ones (8-10 people). Two days later, those two groups would be split again into four groups: rising temperature suggestible group, rising temperature non-suggestible, falling temperature suggestible and falling temperature non-suggestible group. So each group would enter once in the chamber and the temperature would either rise or fall and thus, not all groups would be tested in the same conditions.

Therefore, after the suggestibility tests the hypnotist noticed that in this small number of 16 persons, only four of them seemed to be highly hypnotized, and so the above division in four groups, seemed to be unrealizable. Thus the sample was too small and the high suggestibles were few in this sample, so it was not possible to divide them in four groups and put each group in increasing or decreasing temperatures, because in this way, we would only have 4 persons in each condition, and as a result it would be impossible to statistically analyse the

results. Thus, for this reason it was decided to put all the subjects in the same conditions (rising temperatures), since the energy savings that we would have if the hypnosis would work, would be of same importance either for low temperatures or for higher ones. As a result, the initial thought of testing rising and falling temperatures did not work, and maybe this could be the next step in this field, to also test the falling temperatures.

Concerning the hypnosis part of the experiment, there were different comments from the participants, many of which gave me a clue about why hypnosis did not work as expected. Some of them expressed the opinion that in the second day of the experiments and inside this specific chamber, they could not be hypnotized at all because of the prevailing conditions. The chamber and the seats were uncomfortable and the whole environment inside the chamber was giving them the idea of being inside a fridge (because of its size and metal colors of the walls). The chairs were not comfortable enough to help them relax or stretch their legs and arms. The noise was too annoying or loud for many of them, distracting them from their task and from their focusing on hypnotist's voice, whereas for others, the noise was not allowing them to listen to the voice of the hypnotist or to listen to my instructions during the task part. At the same time, the atmosphere inside the room was too stuffy and some of them expressed the feeling that they couldn't breathe easily, because of this atmosphere (dry environment, odors, bad quality of air). Some others were also referred to the humidity which annoyed them because it felt like it was going up. Thus there were many distractions for the subjects, which made them feel uncomfortable and this as mentioned before could not help them relax in order to be hypnotized. This is also mentioned in the hypnosis chapter (ch.3), where it is stated that in order to be hypnotized the subjects should feel comfortable in all aspects of the environment.

One other opinion, which is quite logical, was the fact that the hypnosis process was "broken" in a way after they opened their eyes and started doing the questionnaire task. They also thought that they were distracted or awaked by the experimenter's voice (mine) who gave them instructions during the second half hour, in order to help them complete the task. They thought that this should be

done by the same person as the hypnosis, because the experimenter's voice reduced the hypnotic experience as opposed to the hypnotist's voice (hypnotist is a professional and knows how to speak to them). Another solution would be for the subjects to read the instructions within the questionnaire, as it was decided at the beginning of the procedure, but changed during the process, in order to be surer that they all would give PMV vote at same times.

Other thoughts about the hypnosis part were concerning the duration of the induction and the intervals between the different sections of the questionnaire.

As everyone observed, the induction part at the day of the experiment lasted less than at the day of the suggestibility tests. Thus, many people thought that the reason they didn't succeed to be hypnotised as much as at the previous day, was the fact that they didn't have enough time to relax. They would like the hypnotism to last as much time as during the suggestibility tests, because they thought that the hypnosis period was too short and they would need more time to relax in this space, because it was unknown and weird for them. As a result, my opinion too is that the induction part should take longer in order to give them more time to adapt and relax in this inhospitable environment.

As for the intervals between the different sections of the questionnaires, many participants expressed the opinion that these intervals made them lose their concentration and awaked them more and more, each time they were waiting to start the next section.

Another reflexion concerning the whole procedure was about the temperatures reached inside the chamber, something which is also noted in chapter five. The climate chamber did not work as expected for the short periods of one or two hours. It probably needed more time to reach the temperatures set and required. However, the tests carried out and revised in this study, indicated that we can never be sure of the final temperatures we will get inside the room, something which made difficult the process and led to many predictions and assumptions.

Finally, an important point at the day of the experiment was the interview part, during which each of the subjects was asked about its opinion on the experience and the procedure. The questionnaire used for this interview is attached in

another appendix, and as it can be seen it includes general questions. These interviews gave me additional clues about how they felt, and thus, these clues combined with the numbers of the votes, gave me an overall view about each persons' thermal comfort. Their answers as well as their reactions as they answered were recorded, in order to know more about their feelings on the temperature and on the hypnosis experience. In addition, their answers helped me understand their true feelings about the temperature, since for many of them the PMV vote was not very clear, and thus the differences between slightly warm, neutral and slightly cold were fine or imperceptible to them. Consequently, many of them gave a thermal vote of neutral and then stated that they were warm or that the temperature was very uncomfortable, or some others gave a slightly warm thermal vote, and stated that they were feeling neutral the whole time. The differences between these three states are too fine and so someone can be easily confused and answer something different. To end up, these interviews created an overall idea of what the subjects were feeling during the whole period of the experiment.

APPENDIX F: "ENERGY SAVINGS IN CASE HYPNOSIS COULD WORK IN REAL LIFE"

In this chapter it is presented an example of the energy savings that could be derived from the hypnosis, if people could be convinced to live and work with higher than the usual temperatures. This is a reference example and it is not referred to a specific type of building.

If the indoor temperature is kept at about 24°C to assure the thermal comfort of occupants and the external temperature is 30°C (in summer), then for a cubic room of 5mx5mx5m:

It is assumed a U-value of $1W/m^2K$ and $\Delta T = 30 - 24 = 6°C$

The surface area of the room will be $A = 6x (5mx5m) = 150m^2$ and so the fabric heat gain will be:

$FHG = 1W/m^2K \times 150m^2 \times 6°C = 900W$ or $0.9kW$

Therefore, 0.9kW of cooling load would be required to maintain the building at 24°C. Except for the fabric gains the room can have ventilation heat gains so,

$VHG = 0.33 \times V \times ACR \times \Delta T = 0.33 \times 125m^3 \times 1ac/h \times 6°C = 247.5W \approx 248W$ or $0.248kW$

So the overall cooling load needed to keep the room at 24°C would be:

$0.9kW + 0.25kW = 1.15kW$

This cooling load will increase if the room is occupied because in that case, there will be additional internal gains. Thus, if there is for example one person sitting, he will produce 130W or 0.13kW, and so the cooling load would increase by 0.13kW.

If it was demonstrated from the experiments that the occupants could be convinced and be satisfied with an internal temperature of 28°C then the cooling load needed to maintain the room's temperature would be less. For summer again the fabric and ventilation heat gains would be ($\Delta T = 30 - 28 = 2\ ^{o}C$):

FHG = $1W/m^2K \times 150m^2 \times 2^{o}C = 300W$ or 0.3kW

VHG = $0.33 \times 125m^3 \times 1ac/h \times 2^{o}C = 82.5W$ or 0.082kW

The overall cooling load in this case would be 0.3kW + 0.082kW = 0.383kW

Thus, if the occupants were persuaded to live with temperatures of 28°C, without using the air condition, then the air conditioning system would have to operate less and so the energy saving would be:

1.15kW-0.383kW = 0.76kW, for increasing the Temperature inside the buildings by 4 degrees Celsius.

APPENDIX G: "METABOLIC RATES FOR DIFFERENT ACTIVITIES AND CLO VALUES FOR BASIC CLOTHING"

Description of Clothing	***Insulation (clo)***
Naked	0
Shorts	0,1
Typical tropical outfit: Shorts, open-neck shirt with short sleeves, light socks and sandals	0,3 - 0,4
Light summer clothing: Short underpants (briefs), long light-weight trousers, open-neck shirt with short sleeves	0,5
Light working clothes: Short underpants (briefs), woollen socks, working trousers, cotton open-neck shirt not tucked into trousers	0,6
Light-weight suit	0,8
Typical business suit	1,0
Cotton coat over typical business suit	1,5
Light outdoor sports clothes: Cotton vest and underpants, T -shirt, shorts, socks, shoes, single-ply poplin (cotton and dacron) jacket	0,8-1,0
Traditional heavy European business suit: Cotton underwear with long legs and sleeves, shirt, woollen socks, shoes, trousers, jacket, waistcoat	1,5

Activity	Metabolic Rate (met)
Resting	
Sleeping	0,8
Seated quietly	1,0
Standing at ease	1,2
Walking on the level	
3,2 km/hr	2,0
4,4 km/hr	2,5
5,3 km/hr	3,0
6,0 km/hr	3,5
6,7 km/hr	4,0
Walking up a 1 in 20 hill	
1,6 km/hr	2,4
3,2 km/hr	3,0
4,8 km/hr	4,0
Office work	
Electric typewriter, 40 words per minute	1,0
Mechanical typewriter, 40 words per minute	1,2
Miscellaneous (e.g., filing, checking ledgers)	1,0-1,2
Drawing office	1,2
Laboratory work	
Examining microscope slides	1,4
General laboratory work	1,6
Setting up apparatus	2,2
Machine work	
Light (e. g. electrical Industry)	2,0-2,5
Machine fitter	3,0
Heavy (e. g., paint industry)	4, 0
Vehicle driving	
Car in light traffic (manual gear-change)	1,0-1,2
Car in heavy traffic (manual gear-change)	2,0
Heavy goods vehicle	3,0
Aeroplane, night -flying	1,2
Aeroplane, instrument landing	1,8
Miscellaneous occupations	
Bakery (e. g. cleaning tins, packing boxes)	1,4-2,0
Brewery (e.g., filling bottles, loading beer crates on to belt)	1,2-2,5
Cutting wood with a power-saw	1,8
Garage work (e.g., replacing tyres, jacking up cars)	2,2-3,0
Locksmith	2,2
Manufacture of tins (e.g., filling, labelling and dispatching)	2,0-2,5
Cobbler (shoe repairer)	2,0
Shop assistant.	2,0
Schoolteacher	1,6
Domestic work	
House-cleaning	2,0-3,5
Cooking	1,6-2,0
Standing washing dishes	1,6
Washing clothes by hand and Ironing	2,0-3,5
Shopping	1,6

APPENDIX H: "HARVARD GROUP SCALE OF HYPNOTIC SUSCEPTIBILITY TEST"

RESPONSE BOOKLET – FORM A

HARVARD GROUP SCALE

OF

HYPNOTIC SUSCEPTIBILITY

By Ronald E. Shor and Emily Carota Orne (modified)

The Scale is a standard procedure for estimating susceptibility to hypnosis. An individual's susceptibility to hypnosis may change, however, over time and with differing circumstances. An individual who appears relatively unsusceptible at this time by these standard procedures will not necessarily still be relatively unsusceptible at a later time or under different circumstances.

PLEASE SUPPLY THE INFORMATION REQUESTED BELOW

Name: _____ Date: _____

Age: _____ Sex: _____ Department: _____

e-mail address: _____

Have you ever been hypnotized? Circle: Yes No
If so, please cite the circumstances and describe your experiences. Please be brief:

DO NOT OPEN THIS BOOKLET until the examiner specifically instructs you to do so

Please write down now briefly in your own words a *list* of the things that happened since you began looking at the target. Do *not* go into detail. Spend three minutes, no longer, in writing your reply.

Please **DO NOT TURN THIS PAGE** *until the examiner specifically instructs you to do so*

PLEASE DO NOT RETURN TO PAGE 2

On this page write down a list of anything else that you now remember that you did not remember previously. Please do *not* go into detail. Spend two minutes, no longer, in writing out your reply.

Please **DO NOT TURN THIS PAGE** *until the examiner specifically instructs you to do so*

PLEASE DO NOT RETURN TO EARLIER PAGES

SECTION ON OBJECTIVE, OUTWARD RESPONSES

Listed below in chronological order are the eleven specific happenings which were suggested to you during the standard hypnotic procedure. We wish you to estimate whether or not you *objectively* responded to these eleven suggestions, that is, whether or not *an onlooker* would have observed that you did or did not make certain definite responses by certain specific, pre-defined criteria. In this section we are interested in your estimates of your *outward behaviour* and *not* in what your *inner, subjective experience* of it was like. Later on you will be given an opportunity to describe your inner, subjective experience but in this section refer only to the outward behavioural responses irrespective of what the experience may have been like subjectively.

It is understood that your estimates may in some cases not be as accurate as you might wish them to be and that you might even have to guess. But we want you to make whatever you feel to be your *best estimates* regardless.

Beneath a description of each of the eleven suggestions are sets of two responses, labelled A and B. Please *circle* either A or B for each question, whichever you judge to be the more accurate. Please *answer every* question. Failure to give a definite answer to every question may lead to disqualification of your record.

I. HEAD FALLING

You were first told to sit up straight in your chair for 30 seconds and then to think of your head falling forward. Would you estimate that *an onlooker* would have observed that your head fell forward at least two inches during the time you were thinking about it happening?

Circle one: A. My head fell forward at least two inches.

B. My head fell forward less than two inches.

II. EYE CLOSURE

You were next told to rest your hands in your lap and pick out a spot on either hand as a target and concentrate on it. You were then told that your eyelids were becoming tired and heavy. Would you estimate that *an onlooker* would have observed that your eyelids had closed (before the time you were told to close them deliberately)?

Circle one: A. My eyelids had closed by then.

B. My eyelids had *not* closed by then.

III. HAND LOWERING (LEFT HAND)

You were next told to extend your left arm straight out and feel it becoming heavy as though a weight were pulling the hand and arm down. Would you estimate that *an onlooker* would have observed that your hand lowered at least six inches before the time you were told to let your hand down deliberately)?

Circle one: A. My hand had lowered at least six inches by then.

B. My hand had lowered less than six inches by then.

IV. ARM IMMOBILIZATION (RIGHT ARM)

You were next told how heavy your right hand and arm felt and then told to try to lift your hand up. Would you estimate that *an onlooker* would have observed that you did *not* lift your hand and arm up at least one inch (before you were told to stop trying)?

Circle one: A. I did *not* lift my hand and arm at least one inch by then.

B. I did lift my hand and arm at least an inch or more by then.

V. FINGER LOCK

You were next told to interlock your fingers, told how your fingers would become tightly interlocked, and then told to try to take your hands apart. Would you estimate that *an onlooker* would have observed that your fingers were incompletely separated (before you were told to stop trying to take them apart)?

Circle one: A. My fingers were still incompletely separated by then.

B. My fingers had completely separated by then.

VI. ARM RIGIDITY (LEFT)

You were next told to extend your left arm straight out and make a fist, told to notice it becoming stiff, and then told to try to bend it. Would you estimate that *an onlooker* would have observed that there was less than two inches of arm bending (before you were told to stop trying)?

Circle one: A. My arm was bent less than two inches by then.

B. My arm was bent two or more inches by then.

VII. MOVING HANDS TOGETHER

You were next told to hold your hands out in front of you about a foot apart and then told to imagine a force pulling your hands together. Would you estimate that *an onlooker* would have observed that your hands were not over six inches apart(before you were told to return your hands to their resting position)?

Circle one: A. My hands were not more than six inches apart by then.

B. My hands were still more than six inches apart by then.

VIII. COMMUNICATION INHIBITION

You were next told to think how hard it might be to shake your head to indicate "no", and then told to try. Would you estimate that *an onlooker* would have observed you to make a recognizable shake of the head "no"? (That is, before you were told to stop trying.)

Circle one: A. I did *not* recognizably shake my head "no".

B. I did recognizably shake my head "no".

IX. EXPERIENCING OF FLY

You were next told to become aware of the buzzing of a fly which was said to become annoying, and then told to shoo it away. Would you estimate that *an onlooker* would have observed you make any grimacing, any movement, any outward acknowledgement of an effect (regardless of what it was like subjectively)?

Circle one: A. I did make some outward acknowledgement.

B. I did *not* make any outward acknowledgement.

X. EYE CATALEPSY

You were next told that your eyelids were so tightly closed that you could not open them, and then you were told to try to do so. Would you estimate that *an onlooker* would have observed that your eyes remained closed (before you were told to stop trying)?

Circle one: A. My eyes remained closed.

B. My eyes had opened.

XI. POST-HYPNOTIC SUGGESTION (TOUCHING RIGHT EAR)

You were next told that after you were awakened you would hear a tapping noise at which time you would reach up and touch your right ear. You were further informed that you would do this but forget being told to do so. Would you estimate that *an onlooker* would have observed either that you reached up and touched your right ear, or that you made any partial movement to do so?

Circle one: A. I made at least an observable partial movement to touch my right ear.

B. I did *not* make even a partial movement to touch my right ear, which would have been observable.

CONTINUE ON NEXT PAGE

YOU MAY NOW REFER TO EARLIER PAGES
BUT PLEASE DO NOT WRITE ANYTHING FURTHER ON THEM

SECTION ON INNER, SUBJECTIVE EXPERIENCES

(1) Regarding the suggestion of EXPERIENCING A FLY – how real was it to you? How vividly did you hear and feel it? Did you really believe at the time that it was there? Was there any doubt about its reality?

(2) Regarding the two suggestions of HAND LOWERING (LEFT) and HANDS MOVING TOGETHER – was it subjectively convincing each time that the effect was happening entirely by itself? Was there any feeling either time that you were helping it along?

(3) On the remainder of this page please describe any other of your inner, subjective experiences during the procedure which you feel to be of interest.

CONTINUE ON NEXT PAGE

HGSHS - SUBJECTIVE RATING SCALE

You have just completed the Response Booklet of the Harvard Group Scale of Hypnotic Susceptibility (HGSHS). For each test item, you were asked to comment on whether an *onlooker* would have judged that you successfully achieved the suggested *behaviour* (e.g. your head falling forward by at least 2 inches).

This scale asks you to rate the degree to which you *experienced* the effects that each item suggested (e.g. how heavy your head *felt*).

For each item, please rate the extent to which you experienced the suggested state of affairs by circling the appropriate number. The meaning of each of the numbers is:-

0 = not at all 1 = slightly 2 = to a moderate extent 3 = fairly strongly 4 = to a great extent

1)	Head falling	0 - 1 - 2 - 3 - 4
2)	Eye closure	0 - 1 - 2 - 3 - 4
3)	Hand lowering	0 - 1 - 2 - 3 - 4
4)	Arm immobilisation	0 - 1 - 2 - 3 - 4
5)	Finger lock	0 - 1 - 2 - 3 - 4
6)	Arm rigidity	0 - 1 - 2 - 3 - 4
7)	Moving hands together	0 - 1 - 2 - 3 - 4
8)	Communication inhibition	0 - 1 - 2 - 3 - 4
9)	Experiencing of fly	0 - 1 - 2 - 3 - 4
10)	Eye catalepsy	0 - 1 - 2 - 3 - 4
11)	Post-hypnotic suggestion (touching right ear)	0 - 1 - 2 - 3 - 4
12)	Post-hypnotic amnesia	0 - 1 - 2 - 3 – 4

THANK YOU FOR YOUR COOPERATION

APPENDIX I: "HYPNOSIS SCRIPT FOR THERMOREGULATION PROJECT"
(Used During the Experiments by Dr. Val Walters)

1. INDUCTION AND SUGGESTIONS (APPROX 20 MINUTES)

Induction:

Just sit comfortably in the chair and rest your hands on your lap.

Now look at your hands and find a spot on either hand .....now just focus on it. It doesn't matter which spot you choose..... just select a spot to focus on. I shall refer to the spot which you have chosen as the target. That's right... hands relaxed ...looking directly at the target. Just look at the target on the back of your hand. Please look steadily at this..... and while concentrating on the target pay attention to my voice. Focus your mind on what I ask you to think about – keeping your gaze fixed upon the target as I speak. If you find your mind wandering at any time just bring your thoughts back to the target and to my words.

1min

Continue to look at the target. As you do so your eyes will feel tired and they will shortly start to close. Breathe gently and easily .....and as you breathe out..... and relax more and more.....your eyes will begin to close..... all by themselves. Just let this happen .....and when your eyes have fully closed you will begin to feel very relaxed. Breathe in and out..... and each time you breathe out you will feel more deeply relaxed – deeply relaxed. Feel the muscles of your face letting go .. and feel the relaxation spreading through your facial muscles into your forehead and into the muscles of your scalp. Feel those muscles letting go ... and feel the relaxation moving through your head .... around... and behind your eyes and into the muscles of your jaw. And the

relaxation continues to move down through your body ....to your neck ....throat, shoulders. Your shoulders feeling limp, heavy and relaxed.

3min

Feelings of relaxation extend along your arms ....down to your elbows .....to your wrists....your hands.....and your fingers. Your arms feel heavy. You feel deeply and peacefully relaxed. Your eyelids are becoming heavier and heavier .... heavier and heavier ..

If your eyelids are now closed they will feel very heavy and if they have not already closed they will do so soon.

Relaxation moves across your shoulders .....into your chest .....spreading like a wave through your body .....moving down to your waist ....and your breathing is easy and regular. Each time you breathe out you go deeper and deeper .....feeling more and more relaxed. Waves of relaxation spread from your waist to your hips ....to your legs ...down to your knees ....to your ankles ....down to your feet .....to your toes. As you become more and more relaxed ... your body may feel heavy ... or perhaps a little numb or tingly. You may begin to have a pleasant feeling of numbness, 'tingliness' and heaviness in your legs and feet ....in your hands and arms ....throughout your body ....as though you were settling deep into the surface beneath you. Your eyelids feel heavy and tired ...

6mins

If your eyelids are closed you will feel them remaining tightly closed ....heavier and heavier. Your eyelids seem weighted down ....pulled down by the weight.

If they are not closed yet, they will begin to close soon as they feel heavier and heavier ... Your eyelids seem weighted down ....pulled down by the weight ....so

heavy ...just allow them to close by themselves now ....let them close now.- Just close your eyes if they have not yet closed.

You are now going to become even more relaxed, and because it's easier to relax with your eyes closed, keep them closed now and feel deeply relaxed ....as you continue to listen to my voice. Just keep your thoughts on what I am saying. Soon I shall begin counting from one to twenty. As I count you will feel yourself going down further ...and further into a deep state of relaxation .....however, you will be able to focus on everything I speak to you about without it disturbing your deep state of relaxation .... And you can find that any background sounds bother you less and less as time goes by – just letting them slip to the back of your mind.

7.5mins

One ....two...down, down into a deep state of relaxation ....**three ....four ....five** ....more and more deeply relaxed **....six .....seven** .....you are sinking deeper and deeper .....**eight ....nine....ten....half way ....eleven .....twelve .....thirteen ....fourteen** .....deeply relaxed ....hearing my voice clearly ...**fifteen ....sixteen ....seventeen** ...**eighteen** ....deeper ....deeper ....more and more relaxed **....nineteen ...twenty** ....deeply relaxed. Just remain in that deeply relaxed state for now

- Just relax deeper and deeper as time goes by.

10mins

<u>Suggestions:</u>

I would like you now to focus on feeling as comfortable as you wish to feel and let the power of your mind maintain your comfort just as you want it to be. Nothing bothering you,..... nobody bothering you, ...any background sounds

not bothering you,..... feeling comfortable in your chair, ...and at just the right temperature. You will continue to maintain a sense of well being and comfort throughout the time that you are in this room.

In a few moments you will be given a task to complete and during this time you will continue to feel as comfortable as you do now..... You will continue to be unbothered by any background noises - just as you are right now,..... you will feel comfortable in the chair – just as you are right now,..... and you will feel the temperature of the room continuing to be as comfortable as it is now.....**just the <u>same</u> temperature as it is right now**. .....
Nothing will change.

1*mins*

In a few moments from now I will ask you to open your eyes.....but you will remain hypnotised. When you open your eyes you will remain hypnotised while another experimenter gives you instructions about completing a questionnaire.....You will complete the questionnaire .....and you will find yourself focussing on the task whilst continuing to enjoy feeling comfortable and relaxed. Even though your eyes will be open you will continue to be <u>un</u>bothered by any background noises - just as you are right now, you will feel comfortable in the chair – just as you are right now, and you will feel the temperature of the room continue to be as comfortable as it is now – **just the <u>same</u> temperature as it is right now**.

13.5mins

Your eyes will be open but your comfort will remain the same..... just as it is right now .....you will continue to be unbothered by any background noises, you will feel comfortable in the chair – just as you are right now, and you

will feel the temperature of the room continue to be as comfortable as it is now – **just the same temperature as it is right now.**

Remember that you will remain hypnotised when you open your eyes, and you will remain hypnotised when the other experimenter speaks to you **and** whilst you complete the questionnaire

Please open your eyes now and complete the task in front of you..... remaining as relaxed and comfortable as you are now.

15.00mins

2. THIRTY MINUTE TASK TAKES PLACE HERE

3. ALERTING (APPROX 5-10 MINUTES)

(After the 30 minute task period):

I would like you now to close your eyes to begin the process of coming out of your trance. Just focus now on the chair that you are sitting on – feel the weight of your body pressing down against the plastic chair .....in the room here at UCL with the shiny metal walls and the grey metal floor. I would like you to focus on the – the [sunny / rainy etc] day outside and what you will be doing when you leave this room. Think now of what you will doing when you leave this room..... When I count you back from 3 through to one you will feel wide awake refreshed and alert and any remaining drowsiness which you may feel will quickly pass.

You may like to stretch your arms and legs when you open your eyes.

So ready now..... 3, 2, 1 open your eyes when you are ready.

2 mins

END OF THE EXPERIMENT

APPENDIX J: "THERMAL COMFORT QUESTIONNAIRE"

CONSENT FORM

- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.

- I agree to take part in the above study and the specific experiments. I understand what is being asked of me.

Name of Participant **Date** **Signature**

QUESTIONNAIRE

1. Please state your gender.
   Female Male

2. What is your age? |_|_|_| years

3. How tall are you? |_|_|_| cm

4. What is your weight? |_|_|_| kg

5. What is your ethnicity? _____

6. Where are you sitting?
   Middle Left/Right

7. How do you feel right now?
   Cold (-3) Cool (-2) Slightly cool (-1) Neutral (0) Slightly warm (1)
   Warm (2) Hot (3)

8. What is your marital status?

   1. Married, living together with spouse
   2. Married, separated from spouse
   3. Single
   4. Divorced
   5. Widowed
   6. You live together with a steady partner

9. What is your current employment status?

   1. Full time work
   2. Part-time work
   3. Student / Pupil
   4. Pensioner
   5. Unemployed or laid off
   6. Taking care of your household or a family member
   7. Recruit or non-military service
   8. Other

10. What is or was the main profession of your father?

_____

11. Which statement do you think best describes your smoking behavior?

1. I have never smoked
2. I used to smoke
3. I now smoke occasionally
4. I smoke daily less than 5 cigarettes
5. I smoke daily 5-15 cigarettes
6. I smoke daily more than 15 cigarettes
7. I smoke daily other tobacco products than cigarettes

12. Which statement do you think best describes your alcohol consumption?

1. I have never been drinking
2. I used to drink
3. I now drink occasionally
4. I drink daily 1 or 2 glasses of alcoholic beverages
5. I drink daily 3-4 glasses of alcoholic beverages
6. I drink daily more than 4 glasses of alcoholic beverages

13. What did you do before entering the room? (1 or 2 hours before)

Resting Walking Exercise Reading

14. Have you been eaten something during these last hours?

Yes No

15. How do you feel right now?

Cold (**-3**) Cool (**-2**) Slightly cool (**-1**) Neutral (**0**) Slightly warm (**1**) Warm (**2**) Hot (**3**)

16. How do you feel about the humidity right now?

Satisfied Unsatisfied

17. How do you feel about the air movement right now?

Satisfied Unsatisfied

18. Is this environment thermally satisfying?

Yes No

19. How do you usually feel at home?
Cold (-3) Cool (-2) Slightly cool (-1) Neutral (0) Slightly warm (1)
Warm (2) Hot (3)

20. Do you think that the temperature rises, falls or remains constant?
Rises Constant Falls

21. Is there a difference between the local temperature of hands and feet and your mean body temperature? (If yes, are they cold or sweaty?)
Yes No

22. Would you like a warmer or a cooler environment?
Warmer No change Cooler

23. Which statement do you think best describes your amount of sport or physical exercise (both at work and during leisure time)?

1. I have never been doing sport / physical exercise
2. I used to do sport / physical exercise
3. I now occasionally do sport / physical exercise
4. I frequently do sports / physical exercise on moderate level
5. I frequently do sports / physical exercise on intense level

24. How many hours per day do you in average spend out of your dwelling?
(Please write number from 0 to 24 hours)

(workdays) |__|__| hours
(week-ends) |__|__| hours

25. Some say that by helping others you help yourself in the long run. Do you agree?
No, not much Yes, very much
1 2 3 4

26. Do you help out a local group as a volunteer?
No, not at all Yes, often (at least once a week)
1 2 3 4

27. Do you feel safe walking down your street after dark?
No, not much Yes, very much
1 2 3 4

28. Do you agree that most people can be trusted?

No, not much Yes, very much
1 2 3 4

29. If someone's car breaks down outside your house, do you invite them into your home to use the phone?
No, not at all Yes, definitely
1 2 3 4

30. Can you get help from friends when you need it?
No, not at all Yes, definitely
1 2 3 4

31. Does your area have a reputation for being a safe place?
No, not at all Yes
1 2 3 4

32. Does your local community feel like home?
No, not at all Yes, definitely
1 2 3 4

33. In the past week, how many phone conversations have you had with friends?
None Many (at least 6)
1 2 3 4

34. How many people did you talk to yesterday?
None at all Many (at least 10)
1 2 3 4

35. Over the weekend do you have lunch/dinner with other people outside your household?
No, not much Yes, nearly always
1 2 3 4

36. Do you think that the temperature rises, falls or remains constant?
Rises Constant Falls

37. Do you think that the humidity is changed or it remains constant?
Changed Constant

38. Do you think that the air movement inside the chamber has remained the same or it has been changed?
Changed Same

39. Are there any odours inside the chamber?
No Yes

40. Please circle any of the next phrases that you feel that describes better the specific environment:

lack of fresh air

mold odor

other noticeable odors

describe:_____

dust in the air

visible mold

other

specify:_____

41. Would you like a warmer or a cooler environment?
Warmer No change Cooler

42. How do you usually feel at home?
Cold (-3) Cool (-2) Slightly cool (-1) Neutral (0) Slightly warm (1)
Warm (2) Hot (3)

43. How long did it usually take for you to fall asleep during the past 4 weeks? (Circle one)

1. 0-15 minutes
2. 16-30 minutes
3. 31-45 minutes
4. 46-60 minutes
5. More than 60 minutes

44. On average, how many hours did you sleep each night during the past 4 weeks?

Write in numbers of hours per night □__□__□

45. Has your sleep been disturbed by noise during the past 4 weeks?
Yes No

46. During the past month, did you feel tired?

1. All of the time
2. Most of the time
3. A good bit of the time
4. Some of the time
5. A little of the time
6. None of the time

47. During the past month, have you felt particularly nervous?

1. All of the time
2. Most of the time
3. A good bit of the time
4. Some of the time
5. A little of the time
6. None of the time

48. Are you allergic to anything? If yes, list and indicate symptoms.

_____

_____

49. Do you suffer from a chronic respiratory problem? (e.g. asthma, emphysema, bronchitis). Please explain.

_____

_____

50. Do you currently use any medication regularly? Yes No

If yes, how long have you been taking this medication? _____

51. During the past month, did you have lots of energy?

1. All of the time
2. Most of the time
3. A good bit of the time
4. Some of the time
5. A little of the time
6. None of the time

52. Did you have low self esteem every day for a period of two weeks or more?

Yes No

53. If you disagree with what everyone else agreed on, would you feel free to speak out?

No, not at all		Yes, definitely	
1	**2**	**3**	**4**

54. If you have a dispute with your neighbours (eg, over fences or dogs) are you willing to seek mediation?

No, not at all		Yes, definitely	
1	**2**	**3**	**4**

55. Do you think that multiculturalism makes life in your area better?

No, not at all		Yes, definitely	
1	**2**	**3**	**4**

56. Do you enjoy living among people of different life styles?

No, not at all		Yes, definitely	
1	**2**	**3**	**4**

57. What is your estimate about the current temperature in the chamber is it comfortable or not?

Comfortable Uncomfortable

58. How would you rate your thermal comfort right now?
Cold (**-3**) Cool (**-2**) Slightly cool (**-1**) Neutral (**0**) Slightly warm (**1**)
Warm (**2**) Hot (**3**)

59. Do you think that the temperature inside the chamber is still the same or is it changed?
Same Changed

60. How do you feel about the air movement?
Satisfied Unsatisfied

61. Would you prefer the environment to be warmer, cooler or as it is right now?
Warmer Cooler No Change

You will wait for five minutes before you will be allowed to get out of the chamber.
Thank you for your patience.

APPENDIX K: "INTERVIEW QUESTIONNAIRE"

NAME OF PARTICIPANT:

INTERVIEW

1. How did you felt about the hypnosis experience? Do you think that you were successfully hypnotised?

2. Have you noticed that the temperature increased during the experiment?

3. Do you think that the hypnotism helped you feel thermally comfortable?

4. Do you have any further comments about your experience?

Thank you for your cooperation

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