ARCHITECTURE IN THE ERA OF TERROR:

DESIGN AND PERCEPTION OF SECURITY IN TWO SOCIETIES

A Dissertation

by

GALI ZILBERSHTEIN

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2009

Major Subject: Architecture

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Approved by:

Chair of Committee,	Andrew D Seidel
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ABSTRACT

Architecture in the Era of Terror:

Design and Perception of Security in Two Societies. (May 2009)

Gali Zilbershtein, B. Arch., Technion - Israel Institute of Technology

Chair of Advisory Committee: Dr. Andrew D Seidel

This dissertation falls in the realm of environmental behavior and focuses on the role of the built environment in influencing responses to threats to personal security associated with terrorism. The research integrates pertinent knowledge from psychology, architecture and security/terrorism into a cohesive conceptual framework.

Based on the conceptual framework, this work examined the effects of levels of terrorism threat (high vs. low) on people who face public buildings (city hall or shopping mall) that vary in their façade and entrance designs (solid exterior vs. glass façade with/without designed vs. temporary access control security measures). The research was conducted in two societies that are different in their experience with terrorism (Israel and Texas). The effects were measured along four dimensions: how much the issue of terrorism threat is on a person's mind, how safe and how anxious the individual feels, and how likely he/she is to use the building.

The investigation consisted of three quasi-experiments and a pretest survey and employed a computer-based web driven platform. A total of 1071 undergraduate students from College Station, Texas and Tel Aviv, Israel participated in these studies.

The results illustrate the predominance of the levels of threat of terrorism in influencing all the examined security-related responses. The characteristics of buildings affected those responses to some extent. Differences between the two societies were found mainly in relation to the building-uses. Participants of the two societies responded similarly to the design elements of buildings. In conditions of low threat of terrorism participants from both societies had a higher sense of security when they were exposed to a glass façade compared to a solid concrete façade. In high terrorism threat, participants from both societies felt safer, and were more inclined to use a building with a solid façade. However, when access control security measures were visible to participants in the approach to the building (regardless of their design), both façade designs elicited a similar sense of security, while the propensity to enter the building was higher towards a glass façade.

The study concludes with a discussion of the implications of the results for architectural design.

DEDICATION

This dissertation is dedicated to my family and friends

– near and far, old and new –

who have supported me throughout this incredible journey.

To my parents, Ora and Yair,

for 34 years of caring love, hard work and devotion,

and their commitment to helping me reach all of my dreams.

To Anat and Nehemia

for opening their home and hearts to me,

for keeping me focused and carrying me through this process.

To my husband, Uri,

for his love and belief,

and for sharing with me his spark and energy.

To my daughter, Maya,

my heart.

ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. Andrew Seidel, for his guidance, support and friendship. Dr. Seidel had continuously challenged me throughout the course of this research to achieve a productive and valid scholarly work. He has made this an unforgettable endeavor for me. I thank him for teaching me valuable lessons and I look forward to collaborating with him on future projects.

I thank all my committee members for their time and assistance. Dr. Michael Lindell for his rigorous academic input, Dr. Roger Ulrich for sharing his knowledge and research experience, and Prof. John Greer for contributing real-world understanding and supporting my work since day one.

I would like to thank the Department of Architecture and the College of Architecture at Texas A&M University for their financial support during my years at the university. The assistantships and travel awards that I received helped me maintain a wonderful life in College Station and allowed me to present my research at different conferences around the world. I want to give special thanks to the 2003-2004 William Wayne Caudill Research Fellowship committee for honoring me with their fellowship, the Department of Architecture for awarding me with the Best Overall Project Award at the 2003 Graduate Research Student Symposium, and The Melbern G. Glasscock Center for Humanities at Texas A&M University for awarding me with their Research Travel Grant.

I would like to extend my gratitude to all of my friends and colleagues at the College of Architecture for making my time at Texas A&M University a great experience. I would like to thank Prof. George Mann for inviting me to College Station and opening the door to a new life. A special thanks goes to Prof. Tom Regan for taking me under his wing. I am grateful for his trust. Working with Prof. Regan has advanced my skills and knowledge, and made my days at Texas A&M University interesting, diverse and enjoyable.

My love and appreciation goes to all of my family and friends in Israel and in the USA. I would like to thank them for being my well of aspiration and giving me fortitude. The continuous connection to them has recharged my emotional, mental and spiritual batteries often.

I thank my parents, Ora and Yair, from the bottom of my heart, for their love and support. It is their dedication, hard work and encouragement that have made me into who I am, and brought me to where I am today. I will always cherish their wise advice at the crossroads of my life and their unconditional support, even when I chose the road less traveled. I hope to continue in their footsteps and provide the same support for my family.

I would like to thank my brother Itai, his wife Tami, their children, and my brother Shay for their continuous support. I am grateful for their love and devotion and thank them for providing me with the relief I needed at times.

I want to extend my thanks to all of my aunts, uncles, and cousins who kept in touch despite the distance.

My deepest gratitude goes to the extended Geva family, as they not only made College Station feel like home to me, but were central to the successful completion of this dissertation.

I thank Anat and Nehemia for accepting me as their own. I want to thank and recognize them for being my counselors and guides and for assisting me on so many different levels. Without their support this dissertation would have never been completed. I am forever in their debt.

I want to thank Roni and Rick for their love and friendship, and Roni for her assistance in proofreading some of my writings.

I would like to thank my husband, Uri, for his love, his patience and his unconditional support. His belief in me throughout the course of this research has kept me going. I thank him for lifting up my spirit when it was down, devoting his time and energy to providing me with the time I needed on nights and weekends, and for being the best father to Maya.

Finally, I thank Maya, my daughter, for brightening my days and bringing a healthy perspective to life.

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CHAPTER I

INTRODUCTION

This dissertation investigates the reactions of people to threats of terrorism, and how characteristics of the built environment may mediate these reactions. Though, before plunging into the topic, it may be useful to employ an interesting analogy that helps provide a perspective to the nature of the threat and its effect on people.

de Becker (2002) describes a study that was conducted in the 1960s that sought to determine which single word has the greatest psychological impact on people. Out of many words that were presented to the study participants (e.g., spider, snake, death, rape, murder, etc.), the word *shark* elicited the greatest fear response (the survey was conducted before the book or movie *Jaws*). "Why do sharks, which human beings come in contact with so rarely, frighten us so profoundly?" de Becker inquires, and replies: "The seeming randomness of their strike is part of it, the lack of warning, the fact that such a large creature can approach silently and separate body from soul so dispassionately. To the shark, we are without identity, we are no more than meat, and for human beings the loss of identity is a type of death all by itself." (de Becker, 2002:49)

With this in mind, de Becker continues and posits that "[as] with the shark attack, seeming randomness and lack of warning are the attributes of terrorist violence we fear most. Like sharks, some terrorists view us without identity; not as individuals but just as

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This dissertation follows the style of *Journal of Architecture and Planning Research*.

victims. Though there is no single strategy for avoiding terrorism, everything you need to know to be safe from sharks can be spoken in five words: Don't go in the ocean. So perfect a precaution, and yet the overwhelming majority of people frolic in the waves, having determined the odds of a shark attack are acceptably low and trusting that if they receive a signal of danger they'll heed it. They have chosen to compartmentalize the reality of sharks—and to go on with life rather than remain in a state of fear" (de Becker, 2002: 49). Is that what happens in the case of terrorism? Do people compartmentalize their fear and go on with their lives trying to ignore it, or do they adjust their lives to the threat, trying to avoid the places that they perceive as prominent targets of terrorism? And if they search for signals of danger in the environment—what are they?

Trying to further clarify how people perceive the threat of terrorism, we find that, though it is not a new threat to humanity, the literature considers the collapse of the twin towers on September 11, 2001, as a turning point in history, comparing it with the collapse of the Berlin Wall on November 9, 1989: "No one, apart from the few people who plotted and carried out these events, could have anticipated that they were going to happen. But from the moment they did happen, everyone acknowledged that everything had changed." (Gaddis, 2001:3). Correspondingly, Paul Bracken (2001) describes this new age as the era of "think the unthinkable".

These statements convey some of the effect that the threat of terrorism has on people, despite its relative rarity. Indeed, there is evidence to suggest that terrorism is one of the most dreaded man-made hazards (Slovic, 2000). And while no single, universally accepted definition of terrorism exists, terrorism, according to all, refers to a premeditated act of violence against persons or property, staged to intimidate an audience, in furtherance of political or social objectives (US Department of Justice, FBI, 1999; Combs, 2000; Pillar, 2001).

In the face of this amplified political threat, that targets the global society, and threatens the physical as well as the psychological well-being of people, we must ponder the role of architecture and the design profession in general, and particularly with relation to terrorism.

Any serious considerations of the social and psychological aspects, as well as issues of security and their relation to the design of the physical environment confront us with political and cultural values. Seidel's article on the importance of the physical environment in peace negotiations is one of the first attempts to "gain an understanding of how the physical environment can facilitate political objectives" (1978:23). In addition, this study presents a good example for testing theoretical hypotheses, which stem from a comprehensive review of relevant areas in the social-psychological literature, on real events of peace negotiations that have taken place in history.

So, what are the political objectives that drive the design profession today, in the face of the threat of terrorism? While it seems as though security is first on the list of priorities, other voices are heard as well. At the symposium "Freedom Without Fortresses? Shaping the New Secure Environment" held at the National Building Museum in Washington, D.C., on November 27, 2001, architects were called to resume their professional responsibilities of building communities, and to not cave to market-driven objectives, like security (Johnston, 2002). "Architecture is inescapably a political art and it reports faithfully for ages to come what the political values of a particular age were. Surely ours must be of openness and fearlessness in the face of those who hide in the darkness. A precaution, yes. Sequester, no" (Czarnecki, 2002).

With the technological advances that we have today, there might be ways for architecture to bridge the objectives of security and of a seemingly open society. Though, do people need a design that does not look secure from terrorism?

This brings us to a more basic discussion of the role of architecture. As the literature indicates, one of the challenges of architecture is to grant the users of the built environment with comfortably usable designs. One dimension of comfort is physical: designs should provide conditions adequate for activities, and protect the human body. The second dimension of comfort is psycho-emotional, which among other things, relates to creating a sensation of feeling safe and protected (Holahan, 1982; Saarinen, 1976; Stamps, 1997). These studies speak of security as an integral aspect of a design that is attuned to human needs. Still, there is research to suggest that prior to September 11th, the culture of architects and planners around the world has not considered security as a required condition that contributes to the creation of a successful design (Seidel, *et al.,* 2006).

Since 2001, the concern for and interest in terrorism has greatly increased. This recent trend is manifested in the numerous publications that claim to address how to gear the built environment against the threat of terrorism (e.g., AIA, 2001, 2004; FEMA 2003a, 2003b; GSA, 2003; Nadel, 2004). The efforts to counter terrorism in the built environment, on which the literature elaborates, specifically target the provision of physical security from terrorism. The majority of these sources posit a policy in which innovation and technology are used “to make security enhancements as transparent to the general public as possible”, while at the same time meeting established security standards (Nadel, 2001).

Is this the right answer to what people need? Do people need to see the security measures in order to feel more secure? These questions raise the paradox of security, especially as we consider the threat of terrorism. A transparency of the security measures that educates and informs the public may also inform the potential terrorists that have the capability to adapt and change their tactics accordingly, and by that reduce the actual level of security. In addition, while the use of extensive security measures may initially deter terrorists, it also conveys that there is something important to protect. Hence, it might make the facility a more attractive target for terrorism. As a result, the public may understand all of this, and consequently become more alert and frightened rather than calm.

To date, no research has directly tested the psychological implications of architectural design on people’s perceptions within the context of a terrorism threat. The above discussion sets the stage for a needed inquiry: Do characteristics of the built environment influence perceptions of security in today’s reality of global terrorism? If so, what are these characteristics and how do they affect the users of the environment?

1.1 The Research Objective

In the attempt to add new and significant knowledge to the nexus of *architecture - security - human behavior*, this research focuses on the effects of the function and image of buildings on how people from different societies respond to threats to personal security associated with terrorism. The investigation centers on how current security threats, familiarity with such threats, building-uses and the visual elements of a building affect how important the issue of a terrorism threat is in the respondent's mind, how safe and how anxious the respondent feels, and how likely the respondent is to use the environment.

1.2 Significance of the Research

The main significance of this research is in its contribution to the body of knowledge in addressing a question that has not been addressed to-date: what is the role of the built environment in influencing people's perceptions of security from terrorism and their consequential responses.

The review of the extensive literature that connects environment and behavior further substantiates the importance of the research question. The literature indicates that the paradox of security is directly related to people's active role in the search for stress inducing stimuli (Goffman, 1971; Holahan, 1982). In order to survive, humans have always had to assess whether events or circumstances might benefit or threaten their well-being (Nasar, 1997; Kaplan, *et al.*, 1998). The physical environment stimulates the human perception (Altman, 1975), and therefore is essential to the way a user of a space evaluates its defensible aspect (Barker and Page, 2002; Tijerino, 1998).

The literature offers an abundance of terms and explanations to the process by which a person is influenced by the surrounding environment. This process is commonly regarded as consisting of a few basic interlinked stages: direct physiological perception of stimuli; cognitive appraisal of the situation which includes potential activation of the emotional system (Geva and Skorick, 2002) and associated physiological responses, (Ulrich, *et al.*, 1991; Ulrich, 1993); and finally, the resulting behavior (Holahan, 1982; Barker and Page, 2002). In addition, the literature links the physiological responses (e.g., elevation of blood pressure due to stress) directly to a person's health and level of well-being (Ulrich, *et al.*, 1991; Ulrich, 1993).

With this in mind, this research originated with the desire to find ways by which designers can attend to people's health and well-being on all levels, physically and psycho-emotionally. "By isolating the types of potential threats and addressing each as a design dilemma, imaginative solutions can produce buildings that enhance our feeling of well-being while simultaneously providing protection" (Ivy, 2002:15).

Still, the same idea brings up questions regarding the ethical implications of this research. Facing the danger of terrorism, should designers create environments that make people feel better? Is it morally acceptable to design buildings that reduce the fear of terrorism and attract people, when such a threat exists? Or, should we strive for designs that make people keep away from vulnerable buildings and possible targets?

Recognizing this dilemma, and without making a moral judgment on what should be done, this research focuses on the basic question that stands behind it: Can the built environment alter people's perception of security from terrorism?

Along with focusing on a question that had not been addressed to-date, the significance of this research is further strengthened by its interdisciplinary nature: combining the domain of human perception, the realm of architectural design for security, and characteristics of the specific threat of terrorism. The research, based on a thorough review of all of these subject areas, proposes a basic, general conceptual model that outlines the main factors that play a role in influencing individuals' perceptions of security from terrorism in the built environment. Based on the specific elements of the proposed model, this research examines cross-cultural patterns of reactions to the global threat of terrorism in general, and specifically as related to conceptual and visual characteristics of the built environment.

Moreover, the research develops and implements a rigorous methodology to empirically test and illustrate the conceptual model and its hypotheses. The methodology employs experimental and survey designs that were meticulously planned, using the latest tools and platforms. The methodology outlined in this study sets the stage for additional inquiries regarding various design elements and how they influence people in the context of international terrorism.

1.3 Structure of the Dissertation

The dissertation is composed of six chapters, including the introduction as the first one. Chapter II consists of a comprehensive literature review. As this topic requires a blend of knowledge from different domains, the literature review includes three sections:

(a) *Human perception, cognition and consequential behavior in relation to the built environment and issues of security.* The review in this section concentrates on pertinent knowledge regarding existing theories on human perception in general and specifically with regards to aspect of security, and discusses the processes of human reaction. This section in the literature review illustrates why it is important to consider the users' point of view, especially in the face of the threat of terrorism. It shows the types of reactions that should be taken into account. Finally, it indicates what factors should be considered as influencing these reactions. The discussion of people's perception of security sets forth important issues that need to be considered as we review the nature of the global threat of terrorism and the ways by which architecture responds to it.

(b) *Terrorism – Assessing the threat to the built environment and to its end users.* This second part of the literature review discusses the character of the threat, its manifestation in different parts of the world, what the potential targets are, and what aspects in the environment can influence the vulnerability to it. The review will define the threat and its unique qualities with regards to the built environment and to the users of the environment.

(c) *The built environment as a response to the threat.* The third part of the literature review, informed by the first two sections, includes a thorough review of the history of architecture and security that concludes with an examination of the current policies that are specific for dealing with the threat of terrorism. The review extracts key concepts and strategies that are pertinent for achieving a secure environment while places the significance of this research in the context of history. This analysis helps with the specifications of the architectural elements addressed in the study.

Following the literature review, Chapter III of the dissertation presents the theoretical framework, which extracts from the literature review key factors that account for how architecture mediates humans' reactions to the threats of terrorism. The chapter presents a conceptual model and derived hypotheses, as well as a discussion of the limitations of the model.

Chapter IV of the dissertation details the research methodology. The chapter discusses the general ideas behind the method of the investigation and the overall research design. It notes advantages as well as limitations. The chapter details the stages of the study, and entails each stage's specific goals, design, material and procedure, and lastly—the statistical analyses that are performed.

Chapter V focuses on the results of the statistical analyses of the data that were collected in each stage of the investigation. The analysis of the results is presented in five major sections. The first concentrates on the results of a pretest study that was used for the appraisal of an instrument that is used in the main investigation. The following three sections are focused each on a phase of the main investigation. Due to the relative complexity of the design, the review of each stage of the study presents the objectives of the specific examination and the hypotheses that were tested, provides a quick review of the design of that stage, elaborates on its results, and presents a discussion of them. The last section of this chapter summarizes the findings of the main investigation.

The final chapter of the dissertation, Chapter VI, presents a summary of the research as well as conclusions. The chapter discusses the research question, the formation of the conceptual model, its components and related hypotheses. The chapter provides a short review of the methodology and follows with a synopsis of the main findings of the research. Furthermore, the chapter discusses possible explanations of the results of the study and suggests their potential implications. The discussion expresses the limits of the conclusions as well as directions for future research.

CHAPTER II

LITERATURE REVIEW: THE THREAT OF TERRORISM, THE BUILT ENVIRONMENT AND THE END USERS*

This chapter provides a first step towards a better understanding of the interesting assay: terrorism threat - physical environment - users of the environment. The link between any threat, the design of the environment and people who use it presents a challenge to the architecture and planning realm. This challenge is rooted in the general, yet important, objective to grant the users of the built environment with comfortably usable designs. One dimension of comfort is physical: when design provides conditions adequate for activities, and acts as a line of defense for the human body (Saarinen, 1976). The second dimension of comfort is psycho-emotional (Holahan, 1982; Stamps, 1997). There are many aspects to this psycho-emotional comfort and they involve issues of aesthetics, satisfaction with the effectiveness of the design to comply with personal and functional needs, and with feeling safe and protected in the built environment. These different aspects of the psycho-emotional comfort are interrelated, and both physical and psycho-emotional comforts are inherently associated with aspects of security (Saarinen, 1976).

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* Part of the data reported in this chapter is reprinted with permission from: (a) "Architecture and terror in a historical perspective: The role of impediment and deterrence" by G Zilbershtein. 2006. *ARRIS.* Volume 17. 53-63. Copyright 2006 by the Southeast Chapter of the Society of Architectural Historians, SESAH; and (b) "Architecture in the era of terror: The security dilemma" by G Zilbershtein. In *Safety and security engineering, SAFE 2005 proceedings.* 805-817. CA Brebbia, T Bucciarelli, F Garzia, and M Guarascio (Eds.). 2005. WIT Press. Southampton, UK. Copyright 2005 by WIT Press.

While the above studies speak for security as an integral aspect of a design that is attuned to human needs, there is research to suggest that until very recently the culture of architects and planners around the world has usually ignored security as a factor to be addressed in the design of the built environment. Seidel, Holden and Ozdil's study (2006), conducted prior to September 11, 2001, surveyed practicing architects from the United Kingdom, the United States and Australasia on "the knowledge areas they report are needed for successful design". This study does not indicate terrorism, nor security in general, as aspects architects reported themselves to be involved with in their work. A special note needs to be made to the fact that this general pattern was true even for the United Kingdom which had a history of terrorism attacks.

Since 2001, the concern from and interest in terrorism, has greatly increased. This recent trend is manifested in the numerous publications that claim to address how to gear the built environment against the threat of terrorism (e.g., AIA, 2001, 2004; FEMA 2003a, 2003b; GSA, 2003; Nadel, 2004).

The relevant sources on how to secure the built environment from terrorism take upon mostly the points of view of the potential adversary and of the building owner or permanent occupants (AIA, 2004; FEMA, 2003a; 2003b). This perspective is reflected in discussions of tactics and goal of terrorism, and focusing on issues such as insurance premium, life cycle costs, and potential losses. These sources, especially when referring to facilities of public nature, comparatively neglect the third side to this problem – the main users of the environment, the public for whom we design these buildings.

With this in mind, the following review of literature begins with the neglected issue: focusing on the users of the environment (section 2.1). Dealing with the users' perspective, the review examines existing theories on human perception in general and specifically with regards to aspect of security, and discusses the processes of human reaction. This section in the literature review will illustrate why it is important to consider the users' point of view, especially in the face of the threat of terrorism. It will show the types of reactions that should be taken into account. And finally, it will indicate what factors should be considered as influencing these reactions.

The discussion of people's perception of security, in section 2.1, will set forth important aspects that need to be considered as we review the nature of the global threat of terrorism, detailed in section 2.2. This second part of the review discusses the character of the threat, what the potential targets are, and what aspects in the environment can influence the vulnerability to it. The review will define the threat and its unique qualities with regards to the built environment and to the users of the environment.

The third part of the literature review (section 2.3), informed by the first two sections, includes a thorough review of the continuous link between architecture and security. The review includes historical strategies of defense against enemies, as well as modern theories of crime prevention, and ends with examination of the current policies for dealing with threats of terrorism. The discussion extracts key concepts and strategies that have proven as pertinent for achieving a secure environment while places the research as relevant in the context of history. In addition, this part of the literature review will point to the architectural elements that should and can be addressed in the scope of this dissertation.

2.1 Human Perception, Cognition and Consequential Behavior in Relation to the Built Environment and Issues of Security

The following review concentrates on the users of the facility, dealing with the processes of human perception and reaction. This section covers existing theories on human perception in general and specifically with regards to aspect of security and reviews empirical evidence illustrating the importance in addressing the point of view of the users of the environment. The review indicates the types of reactions that should be considered, and what factors play a role in influencing these reactions. The review concludes with a theoretical discussion of risk perception and the paradox of security and how these concepts relate to the threat of terrorism. This discussion sets the stage for the next section which focuses on the characteristics of the threat.

2.1.1 Perceptions of Security: Their Importance and the Involved Processes

Holahan stated that "environmental perception provides the foundation for all of our knowledge about the world around us and for all of our activities in the environment" (1982:31). More specifically to the issue of security, and as according to evolutionary perspectives, evaluation of the surroundings is a principle of survival, vital to humans' existence (Kaplan, *et al*., 1998; Nasar, 1997; Nasar and Jones, 1997). The physical environment stimulates the human perception (Altman, 1975), and therefore is essential to the way a user of a building evaluates its defensible aspect. In fact, Goffman (1971) suggested that people search for signals that convey danger in the built surroundings and their immediate environment. Herzog (1976) specified that familiarity is an important factor in this cue-searching process.

Literature considers threatening cues as stress-inducing stimuli. Stress, or anxiety, as according to Baum, Fleming and Singer (1985) is the process by which an individual responds psychologically, physiologically and often with behaviors, to a situation that challenges or threatens well-being. It has been proven that certain visual stimuli in the environment influence a person's level of stress and the level of high-order cognitive functioning (Ulrich, 1993). Reduction in stress, often regarded as restoration, "involves numerous positive changes in psychological state, in levels of activity in physiological systems and often in behavior or functioning" (Ulrich, *et al.,* 1991). Considering stress and its effect on people, we need to consider that while it may harm a person's levels of functioning and health, when it is associated with detection of threatening cues—it may be beneficial in terms of survival.

With regards to the perception of environmental stimuli and its impact on people and their physical and mental well-being, we need to consider Arousal Theory (Berlyne, 1971). Arousal, in a general sense, denotes the level of psychological and physiological activation. In terms of intensity, this level ranges from drowsiness to extreme excitement. According to the theory, the general level of arousal relates to the individual's physical, emotional and psychological well-being. The relation is a symmetrical curve shaped with middle range arousal coinciding with a high level of well-being. Over time, people seek the middle range arousal by balancing a given emotional state and a newly generated arousal. Consequently, when relaxed, most people prefer more arousing stimuli, while when tensed, people prefer less arousing stimuli (Ulrich, 1979).

Holahan, in his work in the realm of environmental psychology (1982), acknowledges the extensive work that has been carried out by Richard Lazarus and his associates on psychological stress. In Holahan's review of Lazarus's work, he denotes that psychological stress is triggered by the environment as a consequence of three types of cognitive appraisals. "Lazarus defines primary appraisal as a mediating psychological process that discriminates potentially threatening situations from beneficial or irrelevant ones. Secondary appraisal functions to assess the individual's resources for coping with the threatening situation. Finally, reappraisal is a change in the original perception of the situation due to either changing environmental conditions or changes within the person resulting from cognitive coping efforts" (Holahan, 1982:159).

In addition, Holahan (1982) accepts Lazarus and his colleagues' (Folkman and Lazarus, 1980; Lazarus, 1980) proposition that there are two ways to cope with stress: problem-focused coping and emotion-focused coping. "Problem focused coping consists of behavioral or cognitive efforts to deal directly with the source of stress, while emotion-focused coping involves behavioral or cognitive efforts to reduce or better tolerate one's emotional reaction to stress" (Holahan, 1982:192). Originally, the stressors in Holahan's explanation were the environmental conditions that affect our body (e.g., noise, heat, etc.). However, this conceptualization may also hold for other conditions in the physical surroundings that affect a person's perception of a place and its implications for personal security or well-being.

The perceptual processes, as well as the search for familiar cues and the ways to cope implied in the previous literature, resonate with a more updated account of information processing that addresses the simultaneous effects of cognitive and emotional components (Geva and Skorick, 2006). The researchers posit that two interrelated, though distinct, systems are used in the perception and interpretation of the environment: emotional system and cognitive system.

The emotional system consists of clustered and inner-connected structures of discrete and basic emotions. The system, which is binary in nature ('on' or 'off'), is "hard-wired" to rapid changes in the person's physiological state. Furthermore, this system is marked by behavioral impulses or routines ("fight or flight") that are associated with feeling threatened or safe. The emotional system works in sync with the cognitive system. Thus, stimulations of emotions can be caused by external cues or by reference to schema or images (cognitive elements) that are associated with experienced episodes of similar emotions. Hence, perception and interpretation of threatening cues can be triggered directly and immediately via the emotional system or indirectly via retrieval and interaction with the cognitive system and can result in influencing behavior (Geva and Skorick, 2006). The later notion had been validated in Barker and Page's study (2002) of visitor safety in Auckland, New Zealand, which concluded that perceptions of safety are particularly important as they affect people’s behavior.

The abundance of terms and explanations to the stages in the process through which a person is influenced by the surrounding environment can be summarized into several basic interlinked stages: direct physiological perception of stimuli; cognitive appraisal of the situation which includes potential activation of the emotional system (Geva and Skorick, 2006) and associated physiological responses (Ulrich, *et al*., 1991; Ulrich, 1993). These are linked to a general level of well-being (Ulrich, *et al*., 1991; Ulrich, 1993; Berlyne, 1971) and finally, to a resulting behavior (Holahan, 1982; Barker and Page, 2002). The cognitive, emotional, physiological and behavioral responses to the stimuli are ways by which people cope with stressful situations, ways by which they try to reach a middle-range arousal and a high level of well-being.

2.1.2 Perceptions of Security: The Theories Behind

There are two schools of thought with regards to what stands behind people’s perception of security. Some sources identify people’s feelings of security and related responses to environmental stimuli as innate reactions, derived from “the most basic and essential survival-advantageous behaviors of our early ancestors” (Hildebrand, 1999: xv; Appleton, 1975; Orians, 1980, 1986; Ulrich, 1993; Ulrich, *et al.*, 1991). Other sources point out a cognitive process, in which learning shapes a person’s conditioning to security issues (Barker and Page, 2002).

"Evolutionary perspective" refers to the proposition that people today are to some extent biologically prepared to deal with circumstances that are similar to situations that were beneficial or threatening to the pre-modern humans (Ulrich, *et al.*, 1991). Ulrich (1993) distinguishes between two types of 'preparedness': biophilic (positive) and biophobic (negative) responses to certain natural stimuli and their configuration. In this scheme, humans' responses are basically intuitive, even if they have a rational explanation.

Orians's "savanna phenomenon" provides a good illustration for the concept of the pre-modern roots to modern humans' preferences (Orians, 1980, 1986; Ulrich, 1993). It also exemplifies humans' search for environments that diminish threats. According to Orians, savanna environments, compared to other habitats, provided favorable combinations of primary necessities to early humans. Savannas offered more abundant plant and animal food as well as lower risk. Empirical studies have shown that today, people from different origins and ages around the world prefer environments that are savanna like in appearance (Ulrich, 1993; Ruiz and Bernaldez, 1982; Yi, 1992). And in fact, crime prevention theories in the built environment (addressed in detail in section 2.3.2), utilize the basic physical attributes of savannas as factors that facilitate deterrence of adversaries and provide a sense of security to members of the community (Jacobs, 1961; Newman, 1972; Poyner and Fawcett, 1995; Fennelly, 1997; Tijerino, 1998).

The other view proposes an individual-learning case-based scheme. This scheme is closely linked to Herzog and Kaplan's (1976) proposition that familiarity is an important factor in the cue-searching-process. According to Herzog, familiarity is the basis for understanding of any situation at hand. With respect to the issue of security, it influences the assessment of risk and the evaluation of the environment and its qualities as deterring potential offenders or providing opportunity for committing an act. Additional studies have shown that the level of familiarity with a threat and with security influences the perception of personal security (Barker and Page, 2002).

Referring to the threat of terrorism, the above theories bring up important questions. To what extent do people's reactions to the threat of terrorism and to means of protection against it depend on their first hand experience and familiarity with it? Does terrorism have qualities that resemble predatory threats that can elicit innate reactions to it?

2.1.3 Perceptions of Security: Factors of Influence

The two schools of thought on the origins of people's perception of security—the *innate* as well as the *learning* propositions—suggest a complex combination of factors that influence individuals' security related reactions to a certain physical environment.

Barker and Page's study on visitor safety in Auckland, New Zealand (as related to crime) supports the case-based-learning proposition (2002). The study indicates that demographic characteristics of the individual affect his/her relation towards security issues and expectations of security measures. In addition, the study implies that perceptions of safety are influenced by two other variables. One variable is the physical image of the facility and the other is the way the media influences perceptions of risk pertaining to the general area (context) of the facility.

Further qualification of the image and the context factors can be found in Nasar and Jones's (1997) analysis of people's sensitivity to environmental stimuli and the process of understanding the security aspect of the situation at hand. The researchers posit that situations that evoke fear can be analyzed along two levels: "distal" and "proximate" (Nasar and Jones, 1997:292).

2.1.3.1 The Distal Level

The distal level of fear addresses a general worry about the chance of victimization. This worry is associated with the symbolic sense of a place, i.e., the type and function of the building and the context in which it operates (Lang, 1987; Nasar and Jones, 1997; Nasar, 1997).

2.1.3.1.1 Building's Type and Function

The importance of the function of the facility is illustrated in the report "American Society in the Age of Terrorism" (Etzioni, 2002). In this report, sociologist Etzioni explains the decrease in air travel after the September 11 attack as a result of fear. This fear is linked to the function of airport being associated with the risk of terrorism attacks.

For the purpose of this dissertation, it is therefore important to study which building uses are closely associated with incidents of terrorism, and even more essential is the question of which building uses the public perceive as associated with high risk of terrorism.

2.1.3.1.2 Context

The element of context relates to two things. First is the physical context of a facility – the environment surrounding it. The second, which is more relevant to the issue of terrorism threat, is the societal-political context. This aspect of context may indicate whether a certain area is of higher or lower risk of terrorism. The societal-political context has bearings on the level of exposure and experience an individual within the society has with the threat of terrorism and with security measures. This in tern may influence the person's expectations regarding security in certain building uses.

Studying societies with different exposure to the threat of terrorism may show if there is a global innate pattern of reactions to the threat, and to what extent people's reactions to it are based on personal familiarity.

2.1.3.2 The Proximate Level

The proximate level of fear is linked to the search of particular cues that may evoke specific fears. This level relates to either the formal, structural cues of the surroundings, or to social cues that can be detected in a place (Lang, 1987; Nasar and Jones, 1997; Nasar, 1997).

2.1.3.2.1 Physical/Structural Cues

The physical/structural cues of the environment, as being influential on a person's security assessment of a place, are discussed in the literature mainly in the context of the evolutionary perspective, referring to savanna-like environments (Appleton, 1975; Fisher and Nasar, 1992; Holahan, 1982; Kaplan, *et al*., 1998; Nasar and Jones, 1997; Newman, 1972; Tijerino, 1998; Ulrich, 1993). These sources identify and discuss three physical attributes of spaces as having direct influence on people's perception of security: prospect (also appears as visual openness), escape and refuge.

Prospect, or the level of visual openness in the space, refers to two issues. A blocked prospect, or a limited visual openness, refers to the physical concealment the space might offer for potential threats to hide behind and emerge to attack. The extent of visual openness also indicates whether the conditions allow for natural surveillance, where other people can detect that there is somebody in need and can come into the rescue. The attribute of escape refers to whether conditions allow for a quick exit if needed and what are the chances of entrapment. The element of refuge speaks for the level of protection the space appears to provide against an attack. All of these attributes have been adopted as strategies of security from crime, and are discussed in further extent in section 2.3.

In addition to the physical qualities of a space, which relate directly to the issue of security, literature elaborates on general visual qualities that influence a person's arousal level and consequently the stress level. Berlyne's Arousal Theory was first tested on works of art and later on visuals of urban scenes (Ulrich, 1979). The theory contends that the arousal attributes of visual stimuli consist of three properties: complexity, novelty and unity (Berlyne, 1971; Holahan, 1982). Complexity refers to the quantity of independently perceivable visual elements; novelty is the level of unfamiliar visual information, rarely encountered or seen; and unity is the degree of organization, patterning and redundancy in the visual information. Berlyne's theory proposes that complexity and novelty increase the arousal level of the perceiver of the visual while unity decreases it. Consistent with this perspective, studies using abstract, non-environmental visual displays have found a decline in the preferred levels of complexity when individuals are already stressed and anxious (Berlyne and Lewis, 1963).

Additional property, suggested later as also affecting arousal, is the level of incongruity: how inappropriate is the design in its context (Holahan, 1982; Ulrich, 1979). This level originally referred to the physical context of the visual stimuli. However, it can be contended that with regards to the built environment this level can also refer to the conceptual context - the building-use as related to the societal context.

In this sense, the level of congruity is what people from a certain society expect a building to be, based on their past experiences of buildings of similar use. Such expectation can be related to issues of proportions, materials, shapes, operation, as well as to the security measures associated with the facility.

In addition, and with relation to the physical cues (i.e., visual stimuli), it is important to remember that perception of architectural forms is based on experiencing a three-dimensional space. Thus, an intriguing idea is how the physical relationships between the user and the physical environment affect people's judgments of the qualities of a design mentioned above (i.e., prospect, refuge, escape, complexity, novelty, unity and incongruity). Along the Kantian theory which posits that the appearance of an object depends on the location from which it is seen (Stamps, 1997), the perception of security and its consequential responses (feeling and action propensity) depends on what parts of the whole building design is actually viewed by the user. Stamp defined this as a viewshed: "Public viewsheds consists of the locus of points, accessible by the general public from which a project is visible" (Stamps, 1997).

This dissertation focuses on realistic yet simple viewsheds, those that can attest for a person's first encounter with a facility. In addition, the examination of how architectural design influences people in the context of the arousing stress-inducing threat of terrorism, will be conducted while keeping the visual elements of complexity and novelty at minimum and stressing the element of unity. This will help center the investigation on the basic characteristics of the design instead of the details and specific configuration of the architectural element that is used in the examination.

2.1.3.2.1 Social Cues

The "proximate" level of fear also refers to social cues that can be detected in a place (Lang, 1987; Nasar and Jones, 1997; Nasar, 1997). The proposition that people search for social cues that may indicate a threat goes along with profiling the strangers that we see around us and evaluating if they impose a danger to us. In addition, another important aspect to the social cue is the number of people around us and whether they are strangers to us or not. With respect to conventional crime, one stranger can seem threatening (pending on its profile), while a few people in the surrounding environment may facilitate the natural surveillance premise and therefore can be considered as reassuring in terms of personal security (Nasar and Jones, 1997).

Previous studies, in which there was no threat of terrorism and the only possible threat is of 'conventional' crime, show that the presence of other people in a scene increases the feeling of security (Shaffer and Anderson, 1983; Zilbershtein and Seidel, 2004). This tendency was only partially supported considering the threat of terrorism in Zilbershtein and Seidel's study (2004). In that study, in the context of the threat of terrorism, presence of other people at a certain scene assured Texan participants, who present an example of a society that is not used to this threat. Israelis, on the other hand, who represent people that are used to live under the threat of terrorism, felt safer when no people were visible at the scene.

While recognizing the importance of social cues in influencing perception and feeling of security, it has been a conscious decision not to study this factor in the scope of this dissertation research. Nonetheless, the importance of the presence or absence of people was taken into consideration in the creation of the material used for the study (discussed in Chapter IV).

In addition, specific to this dissertation research, which focuses on elements and characteristics of the built environment and their influence on people's sense of security in the context of the threat of terrorism, the social factor has relevance to the nature of the threat and to some general attributes of potential targets. The review of the social-related qualities of the threat of terrorism as well as the social character of potential targets is presented in section 2.2.

2.1.4 Risk Perception, Politics, the Paradox of Security and Terrorism

The importance of the social factor in influencing perception of security had been widely supported in the literature. Herzog and Kaplan (1976), making a distinction between physical danger and social danger, conclude that individuals fear more social danger (e.g., a stranger approaching vs. a dimly lighted street). Correspondingly, other sources state that social incivilities are more strongly linked to perceptions of risk than physical incivilities (LaGrange, *et al.*, 1992; Tijerino, 1998). de Becker (2002) continues with linking a reduction of risk to the sensation of feeling safe. For the latter propositions to work we need to consider what risk is. Lindell and Perry define risk as "a condition in which there is a possibility that people or property could experience adverse consequences" (2004:1). de Becker suggests that feeling safe is being free of "unacceptable risk" (2002:46). The notion of unacceptable risk corresponds with Herzog and LaGrange's observation regarding social dangers. As sources indicate, while people knowingly volunteer for some risks (as car accidents, disease from smoking, poor diet etc.), they object to those that are imposed on them by others (de Becker, 2002; Starr, 1969).

In light of this discussion, the question for this dissertation is how do people perceive the threat of terrorism? A similar question and a further comparison of the perception of terrorism and the perception of other known-to-man-hazards were discussed in Zilbershtein and Seidel (2008). The paper suggests that the proposition that social dangers are considered as more influential than environmental ones is illustrated in the elevated public concern regarding terrorism even though acts of terrorism have produced less damage and casualties than other hazards have, and "the likelihood that any individual will become a victim in most places is microscopic" (Mueller, 2004:2).

In addition, empirical evidence attests that terrorism is one of the most dreaded man-made hazards (Slovic, 2000). This tendency corresponds to what Pidgeon, Kasperson and Slovic (2003) define as the social amplification of risk, which explains the global extensive media coverage given to the subject as well as it's being a first priority on the political agenda all over the world. The low salience of other threats as natural hazards (e.g., earthquakes) has been shown even in regions subject to recurrent dramatic disasters (Lindell and Prater, 2000; Prater and Lindell, 2000).

This discussion brings up the political nature of the subject, as political issues compete for attention and resources (Prater and Lindell, 2000). Literature about hazard risk mitigation encourages policy entrepreneurship, especially in the aftermath of a major event, when a window of opportunity opens for advancement of the subject (Prater and Lindell, 2000). Furthermore, it is recommended to develop public awareness on the different hazards (Prater and Lindell, 2000). This is what has been done with respect to terrorism. However, in the case of terrorism, educating the public about security and preparedness measures and procedures are problematic since they can benefit the terrorists and by that reduce the actual level of security. In addition, over alarming the public of a rare threat such as terrorism can cause a false sense of insecurity, which is one of the terrorists' main goals, and can be economically painful to the society (Mueller, 2004).

The above discussion highlights the paradox bounded in the concept of security which is directly related to people's active role in the search for stress inducing stimuli (Goffman, 1971; Holahan, 1982). The paradox of security holds that a complicated relation exists between the salience of security in a place and how secure a person actually feels in that built environment, "Where security systems assert themselves most forcefully…. fear, discomfort, and danger often flourish. Conversely, the absence of visible protection can promote the feeling of well-being" (Farson in Ivy, 2002:15). According to psychologist Farson, even if security measures may protect people, elaborate security measures may induce fear in the users.

This dissertation investigates the paradox concerning the visual representation of security in the design of buildings and they way people respond to them in the global context of terrorism threat.

Following the above discussion on the elevated public concern for terrorism, the subsequent section will provide a more factual review of the threat, its unique characteristics and an analysis of its relation to the built environment. The review will relate to issues that were pointed out in this section as factors that influence people's sense of security.

2.2 Terrorism: Assessing the Threat to the Built Environment and to the End Users

2.2.1 What Are Terrorism and Counterterrorism?

Terrorism is a very old concept. It can be traced back at least to the ancient Greek and Roman republics, with the assassination of Julius Caesar in 44 B.C (Combs, 2003). The term itself was introduced in the French Revolution and the Jacobin Reign of Terror (1792-1794). And while then it was an instrument of the new revolutionary state to intimidate counter-revolutionists who were considered 'enemies of the people', it has since became associated with anti-state and anti government activities (Combs, 2003; Hoffman, 1998). For comprehensive reviews of the history of terrorism please see the noted sources (Coaffee, 2003; Combs, 2003; Hoffman, 1998; Nadel, 2004; Pillar, 2001).

The literature indicates that there is no single, universally accepted definition of terrorism. Different states, different agencies within a state, as well as various scholars and the terrorists themselves have their own definition of the term. Yet, whether it is perceived as a righteous fight for a higher cause or viewed as an unlawful horrible act, terrorism, according to all, refers to a premeditated act of violence against persons or property, staged to intimidate an audience, in furtherance of political or social objectives (Combs, 2003; Hoffman, 1998; Pillar, 2001; US Department of Justice, FBI, 1999).

In the US, the stated objective of the National Strategy for Homeland Security is to "prevent terrorist attacks within the United States; reduce America's vulnerability to terrorism; and minimize the damage and recover from attacks that do occur" (Homeland Security Council, 2007:3; Parachini, *et al*., 2003). In spite of the relative simplicity of this declaration, addressing the threat of terrorism encompasses a variety of operations on different levels - from active diplomacy to secretive intelligence work, from law enforcement to pre-emptive operations and security measures; all of which range from the intent of prevention to reduction of vulnerability and proactive response (Pillar, 2001). In order to deal with the complexity of the matter, the US strategy for countering terrorism is based on establishment of priorities (Parachini, *et al*., 2003).

In the same light, even only in the realm of the built environment, counterterrorism efforts require rational prioritization. Literature indicates that these efforts include elements of design, structural hardening, technology and operational policies, to help prevent, mitigate and facilitate a desired response in the event of a terrorism attack (Coaffee, 2003; FEMA, 2003; Kozlow and Sullivan, 2000; Nadel, 2004). The necessity to prioritize these efforts is further highlighted when we consider questions of cost, i.e., the level of investment vs. the probable consequences. A basic step to this prioritization is accomplished through the assessment of the specific security needs for a certain place in a certain context.

2.2.2 Assessment of Security Needs

Many sources refer to the analysis by which security needs are defined as a risk assessment. Risk assessment examines the consequences of hostile actions for a building and its occupants. It consists of: (1) threat analysis which defines the level of threat to a facility by evaluating the intent, motivation, and possible tactics of potential offenders; (2) asset analysis that identifies and prioritizes the asset to be protected according to its nature, value, location and how, when, and by whom it is accessed and used; and (3) vulnerability analysis which defines the weaknesses of a facility in its design, construction, operation and location (AIA, 2001).

Over the years, computer applications have been integrated into the risk assessment analysis in the case of conventional crime (e.g., CAPIndex). Such applications calculate a probability assessment of a criminal event for a specific place as related to statistics of categories of crime, based on location and use of the architectural item (Linn, 2002). In the case of terrorism, assessment of risk is an intricate matter. While it seems that the media covers terror attacks around the globe on a daily basis, the actual number of occurrences is quite limited to reach a significant numerical probability for a particular location (Linn, 2002). Inevitably, current statistics of terrorism patterns are only supporters to theoretical risk assessment endeavors and are focused on the type of attacks, the general regions (on a global scale) in which they occur, and the use of the architectural item (function of the places in which attacks take place).

The following three sections follow the three basic components of risk assessment: threat analysis, asset analysis and vulnerability analysis. Yet, instead of applying these analyses to a certain building, they are addressed in this review in a broader sense with the intention to gain a better understanding of the nature of the threat, the potential, most probable targets and of the key components of security. The discussion will relate to the global phenomenon, but also, following the review in section 2.1 on human perception, will look into two more specific political contexts. The two contexts are Israel and the U.S., which represent instances of two societies with different experience with the threat.

2.2.2.1 Threat Analysis

Many sources present various views on different terrorists groups and their motivation (Coaffee, 2003; Combs, 2003; Hoffman, 1998; Nadel, 2004; Pillar, 2001; US Department of State, 1994, 1995, 1996, 1997, 1998, 1999, 200, 2001, 2002, 2003). It is not for this research to speculate or judge whether terrorism is means to an end, utilized for achieving other political, social or religious goals (Kozlow and Sullivan, 2000), or whether it has become “the end in itself” (US Department of Justice, FBI, 1999).

The discussion however, does point out two main issues. First, as recognized by many around the world, terrorism is associated with fear or instigation of it. Empirical evidence attests that terrorism is one of the most dreaded man-made hazards (Slovic,2000). Second, the lethality of terrorism attacks has grown. Statistics from the last twenty years show that while the number of attacks decreased over the years, they have become more lethal (Pillar, 2001; US Department of State, 1994, 1995, 1996, 1997, 1998, 1999, 200, 2001, 2002, 2003). In addition, the fact that terrorism is a tool used by motivated people elevates the unpredictable aspect of it as it has the ability to change and adapt to means of protection.

With direct relation to the lethality of the threat, another factor to consider is the growing number of suicide missions (FEMA, 2003; US Department of State, 1994, 1995, 1996, 1997, 1998, 1999, 200, 2001, 2002, 2003). A specific example to this tendency can be found in Israel where during 2001-2006, out of 140 fatal terrorism attacks that took place within Israel's territory, 84 were suicide missions (MIPT Terrorism Knowledge Base, 2007). The trend of suicide attacks may have an impact on tactics of defense in the built environment, as the risk of being caught in action may not have the desired effect on terrorists that do not fear death. Moreover, even if terrorists are prevented from reaching their ultimate target, the space where they are stopped may suffer the hit. In addition, suicide missions emphasize the social nature of the threat and the fact it is being imposed on the population by other human beings. This, in turn, as discussed in section 2.1.4, contributes to the resentment among the population towards the threat and the social amplification of risk with regards to terrorism.

Referring to the possible tactics of potential offenders, we find that terrorism is manifested in many different forms: assassination, armed assault, hijacking, hostage-taking, bombings, product or air contamination and cyber-terrorism (Kozlow and Sullivan, 2000; US Department of State, 1994, 1995, 1996, 1997, 1998, 1999, 200, 2001, 2002, 2003). In many cases, together with the notion of suicide missions, these different types of attacks involve the incursion of armed terrorists into targets. Multiple simultaneous attacks or sequential attacks in a concentrated area are other factors to be considered.

TABLE 2.1. Worldwide terrorist attacks against the Unites States, by type of events, 1994-2003 (US Department of State, 1995:67; 1996: 73; 1997:74; 1998:86; 1999:96; 2000:106; 2001:88; 2002:176; 2003:166, 2004:181).

Type of event	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Armed attack	9	8	3	5	5	11	4	1	8	5
Arson	0	6	7	2	1	6	2	NA	NA	2
Assault	1	0	1	0	0	0	0	0	NA	NA
Bombing	43	65	55	109	96	111	179	207	66	71
Firebombing	2	0	1	0	5	12	1	1	NA	2
Hijacking	NA	NA	NA	NA	NA	NA	NA	1	NA	NA
Kidnapping/hostage	10	11	6	8	4	21	11	6	3	2
Vandalism	1	9	0	0	0	0	0	3	NA	NA
Other	NA	NA	NA	NA	NA	8	3	NA	NA	NA
Total	66	99	73	123	111	169	200	219	77	82

As illustrated in Table 2.1, which shows the terrorists attack against U.S. internationally by type of event, the most common terrorism acts are bombings (Craighead, 2003; MIPT Terrorism Knowledge Base, 2007). These include the use of explosives that are relatively easy to obtain, or utilize whatever destructive means are available as incendiary devices (e.g., using airplanes as missiles in September 11) (Craighead, 2003; FEMA, 2003; Nadel, 2004). Another example of the extensive use of bombing / explosives can be found in Israel where out of the 140 fatal attacks that took place between the years 2001-2006 within Israel's territory, 107 were accomplished using explosives, 26 were performed using firearms, 4 by knives/sharp objects/beating, and 2 by fire (MIPT Terrorism Knowledge Base, 2007). Besides being destructive, and relatively easy to carry through, bombing events also appeal to terrorists due to their theatrical nature. The extensive media coverage of events with bleeding casualties and severely damaged environments serves two interrelated purposes: demonstrating power over authorities and inducing fear in the population (FEMA, 2003; Coaffee, 2003).

The literature also indicates that the risks of chemical, biological, radiological or nuclear (CBRN) attacks are not to be dismissed (Pillar, 2001; FEMA, 2003; Janus and Blewett, 2004). And while past tendencies have been to mostly use conventional weapons (MIPT Terrorism Knowledge Base, 2007; US Department of State, 1994, 1995, 1996, 1997, 1998, 1999, 200, 2001, 2002, 2003), examples as the Aum ShinriKyo attack with the release of sarin in Tokyo's subway system in 1995 that resulted in 12 fatalities and 5500 injured, as well as smaller scale attacks using anthrax and ricin in the U.S. (15 total in 2001-2006, out of which 4 resulted in fatalities), indicate alternative potential weapons of terrorism (MIPT Terrorism Knowledge Base, 2007).

2.2.2.2 Asset Analysis

It is almost impossible to develop a comprehensive list of potential terrorism targets, as in today's urban environment target selection is nearly unlimited. Yet, the presumed intention of terrorism to maximize destruction suggests traits of possible targets: facilities which possess symbolic value, those that if damaged would provoke anxiety/fear among the population, would disturb the economy, or infrastructure; and those which offer the possibility of a Mass Casualty Incident—MCI (Archibald, *et al*., 2002; Combs, 2003; Kozlow and Sullivan, 2000).

Using September 11 terrorist attacks in the US as a case study, we find that the target fits most of these traits: devastating damage to the physical environment and to human lives in a place of symbolic and economic significance. However, sources contend that despite the September 11 attack, fear does not dominate Americans' lives—people feel comfortable and safe enough to continue everyday activities without much consideration of possible terrorist attacks (de Becker, 2002). The terrorists' failure in that respect may suggest that in the future, terrorist organizations will attempt to hit places where every American may happen to be during daily activities. The latter assumption is supported by what has been the case in other parts of the world (e.g., in Europe, in the Middle East). An example for that is found in Israel, where in the years 2001-2006 the majority of fatal attacks took place in or near commercial public functions, public transportation or busy streets (see Table 2.2 for a comprehensive list of the locations of terrorism attacks in Israel).

Consequently, most probable future targets are places which present opportunity of MCI and great destruction and harm, and those that inhabit daily activities, which when hit can provoke anxiety/fear all over the country, e.g., sports venues, transportation facilities, concert halls, shopping centers, amusement parks.

TABLE 2.2. Terrorist attacks that ended with fatalities within Israel's territory, by location, 2001-2006* (MIPT Terrorism Knowledge Base, 2007).

Type of place	Number of attacks	Number of suicide missions	Number of fatalities	Number of people injured
Restaurant	5	3	45	140
Café	9	7	70	255
Fast Food Stand	4	4	28	206
Bar / Nightclub	4	4	44	216
Shopping Mall	6	5	37	287
Pedestrian Mall/ Open Air Market	9	7	53	471
Street	13	6	33	231
Intersection / Road	14	6	23	66
Grocery Store	3	3	7	40
Bus	20	17	231	894
Bus Station / Hitchhiking Post	13	9	64	431
Train Station	3	3	8	52
Seaport	1	1	12	0
Checkpoint / Border / Road Block	9	2	14	21
Private Home	14	1	25	59
Hotel / Banquet	5	2	42	220
Sports Venues	1	0	2	0
Army Base	1	1	2	3
Political Party Headquarters	1	0	8	43
Hospital	1	1	5	24
Synagogue	1	1	10	45
Other	3	1	3	4
Total	140	84	766	3708

* Additional 207 fatal attacks were recorded for the years 2001-2006 in Israel's occupied territories.

2.2.2.3 Vulnerability Analysis

Different reports elaborate on the estimation of a building's vulnerabilities to a terror attack. Such estimation should include operational, structural and contextual considerations (Archibald, *et al*., 2002; FEMA, 2003). While the latter relates to the general level of alert in a certain area or country, as well as to a facility's proximity to other likely targets, the first two considerations relate to aspects of the physical design of a space that can hinder or assist penetration of terrorists, explosives or other hazardous materials into the heart of a facility.

Operational vulnerabilities address the function of a building and operational conditions, such as fire drills, emergency response training, building entry procedures and practices. In facilities of public nature that provide services to the general public, which are probable targets of terrorism (see asset analysis section), all operational procedures are problematic, particularly controlling the access. Some facilities offer opportunities to develop meticulous check points, as they require a permit to enter (e.g., performing/movie theatres, museums, sports venues). Those which do not (e.g., government facilities, healthcare facilities, some transportation terminals, stores/shopping malls) cannot be hardened easily, since hardening them would be against their primary users - the public (Combs, 2003).

Structural vulnerabilities consist of anything intrinsic to the structure that could be exploited by a potential terrorist to produce damage to the building and/or its occupants, e.g., limitations of the structure to withstand the blast of bombs placed in different locations in and around the building, fire suppression capabilities based on hardware and practices (e.g., fire doors, movement restrictions), and air ducts design (Archibald, *et al*., 2002).

Literature suggests a security survey based on all aspects of vulnerability analysis: the facility's physical features, operating policies/procedures, and the context in which it is located. This type of a survey should result in a realistic assessment of a facility's present security status; identification of existing security deficiencies; and suggestions for improvements (Kozlow and Sullivan, 2000). Various risk reduction matrixes offer to help building owners/managers evaluate what measures can diminish the risk for an existing facility or at the design stages of a new building. These matrixes are based on compilation of two scales: facility's level of vulnerability and probable severity level of consequences (Archibald, *et al*., 2002; FEMA, 2003).

2.3 The Built Environment as a Response to the Threat

To better understand the role of the built environment and architectural design in current counterterrorism efforts, it is essential to place the relation between terrorist threats and the design of secure spaces in a historical context. The analysis of the threat, detailed in section 2.2, points to two pertinent lines of research that can inform the review of architectural design for security from terrorism.

First is the examination of how architecture of the past dealt with protection from enemies who sought ultimate destruction and harm. This approach is congruent with the premeditated lethality of the threat of terrorism and the frequent political labeling of it as the new war of our era (Pillar, 2001; US Department of State, 2003) as it indeed offers the dangers of battle (US department of Justice, 1999).

Second is the review of established theories of crime prevention in the built environment. This line of research is based on the fact that terrorism, as criminal activity, happens in the microenvironment of a community, and is even regarded in legislations as an unlawful criminal activity (Pillar, 2001; Combs, 2003).

Following this notion, this section, presenting a comprehensive review of the connection of architecture to security, is based on three parts. The first concentrates on a historical review of the architecture of war. A separate examination of theories to design out crime is introduced in the second part. Finally, the last part concludes with the current design recommendations that relate directly to the threat of terrorism.

2.3.1 Architecture of War

Using concrete examples from the past, the following review of the history of the architecture of war identifies two major strategies that have stood the test of time in securing the built environment against human adversaries: *impediment* and *deterrence*. Though the examples of specific architectural measures for security are extracted from existing literature, reviewing these with relevance to the overall strategies, offers a refreshing and insightful perspective. By exploring the expressions of the design strategies across time we gain better insights into contemporary issues of offense and defense, image and perception, technology and design in today's architectural response to terrorism.

In pursuing this course of analysis, an explanation of the two strategies is in order. *Impediment* is defined by the physical control over a space through a combination of design elements that slow down or hold back attacks. The sum of these elements should provide clear borders definition between controlled and uncontrolled spaces, harden controlled zones (fortification), and secure the access to the controlled areas (Healy, 1983; Gibson, 2001). *Deterrence* deals with the projection of an image that would discourage potential offenders from committing their acts.

With this in mind, the historical review of architecture of war is structured according to the basic components of the *impediment* strategy: (a) defining controlled zones; (b) fortifying controlled zones; and (c) securing access. In addition, the implications of the architectural solutions are explored in terms of their contribution to generating a deterring image. The analysis of the generated image will refer not only to deterrence of adversaries as a goal, but also to possible implications of the image on the residing population, which adversely may have been affected (Holahan, 1982; Johnston, 2002).

2.3.1.1 Defining Controlled Zones

Across the centuries, defined areas of control—those protected from outside enemies—varied in scale, ranging from wide areas of land such as entire provinces or countries, to settlements, to specific structures within a community, to zones within a structure.

As early as the Neolithic Revolution (c. 9000-8000 B.C.E.), as settlements were established, battles over fertile land and raids by predatory nomads became genuine threats. For their protection, settlements were developed as closed, controlled territories (Gibson, 2001; Healy, 1983). A prominent example is Jericho (c. 5000 B.C.E.), which is considered the first walled city in the world. Other early evidence from central Europe (c. 4000 B.C.E.) shows large dwellings fit to house hundreds of people, which were built on stilts in the middle of lakes (e.g., Lake Geneva, Switzerland) (Healy, 1983; van Creveld, 1989).

Layering of walls was a technique used to achieve better controlled segmented areas of larger settlements; for example, meticulous definition of zones as means of impediment may be found at Hattusas, the capital of the Hittites, who dominated Anatolia in Asia (1650 B.C.E.), and in the orthogonal complex system of double-layered walls and canals that created different layers and spaces in Babylon, a megalopolis in Mesopotamia (600 B.C.E.) (Bourbon, 2001; Contenau, 1954; Gibson, 2001). It is plausible to infer that the physical image, as well as the common wisdom regarding such complex and layered systems of defense, must have been deterrents to potential adversaries.

Within the settlements, specific areas were further defined and controlled. David's Citadel within fortified Jerusalem or the design of the most sacred space in Egyptian temples are appropriate examples for such secure sections.

During the Roman Empire, defense was concentrated on core cities, such as the city of Rome, whose fortifications were constructed by Aurelius, 270-275, although attention was also directed at defining the borders of the empire. Hadrian's Wall (124) and the Limes provide examples of strategic defenses meant to deny avenues of attack and deter enemies across a wide front (Gibson, 2001; Keegan, 1993; van Creveld, 1989). The existence of such vast fortifications is a mark of the wealth and advanced political development of the people who built them. Presumably, they bolstered the confidence and feeling of security among the empire's residents but may also have raised doubt about the strength of an empire that needed such measures.

When the Roman Empire split into its eastern and western parts, both sides of the empire were subjected to constant attacks. The eastern Byzantine Empire, with its strong capital at Constantinople, positioned at the straits between the Mediterranean and the Black seas, withstood centuries of attacks. As the borders of the empire suffered major incursions, the Byzantines adopted a strategic in-depth defense. Approximately 700 small-scale fortifications were rebuilt or constructed during the sixth-century in the reign of Justinian. These controlled zones not only obstructed raiders' movements and blocked their way into the empire but also provided places of refuge for the area's inhabitants and defenders and served as supply depots for the Roman mobile field army. In addition, forces that bypassed these strong points faced the threat of rear attacks (Jones, 1987; Gibson, 2001).

The western Roman Empire, on the other hand, caved to the barbarians, until it officially ceased to exist in the middle of the fifth-century and was fragmented into small kingdoms, which were in need of protection from attacks from the north. Settlements were fortified utilizing a layering concept, which divided the controlled area into smaller zones. This type of architecture continued to develop into the Middle Ages. The city of Carcassonne, exemplifies the complexity of Medieval fortifications. It encompassed layers of fortifications, from across-land farmers' fields working inward towards the center of town, where a castle and a church were located as the most controlled spaces in the city. Small-scale architectural elements that were developed as controlled zones, such as towers (known as keeps or donjons), became part of a city complex, as well as residences (Altet, 2001; Gibson, 2001; Gympel, 1996). For example, seventy-two private dwellings were built as fortified towers within one city, San Gimignano, Italy. Such dwellings impeded and deterred outside attackers, as well as local rivals in town, and made their residents feel secure.

The invention of gunpowder by Grey Friar Berthold in 1313 and the weakening of the church and the feudal system after the Black Plague in the mid-fourteenth-century were factors in the decline of knighthood, castles, and layering within cities as fortifying measures (Gymple, 1996). Because firearms had limited range, protective structures employed to define and secure controlled zones, remained in proximity to the assets they were to protect. The great masters of the Renaissance, "Leonardo da Vinci, Albert Durer, Michelangelo, Brunelleschi, Bramante and Cellini did not distinguish between the planning of fortifications and the planning of cities: it was all of a piece" (Hansen, *et al*., 2003:2.4.). Thus, defining controlled zones was part of the master plan. Palmanova, Italy, founded by the Venetian Republic at the end of the sixteen-century, provides a typical example of fortifications meant to impede and deter intertwined with the design of a city.

As the range of cannons increased and protective structures were cited farther away from cities, strategic defenses over wide areas of land reappeared. For example, in the United States, control and protection of land and borders was first and foremost expressed by coastal fortifications, beginning in 1794. At the approach of the nineteenth-century, field fortifications could be found in Europe in the form of layers or belts of entrenchments around major cities and across open land (van Creveld, 1989).

In the twentieth-century, there was a boom in the military-hardware industry. The introduction of airborne missiles and advances in mechanical, electronic, and atomic capabilities changed the rules of war dramatically, as the "distinction between front and rear, combatants and noncombatants" was eradicated (van Creveld, 1989:196). While securing a country's borders remained a priority, efforts were also put into accommodating the growing need for security within the community, with the design of local shelters as small-scale controlled zones.

2.3.1.2 Fortifying Controlled Zones

Impediment has always relied on physical features that harden the defined area of control. Borders were often marked by natural impediments fortified by imposing manmade structures, such as systems of walls, ditches, and towers. In early civilizations, walls were very high and thick enough "to resist battering and to provide a fighting platform for the defenders on top" (Jones, 1987:10). Double walls of masonry, filled with stones or earth excavated from a supplemental outer ditch "deprived the attackers of a platform from which to approach the walls' foundations, while it also formed a prepared killing-ground" (Keegan, 1993:141). Towers were soon added at intervals. An example of these impediments is found as early as in Jericho. According to records from 3000 B.C.E., the city walls were over three times the height of a man, 80 to 110 feet thick at their bases, and included a tower and a dry moat surrounding the wall (Gibson, 2001; Keegan, 1993). Other examples of extreme impeding and deterring fortifications can be found in cities such as Athens and Rome (Connolly and Dodge, 1998; Cooke, *et al*., 1981; Keegan, 1993). In certain places, the wall adapted to the topography, as in the case of Hattusas, Mycenae, and Masada. Masada, constructed by Herod in 30 B.C.E., west of the Dead Sea in the Holy Land, presented an elevated level of impediment from its position on a high cliff with an additional massive stone curtain wall 18 feet high and 12 feet thick surrounding the flat terrain on top of the rock (Bourbon, 2001; Gibson, 2001). The perception of Masada as the most secure refuge in the region prompted the Jewish Zealots to flee there after the Romans destroyed Jerusalem in 70 C.E. However, the same image is what provoked the Romans to charge the city with full strength to prove their resolve and superior military skills.

After the western Roman Empire ceased to exist, the fragmented small kingdoms were vulnerable to attacks. However, the decline in education and the inability to retain the technical expertise of past generations resulted in relatively simple and weaker fortifications. Within the bailey, the protected zone enclosed within a wooden fence and an outside ditch, we find the motte, an artificial mound of earth with flat top and steep sides surrounded by another ditch. In a fortified settlement, the church stood at the center of the flat top, enclosed by an additional wooden fence; this portion could also be occupied by the castle of the lord and his family (Brown, *et al*., 1980; Gibson, 2001).

In the eleventh- and twelfth-centuries, as technological expertise grew and crusaders returned home from their travels to the east having seen the fortified cities of

Constantinople and Jerusalem, wooden fences and structures were replaced with stone walls. The tops of towers and walls were strengthened by an outer layer of construction, which included machicolations or openings between the two layers that were used to pour down Greek fire (pitch and boiling water) on intruders. Windows were intentionally placed high in any wall facing a likely enemy. Many arrow slits were included in the design. Square and rectangular towers were common, as they were easy to construct and divide up internally; later, these towers were replaced by the more resilient circular shapes (Gibson, 2001; Gymple, 1996; Jones, 1987)

Well-fortified structures and cities offering protection and refuge served as deterrents to enemies. Powerful images of fortification systems, often painted white and located at a higher ground, dominated the surrounding countrysides. These fortifications also served to control the locals and were frequently used by Medieval conquerors to attack the natives (Gibson, 2001; Jones, 1987; van Creveld, 1989). The deterring power of fortification systems is best illustrated by the Great Wall of China, which included "25,000 watchtowers, gates, fortresses, castles, guardhouses and even temples and shrines" (National Geographic Society, 1992:186). These physically impeding elements were encircled by an enormous deterring wall: 20 or 30 feet high, 25 feet thick at the base, and 15 feet across the top (Gibson, 2001).

In the fifteenth-century, the use of artillery and firearms dictated changes in the design of fortifications. The need for greater resiliency required construction of lower and thicker walls, often achieved by backing walls with massive earthen ramps. Ditches were widened and deepened, and banks were reinforced with masonry. The towers of the past became unsuitable for artillery defense forces and were replaced by low and broad bastions in star-like shapes which protected the bastions as well as the walls (Dupuy and Dupuy, 1993; Jones, 1987; van Creveld, 1989). Despite these changes, fortifications of this period remained imposing structures, as “the new fortifications conserved every element of strength of a castle” (Jones, 1987:195). Deterrence, therefore, was still based on the projection of a powerful image. Imposing, resilient fortifications designed to accommodate cannons can be found in the Rumeli (European) Castle, which was built by the Ottoman Turks in just three months in 1452, opposite the earlier Anatolian (Asian) Castle (1393), to block the entrance of the Bosphorus during the siege of Constantinople, May 1453.

As the range of cannons increased, protective structures were located farther away from the cities they were to defend, as in the development of coastal fortifications in the United States. Reflecting their European heritage, these fortifications were large and noticeable from a distance with the intention to project power, deter enemies, and provide a sense of security to the population. Coastal fortifications were made of common brick and constructed to the same scale as other large buildings. This connected them to the cities and to civil architecture in general and made them familiar to the public (Hansen, *et al*., 2003).

Closer to the turn of the nineteenth-century, improvement in cannon range and increase in their projectiles weight made the utilization of upper levels of tall fortifications obsolete. The need for greater resilience triggered the search for flexible, strong construction materials, which resulted in the use of redeveloped concrete and its appropriate structural systems (Hansen, *et al*., 2003). New coastal fortifications, as exhibited in San Francisco, featured flat one-story dispersed buildings better suited to the changing weaponry. Cannons could now spread out along the shore making them less vulnerable to attack. The new philosophy endorsed the notion that "low was safe and tall was dead" and was compatible with the growing popularity of entrenchments as in-land fortifications against firepower (van Creveld, 1989:172).

The change from imposing visible fortifications to undetectable "modest" structures reflected a new built image in the game of war. This concept goes along with camouflage as the new tactic of the time, as also expressed in the uniform and firearms design (van Creveld, 1989). Deterrence was based on the uncertainties and risk involved in approaching a target—the supposition that a defense might exist but the inability to detect and attack it. These new fortifications were unfamiliar to residents and less noticeable than previous designs but distinct from other civil architecture in shape and material.

In the twentieth-century, the construction of reinforced concrete shelters and safe-rooms was regulated in contemporary building codes. Shelters within cities had no part in deterring an attacker; on the contrary, with the growing ability for acquiring information though satellites and advances in air power, a fortified shelter has the potential to induce a direct attack on a structure by suggesting something important to protect (Johnston, 2002). As in the case of Masada, a highly secure built environment with elaborated protection measures could attract potential attackers rather than deter them.

2.3.1.3 Securing Access

Defenders throughout the ages faced additional challenges in their attempts to control and fortify the weakest points of the fortifications, i.e., the openings. Special attention was devoted to the reinforcement of gates, as can be seen in the design of enclosed transition zones between uncontrolled areas and a protected controlled zone (such as a city), which could be commanded by guards (Contenau, 1954; Gibson, 2001; Healy, 1983). In certain places, additional protection was provided by the symbolic powerful elements associated with the local gods or rulers that were positioned as icons at the entrances. These psychological deterrents appeared in many forms, from wall ornamentation to full structures.

An early example to this can be found in the case of Babylon. The transition zone of Babylon was a passage through the heavy gates, which opened at intervals to the sky. The gates of Babylon were strengthened by a core of rubble mud, reinforced on both sides with a wall of sun-dried bricks and covered with glazed bricks. The glazed bricks depicted figures associated with gods who were protectors of the gates, for example, a lion figure on Babylon's most famous gate dedicated to Ishtar, the god of war (Bourbon, 2001; Contenau, 1954). In ancient Egypt, obelisks were full-size symbolic protecting structures erected to guard the entrances to temples. The great height of the obelisk and the perfection of its form and material made it an imposing, deterring structure. Moreover, the holy inscriptions on these monolithic towers reinforced the idea that gods shielded the entrance to the temples.

The Porta Nigra gate of the city of Trier, on the Rhine, is an example of an efficient gate design from the Roman Empire. Two layers of gates—external and internal—with space between the layers open to the sky created the enclosed transition zone. The opening above the gate allowed the Romans to attack entering assailants and secure the entrance. The two layers of gates were connected to semicircular towers, which strengthened the gates and facilitated attacks on potential assailants.

In the Middle Ages, as in previous eras, enormous efforts were devoted to securing the gates. Manmade mounds, ditches, and drawbridges that were employed to protect the wide entrances (required by the use of chariots) proved to be insufficient. This led to the development of gatehouses. A typical late Medieval gatehouse consisted of a rectangular three-story building, well-fortified with a tower at each corner. The wooden doors were reinforced with iron strapping and secured with heavy beams that led into the wall at either side. In many cases iron yetts, heavy gates formed as grills that were rolled down, were deployed (Gibson, 2001; Gympel, 1996). The space within the gatehouse became one of the safest locations in cities and castles and provided a double layer of protection from outside intruders, as well as protection from traitors.

With the almost total elimination of walls as measures of fortification, the new gates of the modern age appear as checkpoints along a security fence. In addition, consistent with changes in warfare, airborne fire, whether conventional, chemical, biological, radiological or nuclear, became a security issue. Shielding a community from this threat requires sheltering small-scale elements and reinforcing the everyday built environment, its systems and infrastructure. Furthermore, defense against such attacks is largely dependent on offensive interception through appropriate technical, information, and operations systems. Deterrence is also achieved by fear of counterattacks.

2.3.2 Designing-Out Crime

As in the case of architecture of war, many civilizations have a history of manipulating the natural and built environment to meet public safety needs within communities (Kelly, 2004; Newman, 1972). In the twentieth century, with problems resulting from Modern designs and the disappointment in the social systems for crime prevention, the long-standing concepts for designing safe communities were revisited. These have been formulated to well established and meticulously elaborated approaches of how to design out crime.

This development began in the 1920s with early studies about crime patterns in Chicago as related to land use and the city's historical development (Kelly, 2004). Later, after World War II, riots swept many cities in the U.S. and problems sprang around the Modern high rise blocks, which were perceived as breeding grounds for criminal activity (Coaffee, 2003; Jacobs, 1961; Newman, 1972, 1973). The overall disappointment in what was the common methods for crime prevention, e.g., those that focused on "changing the criminal" or using police patrolling (Poyner, 1983:5), resulted in a general trend in which many individuals were taking measures to "safeguard themselves, their families and their properties" (Gold, 1970:153; Poyner, 1983). With the concern that the new wave of urban fortifications would be socially and economically destructive to a city, urban planners and designers, as well as sociologists and criminologists in America and Europe (Coaffee, 2003; Kelly, 2004; Poyner, 1983), were looking for other strategies that would reduce the opportunity for urban crime.

The concept of changing the “crime situation” (Poyner, 1983:5), based on the idea that the physical environment can be designed or altered so that crime is less likely to occur, and not necessarily through fortification, was the foundation to the modern crime prevention theories. Starting with the works of Elizabeth Wood and Jane Jacobs in the early 1960s, this notion had developed to the well known theories of Defensible Space, Crime Prevention Through Environmental Design (CPTED) and Situational Crime Prevention, a decayed later, with the works of Ray Jeffry, Oscar Newman, Ronald Clarke and others. Since then, the underlying principles of these theories have been implemented, further researched and even critiqued by many around the world.

One major criticism that has been made regarding any of the crime prevention theories, and should be noted here is the problem of crime displacement. Literature suggests three types of displacement: target displacement when choosing an easier target; tactical displacement when selecting a different method; and temporal displacement that relates to finding a different time to operate. According to the displacement premise, while the crime shifts (in location, method or timeframe), the overall rate of crime is not reduced (Tijerino, 1998).

While bearing this critique in mind and the repercussion of crime displacement on the community as a whole, the following presents an overview of the theoretical concepts and the basic practical principles of Defensible Space, Crime prevention

Through Environmental Design and Situational Crime Prevention. Along with the general survey of these crime prevention theories, the review examines whether these conform to the two strategies that were identified in section 2.3.1 as fundamental for the design of a secure environment in the case of war: *impediment* (i.e., defining and fortifying controlled zones, and securing access) and *deterrence*.

2.3.2.1 Defensible Space

Defensible Space was first introduced as a "model for residential environments". The idea was to "inhibit crime by creating the physical expression of a social fabric that defends itself" (Newman, 1972:3), which "could arguably be achieved by the manipulation of architectural and design elements" (Newman, 1972; Coaffee, 2003:18). The model, as defined in Newman's book, *Defensible Space* (1972), has four basic elements of physical design which act individually, or in combination, to contribute to the creation of secure environments: territoriality, natural surveillance, image and milieu (Colquhoun, 2004; Newman, 1972; Poyner, 1983; Tijerino, 1998). And although many sources criticize Newman's work for too much generalization and lack of statistical support, they recognize its huge impact in the study of environmental behavior and in the design of projects in the U.S. and many other places around the world (Coaffee, 2003; Gold, 1982: Poyner, 1983; Tijerino, 1998).

2.3.2.1.1 Territoriality

According to Newman, territoriality is “the capacity of the physical environment to create perceived zones of territorial influences” (1972:51). This means that with the use of real or symbolic barriers, the built environment should be subdivided into clearly distinct zones, from the most private to the most public (Colquhoun, 2004; Newman, 1972; Tijerino, 1998).

While this principle seems similar to the two basic elements of impediment to define the controlled and the uncontrolled zones, and fortify the controlled zones, it actually broadens them. The review of architecture of war illustrates that in defense from war – there are only two kinds of spaces: controlled and uncontrolled. In designing out crime, the element of territoriality identifies not only the two extremes, but several layers of different kind of control, represented in what is defined as: private spaces, semi-private (i.e., communal spaces) and the public zone, which through certain design elements should also be controlled to some extent (Colquhoun, 2004; Newman, 1972; Poyner, 1983).

In addition, according to the Defensible Space paradigm, the control over the semi-private spaces and public spaces does not rely entirely on fortifications as physical impediment, but depends heavily on the residents who share the spaces (in the case of the semi-private spaces) and other members of the community (regarding public spaces) and their sense of community. This is illustrated by the notion that the barriers which physically define the different zones can be either real or symbolic. As such, while the use of walls, fences and gates, which are forms of fortifications, are sometimes inevitable, other, less restrictive elements, as changes of levels, greenery, steps, gateways, portals etc., are encouraged (Colquhoun, 2004; Newman, 1972).

To promote the shared responsibility towards the semi-private and public spaces, the design of these spaces should encourage a general sense of community among the residents, and a feeling of 'stewardship' (Schneider and Kitchen, 2002). Accordingly, these spaces should be located centrally to the private units and should include elements and functions that would promote their usability by the different members of the community. The design should also aspire to make the semi-private zones belong to a relatively small community, by serving small number of private units, so that residents of the private units can recognize each other, and more importantly, recognize intruders (Colquhoun, 2004; Newman, 1972).

As in the impediment strategy, the control over the access to the controlled zones—the private and semi-private spaces—is a crucial element. This control is achieved through designing the semi-private space as a barrier between the private zones and the public domain. The access points to the private zones should be from the centrally located semi-private space, and the access to that space from the public domain is advised to be distinct and limited (Colquhoun, 2004; Newman, 1972).

2.3.2.1.2 Natural Surveillance

The natural surveillance element of defensible Space stands for "the capacity of the physical design to provide surveillance opportunities for residents and their agents" (Newman, 1972:78). This principle indicates that the design of the public spaces and semi-private spaces should allow for "the watchful eye of the public" to always be present (Tijerino, 1998:325).

In order to accommodate this element, common areas in a building, and especially front entrances, should be designed to be visible from the street so that passing pedestrians and motorists can notice anything strange happening. It is also preferable that these common areas are designed to be visible from private units within the building. In addition, the positioning of windows in the design of the private units should not just fit the internal plan of the house but also provide residents the ability to survey what is happening in and around public spaces, inside and outside the buildings (Colquhoun, 2004; Newman, 1972).

The element of surveillance in the Defensible Space model supports the notion that the control over the spaces, as illustrated in the analysis of the element of territoriality, does not rely entirely on fortifications as physical impediment, but also depends heavily on the residents who share the spaces and their sense of community.

In turn, this element profoundly relate to the issue of deterrence. A space that accommodates the natural surveillance element not only physically impedes potential criminals if they are caught in action, but has the potential to deter them from committing the crime because they can be caught in action.

2.3.2.1.3 Image

"The capacity of the design to influence the perception of a project's uniqueness, isolation, and stigma" is what influences how vulnerable a design is to crime as according to Newman (1972:103).

The Defensible Space model proclaims that to achieve a "physical expression" of a space that defends itself a design of residential units should use buildings forms, idioms and materials to avoid the stigma of public housing (Coaffee, 2003; Colquhoun, 2004; Newman, 1972; Poyner, 1983). The model recommends avoiding building shapes, layouts, and materials that stand out as completely different, since they draw specific attention to the project, and avoid high-rise / high-density housing blocks to low income as they are particularly vulnerable to crime. In addition, the design should make sure that finishes and furnishing in interior spaces are robust, yet attractive to residents (Colquhoun, 2004; Newman, 1972).

The concept of image relates directly to the deterrence strategy as it deals with people's perceptions and preconceptions. As according to the guiding principles outlined above, an exceptional design or a design associated with preconceptions of crime and criminal activities would influence the way potential criminals perceive the place – its vulnerability, its attractiveness (i.e., is it a rewarding risk) and how secure it appears to be. It should be noted that the latter – how secure a place is perceived to be - can be influenced by the elements that are used to achieve physical impediment, as in the examples of historical architecture of war, even though it is not the strategy that by definition underlies the concept of image.

2.3.2.1.4 Milieu

In the Defensible Space model, an important factor to forming a perception of a place is the setting, i.e., the context, in which a building is located (Newman, 1972; Tijerino, 1998). Newman recommended that housing should be merged with areas of the city that are considered safe, such as institutional and commercial areas, and should face social functions as these or heavily-trafficked streets (Coaffee, 2003; Colquhoun, 2004; Newman, 1972; Poyner, 1983).

This element in the Defensible Space model not only is tied to the element of image as it influences the perception of a place, but also creates opportunities for natural surveillance. As influencing both the image and natural surveillance factors, it relates directly to the concept of deterrence and to some extent to the strategy of impediment as well.

2.3.2.2 Crime Prevention Through Environmental Design and Situational Crime Prevention

The term Crime Prevention Through Environmental Design (CPTED) was first used by the American criminologist, C. Ray Jeffrey, in his book that carries this title (1971). Jeffrey's argument was that "In order to change criminal behavior, we must change the environment (not rehabilitate the criminal)", and part of this can be done by "increasing the risk involved in criminal acts" (1971:178). Since then, the interest in CPTED has continued to grow till present day and has been reflected in the establishment of federal research programs in the U.S. and other countries, and different international and national associations around the world, e.g., the International Crime Prevention Through Environmental Design Association (ICA), the European Designing Out Crime Association (DOCA), etc. (Colquhoun, 2004).

Existing literature presents different views and various ways to articulate the basic elements of CPTED. Tijerino describes CPTED as "a mirror image of the Defensible Space concepts", and as such "is based on the same four basic principles" (1998:326). Other sources claim that the CPTED model broadens the strategies outlined by the Defensible Space paradigm, as it tries to deal not only with housing designs, but with a variety of different settings (Colquhoun, 2004; Kelly, 2004; Poyner, 1983; Schneider and Kitchen, 2002). This point is illustrated by the range of different programs, studies and working projects that have been done over the years in developments such as commercial settings, schools and overall city planning, in addition to projects that focused on residential neighborhoods (Colquhoun, 2004; Kelly, 2004; Poyner, 1983; Schneider and Kitchen, 2002).

The variety in the types of projects associated with the CPTED illustrates the breadth of the approach. It is considered an interdisciplinary approach which involves all the different stakeholders and members in the community—from planners, designers, city agencies and law enforcement officials, to—residents, businesses, educational facilities and others (Colquhoun, 2004; Kelly, 2004; Poyner, 1983). With the encouragement of entire communities to be proactive in fighting crime (Kelly, 2004), the model had extended to what is referred in the literature as Situational Crime Prevention or 2nd Generation CPTED (Colquhoun, 2004; Poyner, 1983). The extended approach considers "both management and design interventions that reduce the opportunities for crime" (Colquhoun, 2004:38) and address social, economic, and space scheduling issues along with the specific functional and physical attributes of a place (Colquhoun, 2004; Schneider and Kitchen, 2002).

Many of the sources who identify CPTED as an enhancement of the Defensible Space model divide the guiding principle for a space that is designed and managed to reduce crime opportunities into three basic principles: boundary definition or territorial reinforcement, surveillance, and access control (Kelly, 2004; Schneider and Kitchen, 2002). Additional issues, highlighted in the literature as critically relevant to crime rates are land use and activity locations (Kelly, 2004; Schneider and Kitchen, 2002). The issue of maintenance, as identified by Schneider and Kitchen (2002) based on Alice Coleman's work (1985, 1990), is another key element to the 2nd Generation CPTED.

The following review of the basics of CPTED and 2nd Generation CPTED is organized according to these principles. The review draws comparisons to the Defensible Space model and, as in the review of the principles of the Defensible Space paradigm, offers evaluation to the relationship of each principle to the strategies of *impediment* and *deterrence*.

2.3.2.2.1 Boundary Definition / Territorial Reinforcement

The basic idea of boundary definition is derived from the Defensible Space concept of territoriality. It focuses on the way "territoriality is facilitated by boundary markings and clear, although often subtle, definition of spaces" (Schneider and Kitchen, 2002:97). It relies on the assumption that "most people understand where public, semi-public and private space begin and end" and "behave differently in different spaces" (Schneider and Kitchen, 2002:97).

As in the concept of territoriality in Defensible Space, boundary definition can be accomplished through numerous design techniques. These range from symbolic elements, as changes in paving, paint, landscape and signage, to more obvious barriers which reinforce the territory, like fencing, gating and barricades. The latter type of elements, i.e., the territorial reinforcement kind, creates an actual barrier, and hence physically impedes the movement of offenders (Schneider and Kitchen, 2002). The territorial reinforcement elements can also psychologically deter possible offenders as they portray obstacles that are relatively hard to overcome. The subtle elements for boundary definition work mainly as deterrents, as they portray signs of ownership, and mark from where a certain behavior can be interpreted by the owners as offensive. Such an act can potentially provoke a response by the owners of the territory, whether it is a communal territory or a private one.

2.3.2.2.2 Surveillance

Surveillance in CPTED refers to the visibility of property/building/users of the environment. Crowe (1991, 2000) identifies three elements that play a part in CPTED's principle of surveillance: natural surveillance, organized surveillance and mechanical surveillance (Schneider and Kitchen, 2002).

The natural surveillance element is based on Newman's fundamental conception in the Defensible Space paradigm, where surveillance is facilitated by design. The strategic location of windows, doors, corridors, paths, gates, lighting, and landscaping is utilized to increase visibility of the property/building/users. The proper placement of these design elements "increases the likelihood individuals will observe intruders and regular users, challenge inappropriate behavior, or call the police or property owner" (Kelly, 2004:3.4).

Organized surveillance, the second element of surveillance according to Crow, refers to people that their task is to observe the space and look for inappropriate behavior, such as guards or police. Once an inappropriate behavior is detected, these persons respond accordingly.

The third element of surveillance is the mechanical surveillance which is facilitated by electronic or mechanical devices. Different measures of mechanical/electronic surveillance are based on different concepts: break of an electric circuit, interruption of a light beam, variation in electrical or magnetic field, detection of sound, of vibration, of motion or heat, and observation/recording of pictures with cameras or closed circuit television (Craighead, 2003; Healy, 1983).

Surveillance is fundamentally connected to both impediment as well as deterrence as tactics of security. It is based on the fact that once an offensive act is detected, it may trigger a response that could physically impede the criminal activity, and could even result in the criminal being captured and punished. In turn, the risk of being detected and ultimately even getting punished may deter a potential offender from committing a crime altogether.

2.3.2.2.3 Access Control

The goal of access control, as articulated by Kelly (2004:3.3), is “to deny admission to a crime target and create a perception among offenders there is a risk in selecting the target”. As such, and similar to surveillance, access control corresponds directly to both impediment as well as deterrence strategies of security.

In detailing access control measures, some sources bring examples of what has been described here as territorial reinforcement elements, such as fences, shrubs, and walls, as they “deny free access to certain areas” (Kelly, 2004:3.3; Nadel, 2001;

Fennelly, 1997). In addition, sources specify measures which refer directly to securing the openings in the territorial reinforcement that provide access points to the controlled zones. These include elements such as doors and gates, and mechanical equipment as locks, as well as special screening equipment to detect weapons and other hazardous elements (GSA, 2003; Honey, 2000).

Schneider and Kitchen (2002) also identify surveillance as a measure for securing access. As such, they elaborate on the three elements of surveillance that were identified by Crowe detailed in section 2.3.2.2.2 (1991, 2000). According to them, natural surveillance for access control proposes a design that provides as much visibility to entry paths and doorways, organized surveillance refers to using security guards or doormen, and mechanical surveillance includes CCTV and alarm systems.

The measures of access control and surveillance form a greater security system industry that extends from intrusion detection, surveillance by CCTV, to lighting and fire extinguisher systems. Outputs can be taken from one system to activate another, e.g., intrusion detection can ultimately activate systems as vehicle barriers, gates, electronic locked doors or electromagnetic holding devices (GSA, 2003; Honey, 2000; Schneider and Kitchen, 2002). The measures used for access control and surveillance collectively provide what is referred in the literature as “target hardening” (Honey, 2000; Kelly, 2004:3.3).

2.3.2.2.4 Land Use and Activity Locations

The issues of land use and activity locations are rooted in the two concepts of milieu and image of the Defensible Space theory, and relate indirectly to the natural surveillance principle. With the broadening of the crime prevention theory from housing design to a wide-ranging design approach, the principle of land use and activity locations speak of generally placing safe activities in unsafe areas, and placing unsafe activities in what are considered as safe locations (Crowe, 1997; Schneider and Kitchen, 2002). This tactic, using the influence of the surrounding context, not only makes functions that are considered unsafe to be perceived as safer, but also exposes a potential offender to a greater risk as it should create opportunities for natural surveillance. And while this mostly corresponds with deterrence in influencing the image of a place and the perceived risk for offenders, the objective elevation in the risk for potential criminals due to the natural surveillance conditions can be considered as an impeding factor as well.

2.3.2.2.5 Maintenance

The extended approach of CPTED speaks of “supplementing design with regularly scheduled staff or activities, routine inspections and maintenance” (Kelly, 2004:3.4). All these techniques are meant to provide conditions which reflect signs of ownership and also allow for a sense of ownership to develop among users of a space. This in turn should act as a deterrent, “sending a ‘hands off’ message to would-be offenders” (Kelly, 2004:3.4).

The concept of maintenance which relates directly to the Defensible Space principle of image, and hence to the general deterrence strategy, has become important following empirical studies on the ‘broken windows’ theory and Alice Coleman’s work regarding the importance of signs of incivility (i.e., graffiti, trashed entrances, vandalism) as factors conducive to criminal acts (Coleman, 1985, 1990; Schneider and Kitchen, 2002).

While the concept of maintenance is concerned with the physical appearance of a place, the scheduling of staff and routine inspections are non-spatial supplementary strategies. These management-based strategies have no Defensible Space analogues (Schneider and Kitchen, 2002), though they do influence the image of a place with how controlled it is perceived to be, and also create opportunities for natural surveillance.

2.3.3 Current Policies for Counterterrorism Design

The historical review of integration of security measures into the design of the built environment in the case of war as well as for crime prevention purposes exemplifies how architecture has always been a practical response to the practical concerns of the time. It involves addressing issues of offense and defense, image and perception, by applying available technology through design. The material offers a new look into the importance and meaning of patterns and tactics recurring across generations. These tactics, above all, refer to gaining the control over a space through defining its territory; fortifying it (physically and through surveillance); securing the access to it; and creating an image that would discourage potential offenders from acting against the place or the people who inhibit it. These tactics and patterns combine what has been regarded as the two major interrelated overall strategies: *impediment* and *deterrence*.

Over the years, different aspects of these strategies of security as well as other recommendations on how to create reliable, safe, and convenient structures have been incorporated into building standards and codes. The most crucial ones appear in nationally and internationally adopted documents, such as the International Building Code, A117 for Accessibility, NFPA 80, Fire Doors and Windows, and NFPA 101, Life Safety Code (Tierney, 2002). Other recommendations, which are specific to a certain place pending on the cultural context, have been integrated into local codes (e.g., regulation concerning building safe rooms in Israel).

Facing the threat of terrorism, literature specifies the current goals of incorporating security into design: Protection of people and prevention of attacks, and in the case of such - prevention of building collapse; limiting injuries caused by flying debris or by a direct effect of air blast; and facilitating building evacuation/rescue efforts through effective building design (FEMA, 2003a).

With the recent redefined goals of security, different aspects of building codes have been reconsidered, especially with regards to big commercial facilities, those that present an opportunity for Mass Casualty Incident (MCI) – the most probable targets, as indicated in the review of the terrorism threat, section 2.2. As evident in a document by a

US advisory panel to assess domestic response capabilities for terrorism involving weapons of mass destruction, "tougher building safety codes offer another avenue of protection, especially in new commercial buildings. These should focus on structural integrity, minimizing the probability of collapse even after an explosive attack, and making the building more resistant to fire….Given the costs associated with 'hardening' new buildings and the trade-off between risk and cost, any such 'anti-terrorism' building codes should probably apply only to the largest new structures, those that would hold thousands of people" (Brookings Institution Report, 2002).

Prior to focusing on the counter-terrorism measures in the realm of the built environment, it is important to reflect on the general relevance of the *impediment* and *deterrence* strategies, which as pointed out, have proven throughout history to be consistently applied in the design of secure spaces. This deliberation is imperative as the effectiveness of these strategies may be questionable in face of the unique qualities of the threat of terrorism (reviewed in section 2.2).

With regards to the *impediment* strategy, one issue immediately comes to mind considering the threat of terrorism. Even if terrorists are physically prevented from reaching their ultimate target, the space where they are stopped may suffer the hit. This means that impeding terrorists through design might result in a different location or scale of attack than contemplated, but does not necessarily mean a prevention of attack from occurring altogether.

Referring to the *deterrence* strategy, we find three predicaments in using it as a strategy against the threat of terrorism. First is the concern for a displacement of the act. This concern is based on what was raised as a criticism of crime prevention theories according to which while the crime shifts, the overall rate of crime is not reduced (Tijerino, 1998). In terrorism terms, this means that terrorists are likely to come up with a different tactic or look for a softer target to hit, but they will not be discouraged entirely. The terrorism attack, therefore, is likely to happen sometime and somewhere. The second point of concern relates to the questionable effectiveness of *deterrence* on terrorists. Based on the review of the threat, it seems that the chances of being captured or killed presumably do not deter terrorists, as many of them are martyrs. In addition, the last issue in regards to *deterrence* is the questionable effect of a certain image on terrorists. This means that excessive security measures may attract acts of terror instead of discourage them, because they may not be afraid to get caught or killed and since a secure/fortified image may indicate that there is something important to protect (Johnston, 2000).

With this in mind, the review of the recommended measures for security in the design against terrorism is structured according to the basics of the *impediment* strategy: defining and fortifying controlled zones, and securing access. Realizing the questionable effectiveness of deterrence in the face of terrorism, the review includes a discussion of how the design elements may influence the image of a place (in terms of more or less secure) without passing judgment on whether such image reduces the risk of terrorism or not.

The following surveyed material consists of regulated standards established by the General Services Administration (GSA) for the Public Buildings Service (PBS) (2003), recently published Federal Emergency Management Agency's (FEMA) manuals (2003a, 2003b), other institutional recommendations (e.g., Kozlow and Sullivan, 2000; AIA, 2001, 2004; Poyner and Fawcett, 1995), and available private publications (e.g., Anti-Defamation League, 2004; Bershad and Parker Phifer, 2004; Craighead, 2003; Gunning and Josal, 2004; Healy, 1983; Fennelly, 1997; Honey, 2000).

2.3.3.1 Provision of Clear Borders Definition and Hardening of Controlled Zones

Sources recommend a clear differentiation between the structure, its perimeter and the outer, uncontrolled zone (Craighead, 2003; GSA, 2003; Healy, 1983; Kozlow and Sullivan, 2000). Once this distinction is made, further steps, which are intended to prevent, delay and mitigate the effects of an attack, can be taken (FEMA, 2003a). These steps should follow a "layering" concept, similar to what was demonstrated in the architecture of war or in the crime prevention theories. Such concentric design begins with the outer periphery, working inward, where each ring should have a uniform level of security provided along its entire length (AIA, 2001, 2004; FEMA, 2003a, 2003b). This includes providing and reinforcing external borders; defining and securing the structure's entire exterior - sides, top and bottom; and structurally increasing its resistance to explosives (GSA, 2003; Healy, 1983). Intrusion detection and surveillance devices support the control over the structure and over its periphery.

2.3.3.1.1 Site and Perimeter Considerations

Counter-terrorism recommendations regarding site development focus on two issues: positioning of the building on the site as means of protection and using design elements for securing the territory. The first issue speaks of placing the building as far away from property lines as possible - from streets as well as from adjacent facilities. Implementation of this recommendation would create a “stand-off distance” that would minimizes the risk to which the facility is exposed (FEMA, 2003a, 2003b). The design solutions for securing the territory refer to bordering the site or providing any other outdoor ring of security. Literature specifies that these should be chosen, located and designed to stop or delay an intruder (especially large scale carrier of weapon), not provide any concealing cover for surprise attacks or possible bombs, and be impossible to use as a natural ladder to gain entry to upper levels of the structure (Craighead, 2003; FEMA, 2003a; Fennelly, 1997; GSA, 2003; Kozlow and Sullivan, 2000).

Within the spectrum of design solutions for bordering a site or providing any other outdoor ring of security, security fencing (Kozlow and Sullivan, 2000) is the bluntest measure for convening to the general public the efforts put into securing the enclosed territory. Other architectural solutions, i.e., decorative fences, walls, various types and designs of buffers and barriers (FEMA, 2003a, 2003b; Honey, 2000), are less obvious but still associate closely with intentional enclosure for security. For creation of what sources define as more welcoming environments, it is recommended to use less apparent measures of enclosure when possible. These include, for example, changes of topography, trenches, ponds and water basins, plantings, trees, sculptures, and street furniture (FEMA, 2003a, 2003b; GSA, 2003).

2.3.3.1.2 Building Design

Recommendations on how to define and harden spaces within buildings to achieve counter-terrorism goals refer to three main aspects of building design: general layout and design, building structure, and exterior design.

Literature indicates that for counter terrorism purposes, a building's layout should allow the correct operational procedures (e.g., entry procedures, evacuation procedures, etc.), conform to the concentric layering proposition and assist in creating structural strength. For the purpose of creating structural strength, sources advise to use building shapes that better resist blast shock waves (AIA, 2001, 2004). Specifically, it implies the use of simple geometries layouts (circular and cubic) and avoidance of re-entrant corners that may trap and accentuate the effect of possible air blasts (FEMA, 2003a, 2003b). In addition, to minimize opportunities for forced entries through exterior facades while creating humanitarian environments within the building for its users, it is advised to include internal atriums in the design, and have most of the windows of a facility face inward, towards these atriums (FEMA, 2003a).

With regards to a building's structure, in order to achieve air blast resistance it is recommended to use massive constructive elements which provide flexure capacity that would help avoid brittle shear failure and raise the capacity for reversing loads (upward pressure) (FEMA, 2003a). To reduce the risk of progressive collapse, some sources recommend the use of a broad foundation to lessen the stress and strain on the load bearing soil and the use of right-angled connections of load bearing walls (FEMA, 2003a; Kozlow and Sullivan, 2000). In addition, it is advised to introduce structural redundancy to the design of a building and limit the spacing between columns (AIA, 2001; Craighead, 2003; FEMA, 2003a).

Focusing on the design of the envelope of a building, sources specify that this element should be of sufficient strength to stand in an attempt of forced entry (Craighead, 2003; GSA, 2003). To lessen the destructive effect of potential air blasts, the use of heavyweight ornamentation in the façade design as well as over-hangs should be reduced to minimum (FEMA, 2003a, 2003b). For the same reason, it is also recommended to "avoid exposed structural elements (e.g. columns) on the exterior of the facility" (FEMA, 2003b:3-5). Supplemental to the recommendation for creating internal atriums, FEMA's manual (2003a, 2003b) advises to limit the number and sizes of windows on lower floors of exterior facades and to use clearstory windows if possible (above human height). Recommendations regarding the design of the exterior of buildings also relate to material selection. Resistant materials and supporting systems are in constant development. Blast-resistant exterior windows systems provide a good example for that (Bush, *et al*., 2004; GSA, 2003).

The influence of the above recommendations on the image of a building is not an obvious one. Some of the recommendations, especially those regarding general geometric layout and exterior design, bear an effect on the final appearance of a building. Yet, the development of resistant materials and supporting systems allow for some freedom of design, especially with regards to glazing. The question that results from this predicament is how the relative proportion of mass vs. glazing influences the perception of a building. Does the public view, whether they are terrorists or users of the environment, conform to the general guideline, and perceive a building of fewer windows as more secure than a building with a lot of glazing?

2.3.3.1.3 Surveillance

Surveillance is a supporting factor to the physical design in counter-terrorism efforts which helps gain and upkeep the control over a space. As in the crime prevention theories, surveillance has three facets: natural, organized and mechanical/electrical. Natural surveillance, while being related to conditions formulated by the design of a space (e.g., visual openness), relies mostly on the users of the environment. It depends heavily on the public's awareness of the threat and their attentiveness to cues that may indicate a possible terrorism incident (e.g., abandoned package of some sort, suspicious strangers or activity, etc.). Organized surveillance, as the natural surveillance, relates to the physical conditions of a space, and dependent on personnel that is trained to spot terrorist activity. Mechanical/electrical surveillance helps trained personnel monitor many areas at the same time, from outside areas (i.e., the perimeter) to defined volumes (i.e., interior spaces), and even specific objects or points in a space (Fennelly, 1997; Healy, 1983).

Mechanical/electrical surveillance devices have various designs, some more distinct and others that blend in the surroundings. In addition, other devices that are recommended to help control a secured space and facilitate emergency response are emergency response measures. These also may be hidden (e.g., duress alarm buttons) or conspicuous (e.g., brightly marked emergency intercoms or assistance stations on columns, fences, and other posts) (GSA, 2003). Evident use of mechanical/electronic measures indicates a deliberate investment in the security of a space. It signifies that a “watchful protective eye” is always present at the location.

2.3.3.2 Securing Access

The risk of an undesired intrusion to a facility, whether it is a walking terrorist, a suspicious car, a thrown explosive, or some kind of a CBRN weapon, mandates the need to secure all possible openings in the layers of security (e.g., perimeter border, building envelope, private or mechanical areas within buildings, etc.) (FEMA, 2003a, 2003b; GSA, 2003).

The frequent use of car bombs as an effective terrorist tactic highlights the importance to control all vehicle access (i.e., parking garage, lobby entrance, loading docks, shipping and receiving areas). For prevention of vehicle ramping, it is recommended to place the ground floor elevation of a building at 4 feet above grade (FEMA, 2003b). Other ways of control are first initiated by periphery bordering. Then, site circulation should be designed to prevent high-speed approaches by vehicles. In order to force a reduction in speed, vehicle entrance is recommended to be a diversion of the road from which the vehicles approach the site (FEMA, 2003a; GSA, 2003). Other sources contend that vehicles should not be allowed into the inner perimeter of the building (Healy, 1983). Accordingly, it is recommended to maximize the distance between parking and buildings (AIA, 2001, 2004; Kozlow and Sullivan, 2000). In most parking garages, parking should be restricted only for tenants and known visitors. In under-building-garages or subterranean garages, visitor vehicles should not be permitted to park (Kozlow and Sullivan, 2000). In some cases, perimeter vehicle inspection should be implemented and the design should provide space to facilitate this procedure. The area needs to include design features that stop vehicles, prevent them from leaving the vehicular inspection area, and prevent tailgating (FEMA, 2003a; GSA, 2003).

With regards to walk-in traffic, as according to the GSA standards (2003), entrances to public facilities need to balance aesthetics, security, risk, and operational considerations. The standards suggest that entrances should be designed to avoid significant queuing. If queuing does occur within the building footprint, the area should be enclosed in blast resistant construction. In such design, interior and exterior doors should be offset to limit the effect of a blast through the structure (FEMA, 2003b). If queuing is expected outside the building, a rain cover should be provided (historic buildings generally require alternative design schemes that do not alter the exterior or lobby configuration). To reduce the potential for concealment of explosive devices next to the entrance, it is suggested to avoid installing features as trash receptacles and mailboxes (GSA, 2003).

The actual control over the access through entrances can be facilitated through a range of different systems and entry procedures. Access control for office buildings may consist solely of a lock/key system or of a security staff member trained to observe both incoming and outgoing pedestrian traffic (Craighead , 2003). Other, public facilities may require x-ray machines to screen incoming parcels and packages, as well as walk-through metal detectors (Craighead, 2003; GSA, 2003).

The apparent level of security in an entrance depends on what systems are used and what are the entry procedures. With the designs that exist in the industry today, which are obvious and blunt, the more measures are taken and the more complicated is the procedure, the more obvious the security is. It should be noted that there is a potential of reaching high control of access through unobtrusive security measures. An example to this proposition is using revolving doors, and further developing the systems that operate and control such doors. Literature already identifies such doors as a relatively safe mechanism which regulates the flow of pedestrians without exposing the building to out-side elements (Craighead, 2003; FEMA, 2003a).

The importance of access control to security from terrorism is exemplified in the security measures and entry procedures that are added to existing facilities, which were not necessarily planned for countering terrorism, when there is an increase in the level of alert. This phenomenon also exemplifies the relative flexibility of these measures to be adjusted according to current security needs, compare to other design elements which are impossible to change (e.g., location on site, layout, structure), or can be changed only with a significant investment (e.g., exterior materials). The downside to this is that many times, when such measures are added post-construction and were not taken into account in the initial design of the facility, they appear as improvised temporary machinery. While the mere existence of access control security measures elevates the appeared level of security in a building, it is unclear how the level of the design of these measures influences the building's appearance and security image.

A final comment on the issue of access control needs to be made regarding the efforts made for protection from CBRN threats. It should be noted that all of the design recommendations regarding protection from CBRN do not influence the appearance of a building. These are focused on strengthening the control over utility pipes and restricting access to them; investing in HVAC/ventilation systems, and controlling pressure differentials (Kozlow and Sullivan, 2000). In the case of released hazardous airborne substances, e.g., industrial chemicals, toxic fumes or biochemical warfare agents, strategies for protection depend on whether a release occurs outside or inside the building (AIA, 2001, 2004). The location of the building air intakes need to be considered as well as securing the access to them. Analogous to fire doors system, dividing the facility into different zones operated by different HVAC systems could be helpful in isolating incidents (AIA, 2001, 2004). In large commercial spaces where it is impossible to isolate different zones, negative zone pressurization and smoke evacuation methods are critically important (FEMA, 2003a).

2.4 Summary

Architecture has always been a form of response to the practical concerns of the time, addressing, among other matters, the issues of offense and defense, image and perception, by applying available technology through design.

Current security threats are dominated by the proliferation of terrorism. While, in probabilistic terms, terrorism is not a highly frequent phenomenon, the growing public concern has made it a salient issue. The “social amplification” of the risk of terrorism can be attributed to several qualities of the threat. Terrorism is a political matter, one which presents a mortal risk, forced on the population by other people. Described as “the unthinkable”, it is characterized by an abundance of potential targets and forms of attack and the ability to adapt to protective means.

Literature indicates that efforts to counter terrorism in the realm of the built environment include elements of design, structural hardening, technology and operational policies, to help prevent, mitigate and facilitate a desired response in the event of a terrorism attack. These efforts are prioritized through assessing the specific security needs for a certain place in a certain context. The review of relevant sources presented a general analysis of security needs as related to the threat of terrorism using the basics of a risk assessment. The analysis was based on existing information about past attacks and on sources’ discussions of potential terrorists, their goals, incentives, and technological capabilities. The review implies that potential targets are those that if damaged would help terrorists demonstrate power over authorities and induce fear in the population. Such targets include places of symbolic value, places that present opportunities for great destruction and harm to the infrastructure, and those that present opportunities for mass casualty incidents (MCIs), e.g., places which serve daily activities used by the majority of the population. The review also indicates that while the risk of CBRN attacks should be taken into account when planning for this threat, statistics show that terrorism attacks usually employ explosives, which are relatively easy to obtain, can be very destructive with a strong visual impact on the surroundings. Beyond the global general analysis, a closer look at different societies, as the U.S. and Israel, reveal differences and nuances to target selection as well as to the over-all over-time exposure to the threat in different political contexts.

The discussion of the nature of the threat, as well as the review of the current design recommendations and security measures link the struggle against terrorism with former historical strategies of defense against enemies, as well as with modern theories of crime prevention. Whereas terrorism seems to present the dangers of the battlefield, with massive casualties and destruction, it occurs within a community and usually involves penetration of hostile forces into local surroundings.

The historical basics for impeding potential offenders or criminals through physical controls have proven extremely relevant to the current defense efforts against terrorism threats. Consistent with the *impediment* strategy, the architectural measures set to protect a population from terrorism deal with the fortification of the microenvironment. These measures, consistent with the concept of territoriality, provide controlled zones and clear border definitions for single elements within the community.

Literature recommends a concentric design that follows a layering concept, similar to what was demonstrated across time, from the outer periphery working inward. Furthermore, "target hardening" includes aspects of geometric layout, structural elements and materials which increase the resiliency to explosives, as well as intrusion detection devices and surveillance systems (natural, mechanical and organized) as supportive factors to the control over the protected zones. The review indicates the importance of access control as an element in the *impediment* strategy which is extremely relevant to securing buildings from terrorism as well as intricate, as the most probable targets of this threat are buildings of public nature.

The concept of *deterrence*, another historical strategy for defense and a main crime preventing strategy, takes a new turn. Society is faced with attackers who are not conventional criminals or official military forces that are bound by international law. In many cases, these are martyrs who are willing to sacrifice their lives for their idiosyncratic goals. They may ignore conditions that are ordinarily considered deterrents and may be primed to attack the civilian population, as well as places which are perceived to be secured. Thus, excessive security measures may induce an attack. Moreover, the paradox of security becomes multifaceted as the public may comprehend this situation and seek security conditions that signal a less prominent target.

The later notion brings up the importance of the users' perception of security as affected by the built environment. Studies show that visual cues in the environment influence people's levels of stress, well-being, as well as their high-order cognitive functioning, and can link to a resulting behavior. Literature links high level of well-being with a middle range arousal. The cognitive, emotional, physiological and behavioral responses to the stimuli are ways by which people cope with stressful situations, ways by which they try to reach a middle-range arousal and a high level of well-being. In the case of design for terrorism, the importance of catering for the psychological and emotional needs of security is extenuated in light of this threat being directly associated with instigation of fear, its saliency in the public agenda, and the fact that it targets public places. Despite its importance, this issue has been comparatively neglected in the literature on the reduction of risk of terrorism in the built environment.

The review on how people are influenced by the environment suggests a complex combination of factors that influence individuals' sense of security in a place. Some sources identify people's feelings of security and related responses to the physical environment as inborn reactions while others point out a cognitive process in which learning and familiarity shape a person's understanding and responses to security issues. Studying societies with different exposure to the threat of terrorism may show if there is a global innate pattern of reactions to the threat, and to what extent people's reactions to it are based on personal familiarity with it. Statistics on past incidents of terrorism illustrate that the U.S. and Israel can be considered as instances of societies of different experience with the threat. An even greater difference in the exposure to the threat of terrorism can be found when focusing on a specific location in the U.S. which does not have any direct experience with terrorism, as in the case of Texas.

Beyond the general question of what stands behind people's reactions to security threats, the review points out several elements that are considered in the literature as influential on perception of security. These elements are divided into two levels. One level relates to the conceptual qualities of a certain place that may create a general worry about the chance of being victimized. These qualities are identified as the function of the building and the context in which it operates. With regards to the threat of terrorism, as evident in the cases of the U.S. and Israel, the two issues of context and function are interrelated. The review exemplifies differences in target selection as associated with each society. The other level of influential elements on people's sense of security speaks for the tangible qualities of a place that may elicit specific fears. These are indicated in the literature as the physical/structural and social cues of the environment. The review also points to the importance of focusing on realistic yet simple viewsheds, those that can attest for a person's first encounter with a facility.

Based on this analysis, the dissertation attempts to look at the impact of both the idea of a certain facility in a specific political context (i.s., society) as well as some specific physical attributes of a building that are visually evident as a person approaches a building for the first time. The latter notion points to the envelope of a building and the entrance to it. Two elements whose design is imperative to secure a building from a terrorism attack.

In conclusion, facing the global threat of terrorism, the review clearly illustrates the importance of addressing the public's psychological and emotional needs in the design of our communities. This research, therefore, constitutes a first examination of how people perceive this threat in the context of the built environment and their sense of security as related to conceptual and tangible elements of the built environment.

The following chapter discusses the theoretical framework of this dissertation. The chapter extracts from the literature review key factors that account for how architecture mediates humans' reactions to the threat of terrorism. More specifically, the chapter outlines the conceptual model of this research and details the related hypotheses. The chapter concludes with a discussion of the limitations of the model.

CHAPTER III

CONCEPTUAL FRAMEWORK

This chapter consolidates the ideas that were covered in the literature review into a workable theoretical framework. The literature review suggests several levels of factors that link the built environment to individuals' experience of security. The first level relates to the conceptual meaning of the specific built environment (Lang, 1987; Nasar and Jones, 1997; Nasar, 1997). This level includes the function of that building, i.e., the building-use, and how this building-use is associated with specific risks (AIA, 2001; Archibald, *et al*., 2002; Combs, 2003; Etzioni, 2002; Kozlow and Sullivan, 2000; Lang, 1987; Linn, 2002; Nasar and Jones, 1997; Nasar, 1997). The second level of factors concerns the more concrete visual cues that emanate from the built environment and trigger associations to risk. This level includes the formal, structural cues of the surroundings (Appleton, 1975; Berlyne, 1971; Fisher and Nasar, 1992; Goffman, 1971; Holahan, 1982; Kaplan, *et al*., 1998; Nasar and Jones, 1997; Newman, 1972; Tijerino, 1998; Ulrich, 1993) and the social cues that can be detected in a place (LaGrange, *et al*., 1992; Lang, 1987; Nasar and Jones, 1997; Nasar, 1997; Shaffer and Anderson, 1983; Tijerino, 1998; Zilbershtein and Seidel, 2004).

Focusing on the characteristics of buildings, whether conceptual (building-use) or physical (visual cues), the literature suggests that they influence perceptions of safety and other facets of people's reactions as a function of the context in which the building operates (Lang, 1987; Linn, 2002; Nasar and Jones, 1997; Nasar, 1997; Ulrich, 1979; Holahan, 1982).

In dealing with terrorism, the element of context relates to two main issues: the current threats for such events and the experiences/history of terrorism within a given society. The latter expresses the level of familiarity an individual within a society would have with the threat of terrorism and with security measures (Barker and Page, 2002). Both facets of context may taint the individual's awareness of such threats, the perceived risk, and the connotations of the architectural design as related to security. As a result, these factors moderate emotive and behavioral reactions to the function of certain public buildings with certain design features.

Section 3.1 introduces a conceptual model outlining people's security-related reactions and the factors that play a role in influencing those. Alongside the general components of the model, the scheme introduces the specific foci of this dissertation. The section continues with a through explanation of each of the variables in the model. Following the explanation of the model and its components, section 3.2 presents the basic hypotheses of the research. These hypotheses are derived from the conceptual model, the elements that comprise it, and their particular specifications for this research. Section 3.3 discusses the limitations of the conceptual model.

3.1 Conceptual Model

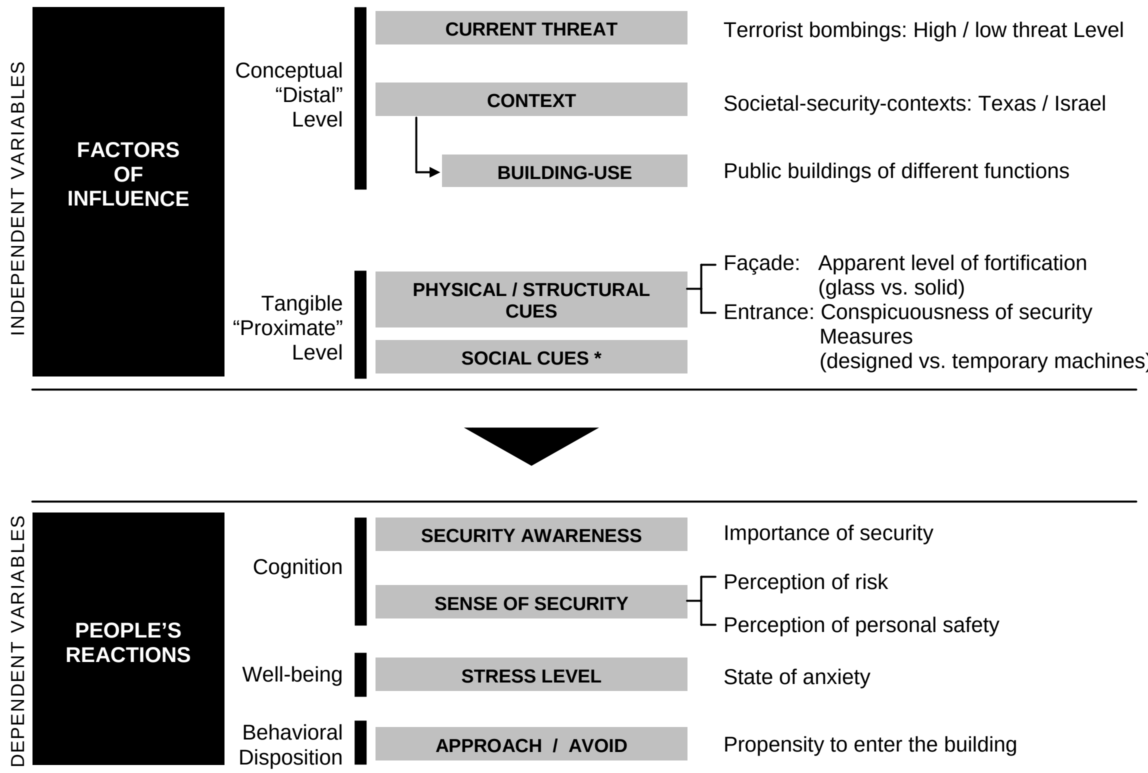


FIGURE 3.1. The conceptual model.

* The research does not include examination of social cues and their possible influence on people's security-related-reactions to the threat of terrorism. Nonetheless, this factor was taken into account in the creation of the material used in this study (see section 4).

The conceptual model, illustrated in Fig. 3.1, indicates four major independent variables (i.e., current threat, social-political-context, physical/structural cues, and social cues) that play a part in influencing people's security-related reactions. The model presents building-use as the fifth variable which is directly linked to the factor of social-political-context. The four dependent variables in this model resonate with the range of people's responses: cognitive processes, emotive reaction, and behavioral disposition. The following sections detail all the variables and explain the specific foci of this research as related to each variable.

3.1.1 Independent Variables

The model, focusing on how users of public buildings are affected by factors of the built environment in the context of terrorism threat, identifies five independent variables. The first three variables relate to the conceptual, "distal" level (Nasar and Jones, 1997). These address the use of the building, its level of association to the risk of terrorism in a certain political context, and the current threats for such events (Etzioni, 2002; Lang, 1987; Nasar, 1997; Nasar and Jones, 1997). The other two factors refer to what was identified in the literature as the tangible, "proximate" level: the visible elements in the built environment (Nasar and Jones, 1997). One addresses physical/structural cues (i.e., design elements) of the environment (Appleton, 1975; Berlyne, 1971; Fisher and Nasar, 1992; Holahan, 1982; Kaplan, Kaplan and Ryan, 1998; Nasar and Jones, 1997; Newman, 1972; Tijerino, 1998; Ulrich, 1993) and the other points to the social cues that can be detected in a place.[1]

The model posits that the interface of architecture of buildings and the individual's security-related-reactions are moderated by the general context of societal history and the specific threats that given building-uses face. In concrete terms, different building-uses have different risks associated with them in given societies. Societal history with a certain threat generates those differential risk levels per building-use. In addition, a person's expectations of security and attitude towards the risk (i.e., what the individual considers as acceptable risk) are also affected by the societal affiliation. Hence, sensitivity to the influence of architecture on feelings of security and associated responses are context dependent. The explanations of the model's independent variables and their specific foci in this dissertation are detailed below.

3.1.1.1 Current Threat: Current Level of Threat of Terrorist Bombings

At different times, different threats and or levels of- may dominate a certain geographical area. This variable refers to the type and level of threat that exists in the area of the facility and endangers it at present time. In this research, this element refers to a current threat of terrorism attack.

Specifically, the research concentrates on the threat of explosives being used by terrorists. As indicated in the literature review, bombings are currently the most common type of terrorism attacks (Craighead, 2003; MIPT Terrorism Knowledge Base, 2007). This form of terrorism relates to several different aspects of architectural design, such as design for resiliency, as well as control of access. Moreover, the use of explosives can be very destructive with a strong visual impact on the surroundings (FEMA, 2003; Coaffee, 2003).

An existing threat of terrorism poses several challenges to architects. One major challenge, which has been relatively neglected in the literature, is how to design relatively secure buildings that would also foster the emotional wellbeing of their users. An even greater question is how to do it with a vision for the future, realizing that during the span of a building's lifetime the level of threat might change as it relates to political and social circumstances. With these questions in mind, this research focuses on variations in the level of current terrorism threat of explosives. Two levels of current threat of terrorism are examined—whether bombing attacks are currently considered as a major threat in the area of the facility (state/country) or are not a threat at all.

3.1.1.2 Context: Societal-Security-Context

Usually, in the field of architecture, the term "context of a building" implies two aspects. One aspect of the term refers to the immediate physical environment surrounding the building. The second aspect of context—on which this study concentrates – refers to the cultural, or the social-political setting of the facility (Holahan, 1982; Lang, 1987; Linn, 2002; Nasar and Jones, 1997; Nasar, 1997; Ulrich, 1979).

As indicated in the literature review, in a society that is threatened by terrorism attacks, single facilities become probable targets, mostly because of their own characteristics and less due to the buildings that surround them (Archibald, *et al*., 2002; Combs, 2003; Kozlow and Sullivan, 2000). This issue makes the physical context less relevant to the threat of terrorism. The other level of context, regarded in this dissertation as the societal-security-context, relates to the history of the political/security milieu of a place, which, according to the literature review, may condition a member of that society to security issues (Barker and Page, 2002; Herzog and Kaplan, 1976; Pidgeon, *et al*., 2003).[2] As this dissertation focuses on the users' perspective as related to threats of terrorism, this level of context becomes the most viable one for the research.

Specifically to this research, the societal-security-context relates to the level of exposure and experience an individual of a society has with the threat of terrorism of explosives and with counter security measures. Familiarity with the threat of terrorism, or lack of -, may influence the perception of risk as related to certain building-uses and the level of understanding of the threat and what environmental conditions may hinder or facilitate it. Consequently, this factor relates to a person's expectations of security measures, and may affect a person's emotional comfort and influence his/her level of stress. In addition, the level of familiarity with the threat and with 'living in its shadow' may taint the individual's emotional endurance to variations in risk, and ultimately affect decisions on whether to avoid or use the environment.

Studying societies with different exposure to the threat of terrorism may show if there is a global innate pattern of reactions to the threat, and to what extent people's reactions to it are based on personal familiarity. In this dissertation research, College Station, Texas, and Tel Aviv, Israel, were chosen as two societies of different security contexts: a society with a very low exposure (almost none) to the threat of terrorism vs. a society which has been experiencing for many years high exposure to the threat of explosives (MIPT Terrorism Knowledge Base, 2007; US Department of State, 1994, 1995, 1996, 1997, 1998, 1999, 200, 2001, 2002, 2003).

3.1.1.3 Building-use: Facilities of Public Nature

This variable refers to the relation between certain building-uses (i.e., functions) and incidents of terrorism of explosives. In general, and according to the literature review, this research focuses on the most probable targets of terrorism - buildings of public nature. As indicated, these facilities possess symbolic values. Damage to these buildings has the potential to provoke anxiety/fear among the population, could disturb the economy, or infrastructure, and facilitate the possibility of a Mass Casualty Incident (MCI) (Archibald, *et al*., 2002; Combs, 2003; Kozlow and Sullivan, 2000).

Concentrating on buildings of public nature also highlights the importance of accessibility to them and their projected image—both key factors in the phenomenological identity of these buildings as well as factors that can be influenced by measures of security (AIA, 2001; Craighead, 2003; FEMA, 2003a, 2003b; GSA, 2003). In addition, as indicated, this dissertation focuses on the users' security-related perceptions and reactions. As such, the research looks into which building-uses, within the general group of buildings of public nature, the public perceive to be associated with terrorism of explosives.

Examining two societies of different experience with the threat would show if people of different societal-security-contexts may attribute different levels of risk to different building-uses. This again would help to understand the extent to which reactions to the threat of terrorism can be considered a global common human phenomenon (i.e., long-term evolutionary based), or as case-based occurrences derived from familiarity based on experiences and learning.[3]

3.1.1.4 Physical/Structural Cues: Architectural Elements at the Approach / Entrance to a Building

This factor refers to the visible design elements that are observed by the users of the building. The research focuses on the first impression a person has of a building. This impression influences the comfort and anxiety level while being in the environment (Berlyne, 1971; rich, *et al*., 1991; Ulrich, 1993). Furthermore, it can influence the decision of whether to use the facility (Barker and Page, 2002; Geva and Skorick, 2006; Holahan, 1982). Consequently, the design elements that are tested in this dissertation are of façades and entrances, two general design components that compose a sequence of a real-life experience of approaching and entering a building (Stamps, 1997).

In addition, as illustrated throughout the literature review, along history, façades and entrances had a major security function. They presented physical impediment through reinforcement to the borders of the interior space and provided control over the access to it. In addition, they generated deterrence through the projection of a certain image (Zilbershtein, 2006).

Within the general concept of façade and entrance design, the specific foci of this dissertation are on elements that, as indicated in the literature review, are extremely relevant to the issue of security from terrorism as well as to the question of human perception: the level of fortification vs. openness as represented in the façade design, and the conspicuousness of the access control security measures in the overall architectural design of the entrance.

3.1.1.4.1 The Level of Fortification vs. Openness as Represented in the Façade Design

Sources specify the importance of the design of the shell of a building for achieving resiliency from potential blasts (AIA, 2001; Craighead, 2003; FEMA, 2003a, 2003b; GSA, 2003). In the past, resilient, secure structures were characterized with very few and very small openings. These days, in design for terrorism, it is still recommended to have fewer windows (especially on lower floors) (FEMA 2003a, 2003b). Though, the development of better and more resistant materials and supporting systems allows a great deal of flexibility in the design and permits the use of large spans of glazing (Bush, *et al*., 2004; GSA, 2003).

While both design alternatives (few windows or many windows) are able to be resilient enough for explosives, the question that arises then, is how the relative proportion of mass vs. glazing influences the way a building is perceived by potential users. Does the public perceive a building of fewer windows as more secure in the context of terrorism threat than a building with a lot of glazing? How does the relative proportion of window area vs. solid area in the building's façade affect people's emotional comfort and finally, their desire to use the building?

With these questions in mind, the dissertation addresses people's security-related reactions to buildings with solid façades in comparison to people's security-related reactions to buildings with all-glass facades.

3.1.1.4.2 The Conspicuousness of the Access Control Security Measures in the Overall Architectural Design of the Entrance

In the history of architecture of war, as well as in crime prevention theories, access control has always been an essential security element (Colquhoun, 2004; Newman, 1972; Contenau, 1954; Gibson, 2001; Gympel, 1996 Healy, 1983; Honey, 2000; Schneider and Kitchen, 2002; Kelly, 2004; Nadel, 2001). In modern times, facing the threat of terrorism, control of access translates to the use of mechanical and electrical systems and entry procedures operated by security personnel. The visible physical/architectural elements entail a layout of x-ray machines for screening incoming parcels and packages, walk-through metal detectors, and barriers of some sort that help direct / restrict the pedestrian traffic (Craighead, 2003; FEMA, 2003b; GSA, 2003).

The importance of access control to security from terrorism is exemplified in the addition of such measures to many facilities when the level of alert of terrorism is elevated. This trend, as indicated in the literature review, also shows the flexibility of these measures to be adjusted according to current security needs.[4] The downside to this phenomenon is that many times, when such measures are added post-construction and were not taken into account in the initial design of the facility, they appear as improvised temporary machinery. While the mere existence of access control security measures elevates the appeared level of security in a building, it is unclear how the level of the design of these measures influences the building's appearance and security image. This research, therefore, focuses on the perceptual effects of access control security measures that appear as part of the overall design vs. those that appear as temporary stationed machines.

3.1.2 Dependent Variables

The dependent variables of the study represent a range of humans' reactions to potentially threatening situations. The specific variables correspond to: (a) cognitive processes, i.e., thought and resulted feeling (Geva and Skorick, 2006; Holahan, 1982); (b) level of well-being, i.e., stress level (Ulrich, *et al*., 1991; Ulrich, 1993), and (c) behavioral disposition, i.e., action propensity (Barker and Page, 2002; Geva and Skorick, 2006; Holahan, 1982).

These levels of reactions are quite interdependent, that is, the stress level and action propensity to avoid a building may be related to a perceived danger and elevated feeling of fear. However, it is plausible to postulate that these interrelationships are not mandatory and may be differentially related to the independent variables. Explanations to the precise dependent variables in the model and their specifications as related to this dissertation are brought below.

3.1.2.1 Awareness of Security from Terrorism

This variable relates to how important the issue of security is in the person's mind. Specifically, this research concentrates on the level of awareness of security from the threat of terrorism. A personal experience with a building of specific use and design may trigger different thoughts on different dimensions in the mind of a user (e.g., aesthetic, way-finding, monumentality). Hence, this variable reflects the user's perception of the relative importance of security from terrorism in the phenomenology of the building. This variable looks at the level of awareness to the subject, without placing judgment on how secure a person considers the environment to be.

3.1.2.2 Sense of Security

The conceptual model suggests two intertwined appraisals of a situation that can inform about a person's overall sense of security. One appraisal is more general, and the other more personal.

3.1.2.2.1 Perception of Risk

The perception of risk is the more general appraisal. It refers to the perceived probability of an incident occurring at a specific location. In other words, this is an assessment of the level of danger in that environment. In this research, the perception of risk refers to how people from different societal-security-contexts perceive the probability of a terrorist attack happening in a specific building-use and with specific design features.

3.1.2.2.2 Perception of Personal Safety

This variable refers to the more personal appraisal of security. It relates directly to how safe the individual feels in that environment. In this research, the perception of personal safety refers to how secure people from different societal-security-contexts feel approaching a specific building-use with specific design features.

3.1.2.3 Stress Level; i.e., the State of Anxiety

Literature suggests that a person's reaction to a situation that potentially challenges or threatens the well-being translates to an increase in the level of stress. More specifically, in this research, the level of stress, indicated by a person's state of anxiety, is expected to be affected by the independent variables. Examination of this factor may show what instances of the independent variables, can be considered as stress inducing stimuli and what may facilitate a reduction in the stress level, particularly as we examine different design alternatives.

3.1.2.4 Approach / Avoid: The Propensity to Enter the Building

This variable refers to a person's behavioral disposition as a reaction to the independent variables. As indicated in the literature, actions, categorized in the literature in the dichotomous verbs of flight or fight, reflect the ways by which people deal with stressful situations. In this research, this variable is translated into the person's level of motivation and likelihood to enter the facility and use the building. It should be interesting to find out the differences in the tendencies to flight or fight between the different societies that have different experiences with the threat of terrorism and as related to different building-uses. Another point of interest would be to see the connection between the action propensities to the other dependent variables.

3.2 Research Hypotheses

The outline of the hypotheses is organized as follows. First, the effects of the distal factors (i.e., the current level of terrorism threat and the societal-security-context) on individuals' security-related responses are presented (section 3.2.1). Then, the hypotheses that link the architectural variables (proximate level) to the distal variables are detailed. Note, that the underlying model assumes that the effects of the architectural variables on individuals are moderated by these distal variables. The hypotheses on the two architectural variables that are tested in this research are grouped per variable (sections 3.2.2, 3.2.3). Within these, the assumed effects of the glass-solid ratio in the façade design on people's reactions are more deductible from previous knowledge, and hence more detailed, while the hypothesized effects of the design of access control devices are rather intuitive and less detailed.

3.2.1 Hypotheses that Relate to Variables of the "Distal" Level

The first set of hypotheses, relating to the independent variables that combine the "distal" level, assumes interdependency among the dependent variables. In other words, variations in the variables that influence characteristics of a place on a conceptual level (i.e., the current level of threat, the societal-security-context and the building-use) influence the different individual's security-related reactions in a corresponding way. This interdependency links a rise in the awareness of the issue of security to a reduction in the sense of security (elevation in perceived risk and in feeling of insecurity), and to an increased level of anxiety and a propensity to avoid going to the building.

(H-1.a) Variation in the level of current terrorism threat influences a person's awareness of security issue, his/her sense of security, the stress level (i.e., state of anxiety) and the propensity to use the building (de Becker, 2002; Slovic, *et al*., 2000). The greater the current threat from terrorism is - the more the issue of security from terrorism occupies the person's mind, and the lower his/her sense of security is (i.e., the higher the perceived risk and danger, and the less secure the person feels). Subsequently, people in this situation are more anxious and tend to want to avoid entering the building.

(H-1.b) The societal-security-context influences a person's awareness of security from terrorism, his/her sense of security, the stress level (i.e., state of anxiety) and the propensity to use the building (Barker and Page, 2002; Herzog and Kaplan, 1976). People from a society that is usually under a high level of terrorism threat (e.g., Israel) have security of terrorism more on their minds, have a lower sense of security (i.e., perceive such attacks to be of higher probability of occurring and feel less secure), and are more anxious than people from a society which is not accustomed to living under such threat (e.g., Texas). In addition, people from a society that is usually under a high level of terrorism threat (e.g., Israel) would more likely keep away from any buildings of public nature. This is a tendency that should not exist in a society that does not have much experience with the threat of terrorist bombings (e.g., Texas).

(H-1.c) The extent to which the current level of terrorism threat influences all aspects of people's reactions (awareness, sense of security, anxiety level and action propensity) is moderated by how used the person is to such a reality (i.e., his/her societal-security-context) (Barker and Page, 2002; Herzog and Kaplan, 1976). Variations in the current level of terrorism threat has greater influence on how much security from terrorism is on a person's mind in a society that is not accustomed to live under high level of security threat (e.g., Texas), than in a society that usually lives under high level of threat (e.g., Israel). In other words, people who are used to live with the threat of terrorism, have it on their minds regardless of the current threat level. People who are not used to the threat are more affected by the current threat level. Accordingly, the fluctuations in a person's sense security, his/her anxiety level and willingness to enter a building as affected by the current security threat is greater in a society that is not accustomed to live under high level of terrorism threat (e.g., Texas), than in a society that usually lives with high level of threat (e.g., Israel).

(H-1.d) The effects of building-use on people's scope of reactions (awareness of security from terrorism, sense of security, level of anxiety and action propensity) is interlinked to the societal-security-context (Barker and Page, 2002; Etzioni, 2002; Herzog and Kaplan, 1976; Lang, 1987; Nasar, 1997; Nasar and Jones, 1997). The societal-security-context, i.e., the experience a society has with the threat of terrorism, varies around the world (MIPT Terrorism Knowledge Base, 2007; US Department of State, 1994, 1995, 1996, 1997, 1998, 1999, 200, 2001, 2002, 2003). This experience influences the extent by which the building-use is considered in that society as a probable target of terrorism. The more a building-use is considered as a probable target of terrorism, the more the issue of security from terrorism is on a person's mind, the lower the sense of security, the higher is the anxiety level, and the greater is the inclination to avoid the building.

3.2.2 Hypotheses Regarding the Level of Fortification Vs. Openness as Represented in the Façade Design

The following hypotheses regarding the effects of the glass-solid ratio in the façade design on people's security-related-reactions present a more complex relationship between the dependent variables. For example, this means that an elevated level of awareness of security from terrorism due to an architectural solution does not necessarily corresponds with a reduction in the sense of security. In addition, while in some cases the behavioral disposition corresponds with the individual's sense of security, in other cases, it may not.

(H-2.a) While a building that has a mostly solid façade increases people's awareness of security from terrorism it also increases their sense of security. In other words, when confronted with a building of little window area, people tend to have security from terrorism more on their minds at the same time that they associate less risk and feel safer than when confronted with a building of extensive window area.

(H-2.b) The effects of glass-solid ratio in the façade design on a person's awareness of security from terrorism and a person's sense of security (perceived risk and feeling of security) are moderated by the current level of terrorism threat. When there is a terrorism threat, the effects are accentuated, and when there is no terrorism threat the effect is attenuated.

(H-2.c) The effects of glass-solid ratio in the façade design on a person's awareness of security from terrorism and a person's sense of security are moderated by the societal-security-context. In a society that is not used to the threat of terrorism (e.g., Texas), the variations in a person's awareness of security and sense of security as affected by the design of the façade would be greater than in a society that is accustomed to living under the threat (e.g., Israel).

(H-2.d) The effect of glass-solid ratio in the façade design on a person's stress/anxiety level is influenced by the current level of terrorism threat. When there is a terrorism threat, a person would be more anxious when confronted with a building of extensive window area (congruent with low sense of security). When there is no terrorism threat, a person would be more anxious when the building's façade is solid (as this design elevates the awareness to the issue of security).

(H-2.e) People that are not used to the threat of terrorism (e.g., Texans) tend to follow their sense of security (as affected by the glass-solid ratio in the façade design, the building-use and the current level of threat) with actions, while people who are accustomed to the threat of terrorism (e.g., Israelis) tend to use buildings regardless of their feeling of security.

3.2.3 Hypotheses That Relate to the Conspicuousness of the Access Control Security Measures in the Overall Architectural Design of the Entrance

The following hypotheses regarding the effects of the design of access control devices on people's security-related reactions are more intuitive and less detailed than the previous group of hypotheses. And while the presented assumptions discuss the main effects that this variable has on the different reactions, it is expected that these effects are moderated by the distal variables. The examination of the conceptual framework, detailed in the next sections (sections 4, 5), looks to see what these interactions are.

(H-3.a) Having access control security measures at the entrance to a building (whether designed or as temporary stationed machines) increases people's awareness of the issue of security from terrorism.

(H-3.b) When confronted with conspicuous security measures that appear as temporary stationed machines people's overall sense of security is reduced and their anxiety level is increased. Well-designed measures, which seem as part of the entrance, enhance the sense of security (i.e., reduce perceived risk and increase perception of personal safety) and reduce the level of anxiety.

(H-3.c) People that are not used to the threat of terrorism (e.g., Texans) tend to follow their sense of security (as affected by the design of access control security measures and the building-use) with actions, while people who are accustomed to the threat of terrorism (e.g., Israelis) tend to use buildings regardless of their sense of security.

3.3 The Model's Limitations

The model presented in this dissertation concentrates on how the use and image of public buildings moderate perceived threats to personal security associated with terrorism. While the model addresses a host of cultural/political variables as well as architectural elements, it is not exhaustive. One can add additional variables that may influence individual's perception of safety (e.g., demographic characteristics that relate to specific knowledge regarding security issues, to age, or to personal family status that may indicate a certain sense of responsibility). In addition, though the model tries to cover all the spectrum of people's reactions to threatening situations, other and more detailed nuances may be found.

With regards to the factor of physical/structural cues, this dissertation focuses on very specific design elements in the façade and entrance of buildings. Other architectural elements can be considered under the general model (e.g., proportions of facades, or of windows or entrances, colors, materials, etc.). In addition, with the intent to simulate a first experience with a building, the focus on façade and the entry in that façade, are not necessarily representative to all the possible "viewsheds" for a first encounter with a building. Other scenarios of first encounter with buildings may include different architectural elements (e.g., some public buildings have garages underneath or may be accessed directly through a public transportation compound).

Finally, the element of the social cues, represented in the scheme of the conceptual model (Fig. 3.1) as a factor of possible influence on people's security-related-reactions, was not developed in the specific model of this research or addressed in the hypotheses. Though, this factor was taken into account in the creation of the material used in this study, presented in section 4.

While recognizing the above limitations, this conceptual model serves as a first step in exploring how buildings, in their specific use and design, influence humans' reaction to terrorism in our era.

Notes

1. While acknowledging the significance of the social cues and including them as a factor of influence on people's security-related-reactions in the basic conceptual model, the research detailed in this dissertation does not include this factor in the investigation. The importance of social cues was taken into account in the creation of the material used in this study (see Chapter 4).

2. Other demographic characteristics may also affect the individual's conditioning to safety, e.g., gender, age, marital status and professional skills.

3. A first step in the empirical stage of this research is to identify building-uses that are associated with terrorism threat for each of the examined societies (Texas, Israel).

4. Other design elements are harder or impossible to change (e.g., location on site, layout, structure), or can be changed only with a significant investment (e.g., exterior materials).

CHAPTER IV

METHODOLOGY

This dissertation examines how the function and image of buildings impact the way people from different societies respond to threats to personal security associated with terrorism. The investigation focuses on how security threats, societal background, building-uses and the visual elements of a building affect how important the issue of a terrorism threat is in the respondent's mind, how safe and how anxious the respondent feels, and how likely the respondent is to use the environment.

To test empirically the complex conceptual framework, this dissertation entails a cross-national investigation, and is composed of three main studies and a pretest survey. The three studies constitute a sequence of progressive phases where each study replicates and extends the previous one, putting another variable to the test.

While different terms are used in the classification of research designs in interdisciplinary endeavors, the empirical thrust of this dissertation, on which the three main studies are based, can be characterized as a quasi-experimental methodology. The use of this term implies several main features of the research procedure.

First, as defined by numerous scholars in multiple disciplines, the experimental element in the term suggests that the researcher introduces (manipulates) the variations in the independent variables (i.e., treatments or conditions) within a relatively controlled research environment (Aronson, *et al*., 1998; Douglas and Holt, 1992; McDermott, 2002). It should be noted that early literature specified the existence of a non- treatment, control group, to achieve a true experiment (Campbell and Stanley, 1963). Yet, some sources suggest that in factorial designs, which consist of more than one independent variable, the comparisons are performed between the treatment conditions (Aronson, *et al.*, 1998; Frankfort-Nachmias and Nachmias, 2000; Groat and Wang, 2002; Schutt, 2001).

Second, with one exception in this project, participants are randomly assigned to the experimental conditions. This randomization is expected to "equate" the "pre" treatment differences among the groups. Campbell and Stanley (1963) argue that randomization is the "assurance of lack of initial biases between groups" and therefore eliminates the need for Pretest in the experimental research designs. They, as well as other scholars, acknowledge the "Post-test only" as part of "true" or classical experimental research designs (ibid:25-26; Frankfort-Nachmias and Nachmias, 2000; Schutt, 2001).

Third, the "quasi" term is employed to suggest that one of the independent variables of the study cannot comply with the randomization requirement (Groat and Wang, 2002; Schutt, 2001). "Although the goal for both experimental and quasi-experimental research is to achieve comparability among the units in each treatment group, such comparability is more precisely established in experimental research through random assignment. In contrast, the quasi-experimental research design is often employed in field setting where people or groups cannot be randomly assigned for either ethical or practical reasons" (Groat and Wang, 2002:255). In this project, the non-manipulated variable relates to the societal origin of the groups, since participants could not have been randomly assigned to be a Texan or an Israeli. The use of this variable decreases the experimental control, as the participants of the two groups are different from each other not only with exposure to terrorism threats – but along a multitude of other features that may contaminate the results (internal validity).

We could use other research design terms such as "contrasted groups" (Frankfort-Nachmias and Nachmias, 2000) to define the research methodology of this project. Though such a terminology would highlight the differences along one particular independent variable (society) – but that would mask the controlled nature of the research design and the fact that other treatments in the study were introduced by the researcher.

Following the above discussion, this chapter carries on with a more thorough examination of the basic concepts behind the use of experimental procedure, its strengths and limitations and how they were addressed in this project. The chapter then continues with the cross-national aspect of the investigation, followed by a review of the different stages of the investigation: the pretest and the three main studies. The review of the stages of the investigation, entail the specific goals of each study, its research design, material and procedure, and lastly—the statistical analyses that were performed.

4.1 Using Experimental Procedure: Strengths and Limitations

Valid knowledge is the central concern of any scientific research. The three components of validity are: measurement validity, external validity (i.e., generalizability) and internal (causal) validity (Groat and Wang, 2002; Schutt, 2001). Measurement validity exists when a measure measures what we intend it to measure. “Generalizability exists when a conclusion holds true for the population, group, setting, or event … given the conditions that we specify. Causal validity exists when a conclusion that A leads to or results in B is correct” (Schutt, 2001:20).

In one of the earliest works on experimental research design, Sir Ronald Fisher’s *The Design of Experiments* (1935), “experimentation was described as “experience carefully planned in advance.” Although experiments as a class are a remarkably diverse lot, what they have in common that distinguishes them from other types of scientific inquiry is that the researcher creates the conditions necessary for observation rather than passively observing naturally occurring situations” (McGraw and Hoekstra, 1994:4). In this explanation lie the strengths and limitations of the experimental methodology. The following sections discus both while detailing elements of the methodology and how they relate to this research.

4.1.1 Strengths of Experimentation

The above explanation to experimental methodology indicates the researcher’s control as the first and foremost basis for this type of scientific examination. This control is over various aspects of the examination (Groat and Wang, 2002; McGraw and Hoekstra, 1994; Schutt, 2001).

The first form of control is over the subject matter, i.e., the critical variables of the theory (McGraw and Hoekstra, 1994). An experimental procedure enables to control fully the variations in the independent variables as well as measure the specific dependent variables of interest. Furthermore, experiments, according to Mook (1983), help explore whether a certain reaction/event can happen, especially in counterfactual contexts when the "tested" reality did not occur yet. The fact that a certain terror attack did not happen in a given environment still leaves the question open of what, if, and how the design profession should deal with it. In this dissertation, the use of experimental methodology allows to examine certain forms of reaction of people to the specific architectural variations as associated with particular building-uses, in two possible levels of terrorism threat.

Another form of control is over extraneous variables that may influence both the independent and the dependent variables of interest (McGraw and Hoekstra, 1994). This control is achieved through the experimental methodology's basic principle to randomly assign participants to treatments. Random assignment refers to the use of chance procedures to ensure that each participant has the same opportunity to be assigned to any given group. This procedure ensures the nonspuriousness, i.e., it guarantees that any differences observed between treatment groups are due to the difference in treatment and not due to a third variable (Groat and Wang, 2002; Schutt, 2001). In this dissertation, participants in each country were randomly assigned to treatments by the web-based computer application.

The third form of the researcher's control is over the setting or the situation in which the research is conducted (McGraw and Hoekstra, 1994). In social sciences, this means that all participants are exposed to a similar procedure while participating in the experiments. As this dissertation deals with a cross-national investigation, the experimental methodology facilitated the need to expose participants of both countries to the same variations in treatments as well as to the same procedure. The uniformity of procedure is achieved in this research through the utilization of a web-based computerized platform.

All aspects of control in experimental methodology enable the identification and testing of cause and effect relationship among the theory's variables (Groat and Wang, 2002; McGraw and Hoekstra, 1994; Schutt, 2001). The ability to identify and test causal relationship between variables is strengthened by the fact that this methodology enables "to isolate and decompose complex phenomena in order to pinpoint their effects with precision" (Kinder and Palfrey, 1992; McGraw and Hoekstra, 1994:6). In addition, the analysis of experimental data is considered as relatively simple and straightforward since there is no ambiguity, as to what constitutes a cause and what constitutes an effect (McGraw and Hoekstra, 1994). These elements and attributes of the experimental methodology go along with the level of development of the conceptual model presented in this dissertation and its related hypotheses.

4.1.2 Limitations of Experimentation

The researcher's ability to control all aspects of experimental research design enables attribution of causality, and hence strengthens the internal validity of the research. Nonetheless, the same control is the reason for the main criticism of this methodology, especially when it is implemented in social sciences. Critics claim that "most real-life settings and socio-cultural phenomena are far too complex to reduce to a small set of treatment and outcome variables" (Groat and Wang, 2002:270). In addition, "the experimental setting and implementation of the independent variables may be artificial in comparison to their manifestation in the real world" (McGraw and Hoekstra, 1994:7).

Recognizing the above limitations, this dissertation research attempts to minimize them. This was done through the development of a comprehensive model, while detailing its components and narrowing the specific investigation to certain controllable variables. In addition, using a phased research design (three main studies and a pretest) allows the investigation of the different components of the complex model.

Furthermore, the material used in the studies was developed to account for as realistic variations as possible of the independent variables. The material was developed utilizing techniques that have been recognized as effective in previous research done in social sciences; political science and architecture research (please see section 4.3.2.3.1).

In addition, the questionnaire was carefully developed using scales and type of questions that are considered reliable and valid for self-reported responses in social research (please see section 4.3.2.3.2 for details). The reliability of measurement was further strengthened using multiple questions to test each of the dependent variables. Statistical examinations were performed to confirm the level of reliability or association between indicators of the same variable (please see section 4.3.2.4 for details).

As a rule, any research that is conducted with "samples of convenience" is limited in its generalizability. This is due to the fact that samples of convenience might not be representative to the general population of interest. More specifically, the literature warns against relying on a narrow database collected in the academic laboratory using college students (Sears, 1986). Other sources contend that while generalizing from the sample to a larger audience is a great concern in survey studies, it may not always be the main concern of an experimental study. Instead, many experiments in the behavioral sciences are focused on testing the merit of a broad theory. In a specific case, the starting point is a theoretical proposition. If the examined sample is a part of the population to which the theoretical propositions relate, then these propositions should work on that sample (Aronson *et al*., 1995; Kruglanski and Kroy, 1976; McDermott, 2002; Mook, 1983). Using this logic, this research uses the convenience samples of college students (undergraduate students from College Station, Texas, and from Tel Aviv, Israel) to test and illustrate the conceptual model, and not as representatives of the entire population. If the model is correct for the general population, and the students are part of that bigger group than it should work for the sample of students.

Another limitation to the generalizability of experimental research as well as to its measurement validity relates to the participants' awareness of being in a study that may alter their responses (McGraw and Hoekstra, 1994; Schutt, 2001). The research detailed in this dissertation divides the examination into three separate studies, each with a between-groups research design. This overall research design facilitates the exposure of each participant to only one treatment. Hence, it reduces the risk of demand characteristics, which is when participants change their responses to conform to what they think the researcher's expectations are (Orne, 1962).

4.2 A Cross-National Investigation

The cross-national aspect of the study pertains to the exploration of the effects of the societal-security-context on the individual's sense of security as related to threats of terrorism and architectural variables. As indicated in the conceptual framework chapter, two locations were chosen for the study: Texas and Israel.

Texas and Israel represent two societies of extremely different security contexts. Texas has a very low first-hand exposure to the threat of international terrorism. Israel, on the other hand, is a society that has been experiencing for many years a relatively high exposure to the threat. As indicated in the literature review, in the years 2001-2006, Israel experienced 139 significant terrorism attacks (i.e., those that resulted in fatalities) within its territory alone (out of a total of 346 that includes Israeli settlements in the occupied territories as well) (MIPT Terrorism Knowledge Base, 2007). At the same time-frame, there were no attacks within Texas. Only 9 fatal incidents were recorded within the general US, including the three events in September 11 and 4 cases of deaths due to Anthrax poisoning (MIPT Terrorism Knowledge Base).

As noted earlier, the cross-national aspect of the research design introduces the “quasi” term to the experimental methodology. This is due to the fact that the researcher is not able to randomly assign participants to the variations of the societal-security-context (Texas or Israel). The fact that two societies are different from each other not only with exposure to terrorism threats – but along a multitude of other features, may contaminate the results and create problems to the internal validity. In addition, this also questions the generalizability of the results of this research to other places around the world.

The participants in all the stages of the investigation were convenience samples of undergraduate students from College Station, Texas, and Tel Aviv, Israel. In each location, participants were randomly assigned to treatments. A total of 601 Texans and 470 Israelis participated in all stages of the research. The participating students were not in architecture or mathematics majors. The exclusion of architects and mathematicians was done purposely, to achieve greater samples generalizability. Students of architecture may express higher sensitivity to architectural features than other groups. Mathematic majors were excluded as many of the questions in the study pertain to a perceived probability or risk, and mathematicians might have answered such questions less intuitively than the general public.

4.3 Stages of the Investigation

4.3.1 Pretest: Selection of Building-uses in Texas and Israel

4.3.1.1 Objective

The first step of the empirical examination of the conceptual model was to identify building-uses that are perceived to be associated with a terrorism threat of explosives in Texas and in Israel.

Based on the literature review, the examined building-uses were buildings of public nature as they are the most probable targets of terrorism. Damage to public buildings has the potential to provoke anxiety/fear among the population, could disturb the economy, or infrastructure, and facilitate the possibility of an MCI (Mass Casualty Incident). Consequently, the issue of security from terrorism as well as their image and accessibility are all extremely relevant and important to buildings of public nature.

The results of this stage guided the selection of two building-uses which were used as the manipulation of the variable of building-use in the subsequent studies.

4.3.1.2 Research Design and Participants

A survey was conducted to assess people's risk perception associated with the threat of terrorism in relation to 20 different public building-uses in Texas and in Israel. A total of

135 individuals participated in the survey. This included convenience samples of 84 undergraduate students from Texas and 51 undergraduate students from Israel.

4.3.1.3 Research Procedure and Material

The study was conducted using a paper-pencil questionnaire. The cover page introduced the subject of the survey and participants were asked to fill demographic information about their sex and age. The second page instructed participants to rate the probability of occurrence of a terrorism bombing attack in each of 20 given building-uses, using a 0% to 100% scale.

The 0-100 has been used in previous research for self-reported perception of danger (Blanchard, *et al*., 1994) and belongs to the class of magnitude estimation methods (Lodge, 1981; van Doorn, *et al*., 1983). The use of this rating scale in this survey seemed appropriate for the terminology used in the question, as participants were asked to rate a probability of occurrence.

The list of building-uses included: City hall, courthouse, municipal library, post office, bank, hospital, stadium, amusement park, movie theater, restaurant, café, shopping mall, department store, airport terminal, central bus station or terminal, railroad or subway station, sea port terminal, church / synagogue (pending on society), university dormitories, and general office building. The building-uses were ordered randomly to create a mix of functions (see Appendix A for the complete survey material).

Prior to participating, participants signed a consent form that included a description of the general goals of the study, its scope, the procedure, the option to quit at any time during participation, their guaranteed anonymity, and relevant contact information (see the consent form in Appendix A). The entire material and procedure of the study was approved by the Institutional Review Board-Human Subjects in Research, Texas A&M University, and the appropriate authority at the Tel Aviv University.

4.3.1.4 Analysis

After the collection of all responses, descriptive statistics were calculated and additional three main analyses were conducted on the perceived risk of terrorism associated with 20 public building-uses in the two examined societies, Texas and Israel. Two of the examinations utilized Analysis of Variance (ANOVA) tests, and one was based on a Spearman Rank Order Correlation Coefficient test.

The purpose of analysis of variance (ANOVA) is to test for statistically significant differences among means associated with different treatments. Every ANOVA test examines the assumption that the tested means are equal (null hypothesis). A significant result in an ANOVA test means that we reject the null hypothesis of no differences between means, and accept the alternative hypothesis that the means (in the population) are different from each other. The term “significance” in statistics does not refer to the level of importance of the result, rather to the level of confidence that the results are not spurious. For example, a 95% confidence means that that the finding has a five percent (.05) likelihood of being due to chance. The later value is the significant level, α.

The first ANOVA test concentrated on the overall ratings of probability of occurrence of a terrorism act and examined the main-effect of the societal context (Texas, US / Israel) on this general perception. For this examination, for every participant, a mean score was calculated, taking into account his/her ratings of all 20 buildings.

The second examination utilizing ANOVA tests were performed to assess the difference between the societies in their perceived risk associated with each of the 20 building-uses.

For all ANOVA tests, before performing any of the tests, statistical assumptions for a fixed effect design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) was used to assess homogeneity of variance. The α used in all ANOVA tests was set to .05, the common significant level in social sciences.

The third examination entailed a comparison between the two societies of the general patterns of the extent to which different building-uses are associated with risks of terrorism. Since it was expected that the perceived risks (across all buildings) will be higher in one society (Israel) than the other (Texas), it is of importance to assess whether in the two societies the ranking of the different building-uses in terms of the extent to which they are perceived as potential targets of terrorism is similar or not. For the purpose of this examination, a mean score was calculated per building-use, per society.

For each society, the twenty scores were rank ordered from 1 to 20. In this scale, the building that received the highest mean (i.e., rated as of the highest probability to be hit by terrorist bombings) was ranked as number 1, and the building that received the lowest mean score (i.e., rated as of the lowest probability to be hit by terrorist bombings) was ranked number 20. Then, Spearman Rank Correlation Coefficient (*Rho*) was administered to the level of association between those patterns. The *Rho* statistic can indicate whether in both societies, certain building-uses are considered as more target prone than others, regardless to possible differences between societies in the scores of the individual building-uses.

Based on the analysis of the data, two building-uses were selected for the manipulation of the variable of building-use in the subsequent studies: Shopping mall and city hall (see discussion in section 5.1.4).

4.3.2 Main Investigation: Reactions to Architectural Design Elements and Building-uses as Affected by Levels of Terrorism Threat, in Two Societies

4.3.2.1 Objectives

In the sequence of the three studies, each one introduced and tested a new main independent variable (level of terrorism threat; level of fortification vs. openness as represented in the façade design; and the conspicuousness of the access control security measures in the overall architectural design of the entrance). Each study expanded on the previous one, creating a basis for comparison between the studies. The two independent variables of building-use and the societal-security-context played a role in all three studies, thus, enabling a conceptual replication of the findings.

In the sequence of the three studies, the first explored how the specific function/use of the building moderates the effects of variations in threats of terrorism on people's perceptions and reactions to safety and security. This examination allowed to test the validity of the experimental treatments that define the level of terrorism threat. It also provided the opportunity to observe reactions to the two different building-uses before architectural solutions are introduced.

The second study added to the test the influence of the conceptual model's first architectural variable: the apparent level of fortification/openness of the façade of the building (represented in the façade's glass-solid ratio).

The third study added the second architectural variable: The conspicuousness of the security measures from the overall design of the entrance.

4.3.2.2 Research Design and Participants

4.3.2.2.1 Study 1

The first study was of a 2 x 2 x 2 between-groups research design, as illustrated in Table 4.1. The study tested the effects of the two building-uses (city hall and shopping mall), which were chosen based on the pretest, and two levels of terrorism threat (almost no threat vs. the highest level of security alert) on people of two different societies with different societal-security-contexts (Texas and Israel).

A total of 175 undergraduate students participated in this examination (89 from Texas and 86 from Israel). The participants' reactions were measured along three of the four dimensions outlined in the conceptual model: how much the issue of a terrorism threat is on the respondent's mind (i.e., security awareness), the respondent's overall sense of security, and his/her level of anxiety. The model's fourth dimension of people's reactions, i.e., the inclination to use the building, was not tested in this study. This was due to the fact that there were no visual representations of the building in this study, only the specification of a building-use.

TABLE 4.1. Study 1: Between-groups research design of the study of reactions to current level of threat as affected by building-use, in two societies (*n* per cell).

Variation in the level of terrorism threat	Texas (89 undergraduate students)		Israel (86 undergraduate students)	
	City hall	Shopping mall	City hall	Shopping mall
High	21	22	21	23
Low	22	24	21	21

4.3.2.2.2 Study 2

The second study employed a 2 x 2 x 2 x 2 between-groups research design. The study tested the effects of the apparent level of fortification/openness of the façade of the building (all glass façade vs. solid façade) in two building-uses (city hall and shopping mall) and two levels of terrorism threat (almost no threat vs. the highest level of security alert) on people of two different societies with different societal-security-contexts (Texas and Israel).

A total of 362 undergraduate students participated in this examination (200 from Texas and 162 from Israel). The participants' reactions were measured along the four dimensions outlined in the conceptual model: how much the issue of a terrorism threat is on the respondent's mind (i.e., security awareness), the respondent's overall sense of security, his/her level of anxiety and the inclination to use the building. Table 4.2 presents the research design of this study, indicating the tested independent variables and the number of participants in each treatment.

TABLE 4.2. Study 2: Between-groups research design of the study of reactions to façade design as affected by current level of threat and building-use, in two societies (*n* per cell).

Variation in the design of the façade	Variation in the level of terrorism threat	Texas (200 undergraduate students)		Israel (162 undergraduate students)	
		City hall	Shopping mall	City hall	Shopping mall
Glass	High	21	25	18	20
	Low	24	23	19	21
Solid	High	27	26	21	21
	Low	28	26	22	20

4.3.2.2.3 Study 3

The third study employed a 2 x 2 x 2 x 2 between-groups research design, as did the second study. The study tested the effects of the level of conspicuousness of the access control security measures in the overall architectural design of the entrance (designed vs. temporary stationed machines) combined with the effects of the apparent level of fortification/openness of the façade of the building (all glass façade vs. solid façade) in two building-uses (city hall and shopping mall) on people of two different societies with different societal-security-contexts (Texas and Israel).

In this study, in order to limit the accumulated complexity of the research design with the addition of the second architectural variable, the examination was focused only on high level of terrorism threat.

As in the second study, participants' reactions were measured along the four dimensions outlined in the conceptual model: how much the issue of a terrorism threat is on the respondent's mind (i.e., security awareness), the respondent's overall sense of security, his/her level of anxiety and their inclination to use the building. A total of 399 undergraduate students participated in this examination (228 from Texas and 171 from Israel). Table 4.3 presents the research design of this study, indicating the tested independent variables and the number of participants in each treatment.

TABLE 4.3. Study 3: Between-groups research design of the study of reactions to entrance design as affected by façade design and building-use, in two societies, in a high level of terrorism threat (*n* per cell).

Variation in the access control security measures	Variation in the design of the facade	Texas (228 undergraduate students)		Israel (171 undergraduate students)	
		City hall	Shopping mall	City hall	Shopping mall
Designed	Glass	25	23	20	23
	Solid	27	31	19	19
Temporary	Glass	30	34	20	24
	Solid	23	35	26	20

4.3.2.3 Research Procedure and Material

The three studies, which were administered in Texas and Israel, utilized a web-based computerized system. Participants were recruited from classes and did not get any compensation. In each study, the computer program randomly assigned participants to the different scenarios. For each location the material was presented in the native language (English in Texas and Hebrew in Israel).

Participants began with reading a general instruction page and answering a few demographic questions. Then, each participant was exposed to his/her assigned scenario, and was asked to respond to several questions. After answering each question, the participant would hit a “next” button and a new screen appeared with the next question, until completion of the questionnaire.

Prior to participating, all the participants signed a consent form that included a description of the general goals of the study, its scope, the procedure, the option to quit at any time during participation, their guaranteed anonymity, and relevant contact information (see the consent form in Appendix A).

The entire material and procedure of the study was approved by the Institutional Review Board-Human Subjects in Research, Texas A&M University (see approval notification in Appendix A), and the appropriate authority at Tel Aviv University.

4.3.2.3.1 Manipulated Scenarios

The manipulated scenarios described a reality of high or low level of terrorism threat in the country and a certain building-use to which the respondent was about to enter and meet a friend (a shopping mall or a city hall). The scenario in the first study was based on a written description only. The second and third studies included one or two images of the building as well (of the main façade and a close-up image of the entrance of the building), depicting the manipulated architectural variables.

In the first study, prior to exposing each participant to a scenario, the participant was asked to think of a building he/she knows of the same function that was included in the scenario, and enter to the computer its specific location/name. The building which the participant recorded to the system was then automatically included in the scenario as the location for the meeting with the friend. This specification of the building was done to help participants place themselves in the scenario, imagine a certain building, and make the physical reality more tangible (as no image was included in this study).

In the second and third studies, which included images, the images appeared after the written description, during the questionnaire session at the top of every screen (see Appendix A for example of screenshots). Below are the exact manipulations that were used in the studies.

4.3.2.3.1.1 Written descriptions

Many studies in social science, and especially in psychology, economics, sociology and political science, involve written descriptions of scenarios as the experimental treatments (Boettcher, 1995; Hermann, *et al.*, 1999; Kemmelmeier and Winter, 2000).

In this research, written scenarios manipulated the level of current terrorism threat. These were adapted to the specific political and organizational circumstances of the society/country that participated in the study (Texas/Israel). For that reason, for creation of a low-level of current terrorism threat in Texas, the threat of terrorism was not mentioned at all due to the reason that this is the prevailing reality in Texas.

Below are the descriptions that were used for manipulation of high or low current level of terrorism threat in Texas and in Israel (excluding the low level in Texas – where, as indicated, no description was used). For the Hebrew version of the written descriptions that were used in Israel, please see Appendix A.

Scenario: High level of current terrorism threat, in Texas

Urgent Newsbreak:

A t t e n t i o n !!!

The Secretary of Homeland Security has put the nation in the highest, most critical, RED ALERT warning, because of the recent number of acts of terror that were committed in many public buildings, all over the country (including several cases in Texas).

The terrorist bombings, reported daily in the media, have become a major concern in every state of the nation!!!

Scenario: High level of current terrorism threat, in Israel (English translation)

Urgent Newsbreak:

A t t e n t i o n !!!

The National Security Agencies headed by the Minister of Defense announced the highest terrorism alerts ever to exist in Israel until today. That is due to the recent numerous terrorism attacks taking place in public buildings throughout the country. The Minister of Defense warns that the entire state is under a severe security alert!!!

The repeating terrorist bombings, reported daily in the media, have become a major concern all over the state.

Scenario: Low level of current terrorism threat, in Israel (English translation)

Urgent Newsbreak:

End to Terrorism!!!

At the end of a peaceful year, which followed the peace agreements that had been signed between Israel and all its neighboring countries and the prosperous commercial and tourism ties that have developed among Israel and the entire Middle East region, the Prime Minister and the Minister of Defense announced today the end to the threat of terrorism in Israel!

Reports that were submitted to the Foreign and Security Council at the Kneset (House of Representatives), by the IDF's (Israeli Defense Force) Commander-in-Chief and the heads of the Shabach (Israel's internal general security service) and the Mossad (Israel's foreign intelligence service) validated this statement.

All of the written scenarios ended with a statement that presented the general building-use (i.e., a city hall or a shopping mall) which the participant is about to go to and meet a friend. In the first study, instead of the specific building-use, the computerized system included the name of the specific facility that the participant had entered in the previous screen.

4.3.2.3.1.2 Manipulated images

In the second and third studies, images were used to represent and test the two architectural variables of the conceptual model. These images were based on visual simulations, combining computer graphics and artistic enhancements.

The literature provides examples to the use of photographs in studies of people's reactions to different spatial environments. Shafer and Richards in their paper, "A comparison of Viewer Reactions to Outdoor Scenes and Photographs of Those Scenes," concluded that "when color-slide or picture presentations adequately depict most of the variation of natural and man-made environments, the adjective-pair measurement of response to the picture presentations agrees favorably with similarly measured on-site responses to the same scenes" (1974:26). Since then, many studies have used pictorial representations of scenes to test people's reactions to those scenes (e.g., Schroeder and Anderson, 1984; Shaffer and Anderson, 1983; Stamps, 1997; Ulrich, 1979). Furthermore, other studies have used computer-generated simulations and collage techniques to systematically vary the architectural treatment while the general scene remains unchanged (e.g., Bishop, *et al.*, 1985; Stamp, 1988).

In this dissertation research, for every architectural variable, two manipulations were made to the same basic image. This means that only the specific variable was manipulated, while everything else was kept identical in the two images – from the vieweshed (angle of view) to the geometry of the built environment, the lighting, the landscape elements and the people that appeared in the images. Using this technique increases the control over the independent variables, reduces the risk of extraneous variables, and hence enhances the research's internal validity.

It should be noted that the inclusion of people in the images was deliberate. It created livable and believable images. However, only several people were included in those images, since a big crowd may be associated with higher concern for terrorism attack (as it posses opportunity for Mass Casualty Incident), and may draw the attention away from the objects of examination.

More specifically, in this dissertation, the first study did not include any image as it did not test any of the architectural variables.

The manipulated scenarios in the second study included one image of the main façade, showing a facade that is mostly glass or a façade that is mostly concrete.

In the third study, every manipulated scenario included two images – one of the main façade, made of glass or concrete, and a close-up image of the entrance of the building, portraying access control measures that are either designed as part of the entrance or that appear as add-ons temporary stationed machines. In this study, for consistency in the visual information given in the sequence of images (full façade view and then a close-up of the entrance), the type of access control security measures that was shown in the close-up view of the entrance was added to the image of the full façade.

In the second and third studies, participants were asked to look at the image/s as they answer the questions. Below are the images that were used in each of the studies.

FIGURE 4.1. Study 2: Distant view of the building, depicting a solid façade.
* All the images of the façade were manipulated to show the U.S. flag for the Texan sample and the Israeli flag for the Israeli sample.

FIGURE 4.2. Study 2: Distant view of the building, depicting an all-glass façade.

FIGURE 4.3. Study 3: A close-up of the entrance, depicting access-control security measures that appear as temporary stationed machines.

FIGURE 4.4. Study 3: A close-up of the entrance, depicting access-control security measures that appear as part of the overall design of the entrance.

FIGURE 4.5. Study 3: Distant view of the building, depicting an all-glass façade and access-control security measures that appear as temporary stationed machines.

FIGURE 4.6. Study 3: Distant view of the building, depicting an all-glass façade and access-control security measures that appear as part of the overall architectural design of the entrance.

FIGURE 4.7. Study 3: Distant view of the building, depicting a solid façade and access-control security measures that appear as temporary stationed machines.

FIGURE 4.8. Study 3: Distant view of the building, depicting solid façade and access-control security measures that appear as part of the overall architectural design of the entrance.

4.3.2.3.2 Questionnaire

After reviewing a scenario, each participant was asked to answer several questions. The complete questionnaire, used in studies 2 and 3, included seven questions pertaining to the four dependent variables of the conceptual model. These questions were devised to test how important the issue of a terrorism threat is in the respondent's mind, the respondent's sense of security, his/her state of anxiety, and the respondent's tendency to use the environment in light of the given situation. The first study included the same questions except for the questions regarding the tendency to enter the building, since no visual manipulations were included at that stage of the examination. The second and third studies included three additional questions (on top of the seven questions pertaining to the four dependent variables) at the end of the questionnaire to clarify the respondent's basic impression of the building's security as affected by the visual manipulation.

The following sections elaborate on each of the dependent variables and their representation in the questionnaire. The exact format and text used in all of the questionnaire's items (the English version and the Hebrew version) appear in the example screen shots in Appendix A.

It should be noted that the answers to all questions were along a Likert scale with explicit anchors for each point on the scale (Likert, 1932; Rainer, *et al*., 2007). This technique is very common in measuring attitudes and other factors, especially in surveys and experimental research designs. As indicated in the literature, accurate and explicit labeling of all the points on the scale—the two extreme endpoints as well as the other points along the scale—help the participants to select the option that best represents their attitude. The majority of the questions in this research used a 5-point scale, as commonly accepted in social science studies. The only measure that differed was of the state of anxiety, which utilized the State Anxiety Inventory questionnaire (Spielberger, *et al*., 1970), in which items are based on a 4 point scale.

4.3.2.3.2.1 Question on the awareness of security from terrorism (administered in studies 1, 2, 3)

To find out about the level of awareness of security from terrorism, or in other words—how much security from terrorism was on the respondent's mind, participants were asked to rate how much various issues occupy their mind, each issue along a 5-point scale, 1 being "not at all" to 5 "very much". Five different issues were included: (1) The looks (aesthetics) of the building; (2) the orientation in the building (finding the way around the building); (3) the security from criminal activity; (4) the monumentality of the building (whether it is imposing in size and shape); and (5) the security from terrorism (for the exact wording of the questions see Appendix A, question 1 in the screen-shots example).

The idea behind the design of this question was to ask the question without sensitizing the issue of security from terrorism. The fact that this issue was embedded in four additional dimensions contributed to the validity of the measurement.

4.3.2.3.2.2 Questions on the sense of security (administered in studies 1, 2, 3)

Information on the respondents' sense of security was collected through two questions. One question pertained to a more general appraisal of the situation, and the other to a more personal appraisal.

The first question (question 2 in the questionnaire) pertained to the perception of risk, i.e., the perceived probability of an incident occurring at the specific location. This question rated how dangerous the respondent perceives his/her visit to the specific building considering the described scenario, on a 5-point scale, when 1 being "not at all dangerous", and 5 "very dangerous".

The second question (question 3 in the questionnaire) addressed the perception of personal safety. This question, in contrast to the previous question, was posed on a positive note, asking how safe the participant feels. The 5-point scale ranged from 1, "very unsafe" to 5, "very safe".

The answers to the second question (question 3 in the questionnaire) about the perception of personal safety were recoded into a reverse scale. These scores, together with the answers to the first question (question 2 in the questionnaire) were used in a calculation of an average score per participant. This average score indicated the respondent's general sense of security: 1 being the highest sense of security, and 5 indicating the highest sense of insecurity.

The exact wording of both questions, the labels of their optional answers and the format in which they appeared can be found in Appendix A, questions 2 and 3 in the screen-shots example.

4.3.2.3.2.3 Questions on the state of anxiety, i.e., stress level (administered in studies 1, 2, 3)

The participants' anxiety level at the time of the study was recorded using Spielberger, Gorsuch and Lushene (1970) State Anxiety Inventory, and its Hebrew translation (by Teichman and Melineck, 1979). This instrument has been well established as a self-reporting tool for measuring anxiety level in general, and in cross-cultural studies in particular (Spielberger and Diaz-Guerrero, 1976, 1986).

The inventory is based on twenty different statements about a possible state of mind; some reflect positive affect (e.g., "I feel calm") and some negative affect (e.g., "I am worried"). Ratings for each statement is on a 4-point scale (1 "not at all" to 4 "very much so"). In this dissertation, each participant was asked to rate each statement in a way that would reflect his/her state of mind at that moment in time. The exact wording of this item can be found in Appendix A, question 7 in the screen-shots example.

4.3.2.3.2.4 Questions on the tendency to enter the building (administered in studies 2, 3)

A pool of three questions was formed to assess the participant's action propensity. The first question (question 4 in the questionnaire) inquired if the participant has any reservations about going to the facility. The 5-point scale ranged from 1, "not at all" to 5, "very much so". The second question (question 5 in the questionnaire) directly asked about the likelihood of the participant to enter the building. The answers ranged from 1, "not at all likely" to 5, "very likely". The third question (question 6 in the questionnaire) asked whether the participant prefers to meet his/her friend at a different location. Answers to the latter question ranged from 1, "not at all" to 5, "very much".

The answers to the second question about the likelihood to enter the building were recoded into a reverse scale. These scores, together with the answers to the first and third questions were used in a calculation of an average score per participant. This average score indicated the respondent's general propensity to use the building: 1 being the highest tendency to use the environment, and 5 indicating the highest tendency to avoid entering the building.

The exact wording of the three questions, the labels of their optional answers and the format in which they appeared can be found in Appendix A, questions 4, 5, 6 in the screen-shots example.

4.3.2.3.2.5 Additional questions about the security in the building (administered in studies 2, 3)

Three more questions pertained to the effect of the visual architectural manipulations on the perception of the level of security in the building. These were additional indicators that were designed to help clarify any of the results of the four dependent variables.

The first question (question 8 in the questionnaire) asked about the level of sophistication of the security in the building. Answers ranged from 1, "very sophisticated", to 5, "very unsophisticated".

The second question (question 9 in the questionnaire) asked whether the design triggers thoughts about threats of terrorism. Scores ranged from 1, "not at all", to 5, "very much".

The last question (question 10 in the questionnaire) inquired about the effectiveness of the design in deterring terrorists. Answers ranged from 1, "very effective", to 5, "very ineffective".

The exact wording of these questions, the labels of their optional answers and the format in which they appeared can be found in Appendix A, questions 8, 9, 10 in the screen-shots example.

4.3.2.4 Statistical Analyses

The statistical analysis of the data collected in the three studies was conducted in a few stages. The first stage of statistical analysis for each study was conducted per dependent variable: how much the issue of security from terrorism is on the respondent's mind, the respondent's sense of security, his/her state of anxiety, and the tendency to use the building. The second stage of analysis looked for connections among the dependent variables within each study. In the second and third studies, additional analysis was made on the additional questions that were intended to clarify the effect of the visual architectural manipulations on the perception of the level of security in the building. The following sections detail each stage of the analysis.

4.3.2.4.1 Analysis per Dependent Variable in Each Study

4.3.2.4.1.1 Analysis of the level of awareness of security from terrorism (performed in studies 1, 2, 3)

An ANOVA test of between-groups effects was conducted for the recorded responses to how much the issue of security from terrorism occupies the mind, i.e., to the level of awareness of the subject (Question 1.5 in the questionnaire; see screenshots in Appendix A for exact wording). Effect size was calculated using *Partial* η^2. [1] In certain cases, pending on the interactions that were found, additional ANOVA tests were conducted to further assess the statistical significance of specific differences.

Before performing the any of the Analysis of Variance tests, descriptive statistics were reviewed and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) was used to assess homogeneity of variance. The α used in all ANOVA tests was set to .05, the common significance level in social sciences.

In the analysis of study 3, additional ANOVA test was done comparing the results of study 3 with the results in study 2 for the scenario of high level of terrorism threat. This examination was conducted in order to evaluate the effect of having access control security measures (study 3) vs. not having them at all (study 2). This examination was designed to test the assumption in H-3.a that any access control security measures at the entrance to a building (whether designed or temporary stationed machines) increase people's awareness of the issue of security from terrorism.

4.3.2.4.1.2 Analysis of the sense of security (performed in studies 1, 2, 3)

A correlation coefficient test was conducted to measure the linear association between the responses to question 2 in the questionnaire on how dangerous participants perceive the situation to be, to responses to question 3 regarding how safe the participants would feel entering the building (for exact wording of questions, see Appendix A: screenshots).

This analysis was done to assess if the answers to both questions can collectively inform about the overall personal sense of security.

In general, the correlation coefficient, i.e., Pearson's correlation coefficient (*r*), indicates the linear association between two quantitative variables for pairs of observations. The value ranges between 1, for a strong positive linear association between the two variables, to -1, a strong negative linear association between the two variables, when the value of 0 indicates no linear correlation (Rasmussen, 1991). In this case, the two questions addressed what can be considered as opposite ideas: the level of perceived danger (when a score of 5 means "very dangerous") and the feeling of safety (when a score of 1 means "very unsafe"). Therefore, the expected linear association was a negative one.

In each of the three studies, the correlation coefficient tests yielded significant negative correlations between the answers to the two questions. Following these findings, in each study, responses to the two questions were recoded into one variable. The new value to indicate a participant's sense of security equaled the average score of the answers to the two questions (calculated with the reverse value to the answers for the question of how safe they feel). Consequently, this value ranged between 1 and 5 — a score of 1 indicating a secure feeling and 5 corresponding with a high sense of insecurity.

An ANOVA test of between-groups effects was performed on the new calculated value of the sense of security/insecurity. Effect size was calculated using *Partial* η^2. In certain cases, pending on the interactions that were found, additional ANOVA tests were conducted to further assess the statistical significance of specific differences.

Before performing any of the ANOVA tests, descriptive statistics were reviewed and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) was used to assess homogeneity of variance. The α used in all ANOVA test was set to .05, the common significance level in social sciences.

4.3.2.4.1.3 Analysis of the state of anxiety (performed in studies 1, 2, 3)

The handling of the responses to the twenty statements followed the established procedure for evaluating the State Anxiety Inventory. As indicated in the material and procedure section, every statement was rated on a 4 point scale (1 "not at all" to 4 "very much so"). Responses to the statements that portrayed a positive state of mind were recoded into a reversed scale. The sum of all the answers to the twenty statements was the final score to portray the participant's state of anxiety. Thus, these final scores ranged from 20 to 80; 80 being the highest level of anxiety.

Prior to calculating the total score of anxiety state for each participant, the Cronbach's Alpha Reliability Coefficient test was conducted, one for each society, to assess the reliability of the twenty items to which responses to all combine the total score for the anxiety state. The Cronbach's Alpha Reliability Coefficient is an analysis used to evaluate the internal consistency reliability of Likert-Type summated scales, which are an assembly of interrelated items designed to measure underlying constructs. Scores of the Cronbach's Alpha Reliability Coefficient range from 0 to 1. The closer the value is to 1, the greater the internal consistency of the items in the scale (Gliem and Gliem, 2003).

An ANOVA test of between-groups effects was performed on the new calculated value of the level of anxiety. Effect size was calculated using *Partial* η^2. In certain cases, pending on the interactions that were found, additional ANOVA tests were conducted to further assess the statistical significance of specific differences.

Before performing any of the ANOVA tests, descriptive statistics were reviewed and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) was used to assess homogeneity of variance. The α used in all ANOVA test was set to .05, the common significance level in social sciences.

4.3.2.4.1.4 Analysis of the tendency to enter the building (performed in studies 2, 3)

Correlation coefficient tests were conducted to measure the association between the responses to the three questions that were used as indicators of the propensity to use the building. As Pearson's correlation coefficient test indicates the linear association between two quantitative variables, three tests were performed altogether. The correlation coefficient tests were as follows: (1) for the rated reservations about going to the facility and the rated likelihood to enter the building, (2) the rated reservations about going to the facility and whether they prefers to meet the friend at a different location, and (3) the rated likelihood to enter the building and whether they prefers to meet the friend at a different location.

In each of the two studies, the three correlation coefficient tests yielded significant correlations between the answers. Following these findings, in each study, responses to the three questions were recoded into one variable. The new value to indicate a participant's propensity to use the building equaled the average score of the answers to the three questions (calculated with the reverse value to the answers for the question of how likely they are to enter the building). Consequently, this value ranged between 1 and 5 — a score of 1 indicating an inclination to use the building and 5 corresponding with a propensity to avoid the building.

An ANOVA test was performed on the new calculated value of the propensity to enter the building. Effect size was calculated using *Partial* η^2. Before performing the Analysis of Variance test, descriptive statistics were reviewed and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) was used to assess homogeneity of variance. The α used in all ANOVA test was set to .05, the common significance level in social sciences. In certain cases, pending on the interactions that were found, additional ANOVA tests were conducted to further assess the statistical significance of specific differences.

4.3.2.4.2 Examinations of Linkages among the Dependent Variables in Each Study

The analyses described so far have been univariates in which the examination concentrated on one dependent variable at a time, looking at how the independent variables in each study influenced it.

Some of the dissertation's hypotheses speak for cases in which the four dependent variables are influenced in the same manner by the dependent variables. However, the conceptual framework of this dissertation also outlines several hypotheses that propose a more complex relationship between the dependent variables, particularly when visual architectural variables are introduced.

In order to further examine the connections between the dependent variables of the conceptual model, bi-variate Pearson product-moment correlations were conducted for each sample separately.

In studies 2 and 3, further examination of the specific linkage between the propensity to avoid/enter a building and the sense of security was done using a repeated-measures ANOVA. In these tests, the two dependent variables—the sense of insecurity and the propensity to avoid the building—where recorded as the within subject factor. This test, allowed to examine hypotheses H-2.e and H-3.c by comparing the mean ratings for these dependent variables and to find potentially different tendencies in which of the independent variables affect them and how. Effect size was calculated using *Partial* η^2.

4.3.2.4.3 Analysis of the Additional Questions about the Security in the Building (performed in studies 2, 3)

ANOVA tests were performed on each of the three additional questions regarding: The level of sophistication of security in the building; whether the design triggers thoughts about terrorism; and the appraisal of the design's effectiveness in deterring terrorists.

For each ANOVA test, descriptive statistics were reviewed and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) was used to assess homogeneity of variance. The α used in all ANOVA test was set to .05, the common significance level in social sciences.

A note should be made that this part of the examination was directed towards achieving a better understanding of how the visual architectural variables affect the participants' perception of the security of buildings. With this in mind, the review of the results of this part of the examination focuses only on the statistically significant findings that relate to the architectural variables of the study: façade design (glass façade vs. solid façade), and the design of the access control security measures at the entrance to the building (appear as part of the overall design vs. add-ons temporary stationed machines).

Following this methodology chapter, the next chapter elaborates on the results of the statistical analyses that were performed in every stage of the investigation and presents a discussion of them.

Notes

1. Though there are other estimates of effects size (*omega* squared*, epsilon squared, eta squared*), Cohen argues that the *partial eta squared* (*partial* η^2) may prove more comparable across studies in which additional manipulated variables are added to a basic similar research design (Cohen, 1973).

CHAPTER V

ANALYSIS OF RESULTS

This dissertation examines the effects of the function and image of public buildings on how people respond to threats to personal security associated with terrorism. The research entails a conceptual framework that takes into account the different factors that play a role in influencing potential users of the environment. These independent variables are: The current level of threat of terrorist bombings; the societal-security-context that defines the individual's experience with this threat; the building-use; and design elements that influence the first impression of a building and of its level of security. The conceptual framework provides hypotheses that connect these independent variables to several levels of people's reactions, which are the dependent variables. The range of reactions represents cognitive processes, emotive reaction, and behavioral disposition. Specifically, the dependent variables of the study are: How much the issue of a terrorism threat is in the respondent's mind; the respondent's sense of security; his/her level of anxiety; and the respondent's inclination to use the building.

The empirical investigation in this research was designed to illustrate and test the conceptual model and its related hypotheses. As detailed in the methodology chapter, the investigation entailed a pretest survey and three main studies. In the sequence of the three studies, each one introduced and tested a new main independent variable (level of terrorism threat, level of fortification vs. openness as represented in the façade design, and the conspicuousness of the access control security measures in the overall architectural design of the entrance).

This chapter focuses on the results of the statistical analyses that were performed on the data that was collected in every stage of the investigation. The following sections elaborate on each of the four stages of the dissertation research. Due to the relative complexity of the research design, the review of each stage of the investigation presents the objectives of the specific examination and the hypotheses that were tested, provides a quick review of the research design of that stage, elaborates on its results, and presents a discussion of them. For each of the three main studies, the review of the results is organized according to the dependent variables. Following the analyses per dependent variable, the review covers the results of the statistical examinations of connections among the dependent variables. The last section summarizes the findings of all the stages of the investigation.

5.1 Pretest: Selection of Building-uses in Texas and Israel

5.1.1 Objective and Hypotheses

The objective of this stage of the study was to identify building-uses that are perceived to be associated with a respective terrorism threat in Texas and in Israel. The results of this stage guided the selection of two building-uses which helped in testing the main hypotheses of the research, and were included as the manipulation of the variable of building-use in the subsequent studies. Two hypotheses were formed for this preliminary stage of the investigation:

(H-BU.1) The general perception of risk of terrorism depends on the societal exposure to the threat. People from a society that is used to live under the threat of terrorism, e.g., Israel, perceive such attacks to be of higher probability of occurring than people that are not used to this threat, i.e., Texans.

(H-BU.2) People from societies of different exposure to the threat of terrorism associate the threat of terrorism attacks with different building-uses. For a specific society, the association of a building-use to the threat of terrorism is related to the actual occurrence of attacks of buildings of this function in that society. More specifically, based on the analysis of the threat in the literature review, in Texas, high threat of terrorism would be associated with transportation terminals, especially airports, and with government facilities. In Israel, high threat of terrorism would be associated with commercial buildings as shopping malls, dining facilities as restaurants and cafés, and with transportation terminals, particularly bus stations.

5.1.2 Research Design and Procedure

A survey, using a paper-pencil questionnaire, was conducted to assess people's risk perception associated with the threat of terrorism in relation to different public building-uses in Texas and in Israel. A total of 135 individuals participated in the survey (84 undergraduate students from Texas and 51 undergraduate students from Israel).

Participants in both societies, Texas and Israel, were asked to rate the probability of occurrence of a terrorism attack in each of 20 given building-uses, using a 0% to 100% scale. The list included: City hall, courthouse, municipal library, post office, bank, hospital, stadium, amusement park, movie theater, restaurant, café, shopping mall, department store, airport terminal, central bus station or terminal, railroad or subway station, sea port terminal, church / synagogue (pending on society), university dormitories, and general office building. The building-uses were ordered randomly to create a mix of functions. (For the complete survey material see Appendix A).

5.1.3 Results

5.1.3.1 The Findings

ANOVA tests were conducted on the perceived risk of terrorism associated with 20 public building-uses in the two examined societies, Texas and Israel. The first ANOVA test concentrated on the overall ratings of probability of occurrence of a terrorism act and examined the main-effect of the societal context (Texas, US / Israel) on this general perception. For this examination, for every participant, a mean score was calculated, taking into account his/her ratings of all 20 buildings. Additional ANOVA tests were performed on the perceived risk associated with each of the 20 building-uses. Before performing any of the tests, statistical assumptions for a fixed effect research design were examined. In addition, to compare patterns between societies, Spearman Rank Order Correlation Coefficient test was administered.

The results of the first ANOVA test show that across building-uses (using the overall calculated mean per participant), the perceived probability of a terrorism attack (on a 0%-100% scale) was significantly higher in the Israeli sample (M=49.92) than in the Texan sample (M=37.34), $F(1,134)=18.18$, $p<.01$. The findings support hypothesis H-BU.1.

Table 5.1 presents the descriptive statistics of the mean scores for the perceived probability of occurrence of a terrorism attack in each of the 20 building-uses, in Texas and in Israel. The table also indicates the results of the ANOVA tests for each of the building-uses, comparing the samples from the two societies. The results of the ANOVA tests show that significant differences between the two samples in the perceived probability of terrorism incident appeared for the following building-uses: amusement park, movie theater, restaurant, café, shopping mall, department store, airport terminal, central bus station, church or synagogue, and municipal library. For all of these building-uses, except for an airport terminal, Israelis' perception of probability for terrorism attack was significantly higher than the Texans'. An airport terminal was rated to be of significantly higher probability for terrorism attack by Texans than by Israelis. The results support hypothesis H-BU.2.

Other building-uses for which the Texan's ratings for probability of terrorism attack were greater than the Israelis': post office, bank, and hospital (though not statistically significant).

TABLE 5.1. Pretest: Mean ratings of the probability of a terrorism bombing attack in 20 building-uses in Texas and in Israel, and the results of ANOVA tests of the effect of the societal-security-context on these ratings.

Building-use	Texas		Israel		Between-groups test for the effect of the *Society* variable	
	M	*SD*	*M*	*SD*	*F*(1,134)	*Sig.*
City hall	30.14	23.79	36.35	26.46	Non significant	
Courthouse	35.80	24.34	34.61	27.94	Non significant	
Post office	32.68	24.74	25.63	25.05	Non significant	
Municipal library	14.18	14.26	21.37	20.76	5.69	*p*<.02 *
Bank	40.74	27.58	34.71	28.81	Non significant	
Hospital	43.04	27.02	39.55	29.41	Non significant	
Stadium	56.11	26.93	62.90	28.03	Non significant	
Amusement park	38.89	24.78	51.39	28.95	7.10	*p*<.01
Movie theater	25.14	22.736	43.96	26.90	18.90	*p*<.01
Restaurant	19.14	17.86	77.55	23.28	268.67	*p*<.01
Café	14.86	16.01	78.98	24.51	338.18	*p*<.01
Shopping mall	41.37	24.99	75.37	25.90	57.16	*p*<.01
Department store	21.44	19.71	37.75	26.10	16.92	*p*<.01
Airport terminal	69.60	26.74	57.41	35.15	5.17	*p*<.03 *
Central bus station	54.60	25.71	84.31	23.57	45.10	*p*<.01
Railroad or subway station	67.10	25.66	66.24	26.62	Non significant	
Seaport terminal	54.02	27.25	48.57	31.61	Non significant	
Church / Synagogue	32.43	27.17	56.82	30.58	23.25	*p*<.01
University dormitories	25.20	21.30	29.98	25.55	Non significant	
General office building	30.32	25.79	34.96	26.85	Non significant	
All building-uses (*Mean*)	37.34	16.28	49.92	17.18	18.18	*p*<.01

Note. For the statistical tests that are marked with *, Levene's test for homogeneity of variance, for .01 Type 1 error rate, indicated a significant difference in the error variance across groups.

Using the Spearman Rank Order Correlation Coefficient provided an additional insight to the way the two samples associate terrorism with the different building-uses. The coefficient which compared the patterns between samples in the perceived probability of terrorism incident with relation to the 20 building-uses resulted in a low, insignificant correlation, Rs=.33, t(18)=1.47, p<.16 (two tailed). This finding provides additional support to hypothesis H-BU.2, according to which the association of building-uses with the threat of terrorism is different in the two societies.

The ranking of how probable terrorism incident is in each of the building-uses, detailed in Table 5.2, shows that in Israel, aside from the central bus station, which received the highest probability for a terrorism act, the building-uses that were mostly associated with terrorism activities are the dining/commercial facilities. These building-uses and other leisure related functions were ranked as the least associated with terrorism activity in Texas. In Texas, the building-uses that are mostly associated with threat of terrorism were all the transportation facilities (with airport being number 1, the most probable target), and a stadium. Government-related facilities received a middle range of scores in the Texan sample, while being the least associated with terrorism in Israel. Three building-uses were ranked similarly in both societies: amusement park (ranked 9), city hall (ranked 14), and municipal library (ranked 20).

TABLE 5.2. Pretest: Mean ratings of the perceived probability of a terrorism bombing attack in 20 building-uses in Texas and in Israel, in a descending order.

Texas				Israel			
Rank	Building-use	*M*	*SD*	Rank	Building-use	*M*	*SD*
1	Airport	69.60	26.74	1	Central bus station/terminal	84.31	23.57
2	Railroad/subway station	67.10	25.66	2	Café	78.98	24.51
3	Stadium	56.11	26.93	3	Restaurant	77.55	23.28
4	Central bus station/terminal	54.60	25.71	4	Shopping mall	75.37	25.90
5	Sea port terminal	54.02	27.25	5	Railroad/subway station	66.24	26.62
6	Hospital	43.04	27.02	6	Stadium	62.90	28.03
7	Shopping mall	41.37	24.99	7	Airport	57.41	35.15
8	Bank	40.74	27.58	8	Synagogue	56.82	30.58
9	Amusement park	38.89	24.78	9	Amusement park	51.39	28.95
10	Courthouse	35.80	24.34	10	Sea port terminal	48.57	31.61
11	Post Office	32.68	24.74	11	Movie theater	43.96	26.90
12	Church	32.43	27.17	12	Hospital	39.55	29.41
13	General office building	30.32	25.79	13	Department store	37.75	26.10
14	City Hall	30.14	23.79	14	City Hall	36.35	26.46
15	University dormitories	25.20	21.30	15	General office building	34.96	26.85
16	Movie theater	25.14	22.74	16	Bank	34.71	28.81
17	Department store	21.44	19.71	17	Courthouse	34.61	27.94
18	Restaurant	19.14	17.86	18	University dormitories	29.98	25.55
19	Café	14.86	16.01	19	Post Office	25.63	25.05
20	Municipal library	14.18	14.26	20	Municipal library	21.37	20.76

Note. For each society, a rank of 1 indicates the building that was perceived to be of the highest probability of occurrence of a terrorism attack, and the rank of 20 indicates the building that was perceived as the least probable target for a terrorism incident.

5.1.3.2 The Relation of the Findings to the Reality of the Threat in the Two Societies

The finding that the overall perceived probability of occurrence of terrorism activity (across building-uses) was significantly greater in the Israeli sample than in the Texan sample supports hypothesis H-1.1 and corresponds with the different occurrence rate of terrorism incidents in the two societies in the last few years. During 2001-2006, while Israel experienced 139 terrorism attacks that resulted in fatalities within its territory alone (and a total of 346 fatal attacks including those that occurred in Israeli settlements in the occupied territories), there were no attacks within Texas, and only 9 fatal terrorism incidents within the general U.S., all of them except for one occurred back in 2001 (MIPT Terrorism Knowledge Base, 2007).

The significant differences found between Texan and Israeli participants in the ratings of the probability of a terrorism attack with relation to specific building-uses, and the difference in the rank order of the building-uses are for the most part congruent with difference in the experience these societies have with international terrorism attacks. This supports most of the assumptions underlying hypothesis H-1.2.

As detailed in the findings, commercial, dining and leisure related building-uses were rated significantly higher by Israelis than by Texans. Moreover, while in Israel some of the dining and commercial facilities were ranked as the most probable targets, in Texas these building-uses were rated as the least probable targets for terrorism incidents. And in fact, in the years 2001-2006, out of a total of 139 fatal terrorism incidents in Israel, 17 occurred at dinning facilities (13 in cafés and restaurants, and 4 in fast food stands), 6 in shopping malls, 3 in grocery stores, 9 in outdoor markets, and 13 in crowded streets (MIPT Terrorism Knowledge Base, 2007). During the same period of time there were no significant terrorism incidents in the U.S. on any of these types of facilities.

With relation to the difference in perceived probability of terrorism associated with transportation facilities, the response of the Israeli sample, ranking a bus station as the most probable target, reflects numerous attacks on buses and stations. In 2001-2006 there were 20 terrorism attacks on buses in Israel, and 13 on bus stations or hitchhiking posts, all of which resulted in fatalities (MIPT Terrorism Knowledge Base, 2007).

The response of the Texan sample, identifying airports as the most probable target, fits the occurrences of terrorism attacks in the U.S. Out of the total of 9 terrorism incidents that resulted in fatalities in the U.S. in the years 2001-2006, 4 attacks were related to airports or airplanes. In addition, the magnitude of the 3 coordinated events on September 11, can also be a contributing factor, as no other attack of the same scale happened since. In addition, the security measures and procedures at American airports, which are considerably different than security procedures in other public facilities in the U.S. may contribute to the level of threat that the public associate particularly with these facilities. Association of other type of transportation terminals and of stadium with terrorism in the Texan sample can be credited to their similarity to airports in scale.

In addition, as the Texans have only limited experience with the threat, these findings as well as building-uses as hospital and bank being ranked higher by the Texan sample than by the Israeli sample may also be attributed to ideas that movies and TV shows propagate, as they have no factual basis. With respect to the ranking of a stadium as the second most probable target in Texas, it should be noted that this building-use is particularly relevant and familiar to the Texan sample of participants, living in what can be considered as a "college town" in a society and atmosphere that promotes big sports venues.

The findings which indicate a statistically significant difference between the two samples in their perceived probability of terrorism associated with a religious function (church / synagogue) seem to correspond with the realities of each society. In the past few years, there has been no terrorism attack on churches in the U.S. In Israel, in the years 2001-2006, there were two attacks associated with synagogues. One occurred at a street next to the entrance to a synagogue in Jerusalem, and the other within a synagogue of an Israeli settlement in the occupied territories. In addition, the Israeli public may recall significant attacks that took place in synagogues around the world in the last few years (in Tunisia in 2002 and in Tuerkey, 2003) and hence perceive this building-use as a probable target (MIPT Terrorism Knowledge Base, 2007).

The assumption detailed in H-BU.2 according to which Texans perceive governmental facilities as more associated with terrorism than Israelis was validated by the rank order analysis. Relatively to other building-uses, these buildings were ranked higher by the Texan sample, than by the Israeli sample.

The third governmental facility, a city hall, is the only building-use that was found not only as not significantly different in the two societies in its rating as a probable target, but also received the same ranking as relative to other building-uses by both samples (ranked 14). With relation to these findings, Israel had experienced one fatal terrorism attack on two buses which blew up next to a city hall (and one attack on a political party center). This might have influenced the ranking of city hall to be considered as a more probable target than courthouse or post office, while still being not very high on the list of probable targets as compared to all the locations of other terror incidents in Israel. In Texas, without any experience with terrorism with relation to the particular building-uses of courthouse or city hall, peoples' recollection of attacks on authorities/government related facilities (Washington DC, September 11, Oklahoma, 1995) may have influenced the perception of these facilities as probable targets.

The difference found between the samples in the ranking of the post-office is compatible with media reports on anthrax and ricin envelopes in the U.S. (15 total in 2001-2006, out of which 4 resulted in fatalities), and with lack of such experience in Israel (MIPT Terrorism Knowledge Base, 2007). A similar difference in the ranking was exhibited in the case of a courthouse, when relative to the other building-uses it was ranked in Texas as a more probable target than in Israel. This finding is not consistent with occurrence rates, as there were no terrorism incidents in courthouses in either of the countries in the past few years.

5.1.4 Conclusion and Selection of Building-uses

The findings of the first stage of the investigation show that across all building-uses, Israeli participants perceived the probability of a terrorism attack as higher than the Texan participants. This difference in the risk perception corresponds to the actual occurrence rate in each of the societies. Disagreements between the samples were found with regards to particular transportation facilities, commercial buildings (including dining, shopping and entertainment facilities) and to most government facilities. Texans exhibited the highest sensitivity to transportation terminals (particularly airports), and large sports venues (stadiums), while Israelis considered bus stations and dining facilities as the most probable targets. Government facilities, with the exception of a city hall, were found to be perceived as moderately probable targets in Texas, relative to other building-uses, and the least probable targets in Israel.

These results, as well as other factors lead to the decision to focus the next stages of the investigation on two building-uses: (a) city hall and (b) shopping mall. Looking closely at these two building-uses, we find several factors which support this decision.

First, as the results of this investigation show, both of these building-uses did not make the top three most probable targets or the bottom three most unlikely targets by both groups of participants. Using these building-uses in the main investigation will increase the sensitivity of the research design to the effects of the remaining variables in the conceptual model.

Second, an interesting comparison can be made between the two building-uses. The two building-uses represent larger groups of functions, where a city hall is a government facility, and a shopping mall is a commercial function. Moreover, the analysis of this pretest shows a difference in the association of these building-uses with terrorism threat in general and within each of the societies. More specifically, by both samples, a shopping mall was ranked as a more probable target than a city hall. In addition, a shopping mall was perceived as a significantly more probable of a target by the Israeli sample than by the Texan participants. At the same time, the city hall was the only building-use which not only received a similar evaluation by participants from the two societies of how probable of a target it is, but was also ranked the same relatively to other building-uses in each country.

The logic behind the selection of these two building-uses was further supported by two other factors. One is the fact that both city hall and shopping mall are commonly found in both societies, and specifically in the local communities from which participants were selected in all stages of this research (College Station, Texas, and Tel Aviv, Israel). Hence, participants can relate to these building-uses, rather than comment on places they are not familiar with. The other relevant and important factor in the selection of these two building-uses is their similarity in scale and general architectural manifestation. This made it reasonable to use the same manipulations of the examined architectural factors for both building-uses.

5.2 Study 1: Reactions to Levels of Terrorism Threat, as Affected by Building-use in Two Societies

5.2.1 Objective and Hypotheses

The general objective of this part of the investigation was to examine the effects of the two levels of terrorism threat (almost no threat vs. the highest level of security alert) and the two building-uses (shopping mall vs. city hall) on people of two societies of different exposure to the threat (Texas and Israel). In this study, only the conceptual model's first three dependent variables were addressed: level of awareness of security from terrorism (i.e., how much security from terrorism is on the respondent's mind), the respondent's feeling of security, and the respondent's level of anxiety. The model's fourth dependent variable, i.e., the propensity to enter the building, was not tested as no "tangible" architectural solution was introduced.

More specifically, the examination, at this stage, was directed towards: (1) Testing whether the written manipulations which define the treatments of high level of terrorism threat vs. almost no terrorism threat work; (2) examining the difference between the samples from the two societies in terms of reactions to the low or high levels of terrorism threat; (3) observing the difference between city hall and shopping-mall for reactions to threats of terrorism before architectural solutions are introduced.

This first study, tests only the first set of hypotheses outlined in the conceptual framework. As explained in section 3.2.1, these hypotheses relate to the independent variables that combine the "distal" level (before architectural solutions are introduced). These hypotheses assume interdependency among the dependent variables. This interdependency links a rise in the awareness of the issue of security to a reduction in the sense of security (elevation in perceived risk and in feeling of insecurity), an increased level of anxiety and an inclination to avoid going to the building.

Below are the hypotheses that were tested in this study. Please note that while the hypotheses refer to all four dependent variables, only three dependent variables were examined here. The action propensity (i.e., the propensity to avoid or enter the building) was not tested in this study.

(H-1.a) Variation in the level of current terrorism threat influences a person's awareness of security issue, his/her sense of security and the stress level (i.e., state of anxiety). The greater the current threat from terrorism is - the more the issue of security from terrorism occupies the person's mind, and the lower his/her sense of security is (i.e., the higher the perceived risk and danger, and the less secure the person feels). Subsequently, people in this situation are more anxious.

(H-1.b) The societal-security-context influences a person's awareness of security from terrorism, his/her sense of security and the stress level (i.e., state of anxiety). People from a society that is usually under a high level of terrorism threat (e.g., Israel) have security from terrorism more on their minds, have a lower sense of security (i.e., perceive such attacks to be of higher probability of occurring and feel less secure), and are more anxious than people from a society which is not accustomed to living under such threat (e.g., Texas).

(H-1.c) The extent by which the current level of terrorism threat influences people's awareness of security from terrorism, their sense of security and anxiety level is moderated by how used the person is to such a reality (i.e., his/her societal-security-context). Variations in the current level of terrorism threat has greater influence on how much security from terrorism is on a person's mind in a society that is not accustomed to live under high level of security threat (e.g., Texas), than in a society that usually lives under high level of threat (e.g., Israel). In other words, people who are used to live with the threat of terrorism, have it on their minds regardless of the current threat level. People who are not used to the threat are more affected by the current threat level. Accordingly, the fluctuations in a person's sense of security and his/her anxiety level is greater in a society that is not accustomed to live under high level of terrorism threat (e.g., Texas), than in a society that usually lives with high level of threat (e.g., Israel).

(H-1.d) The effects of building-use on people's reactions (awareness of security from terrorism, sense of security and level of anxiety) is interlinked to the societal-security-context. The later factor influences the extent by which the building-use is considered in that society as a probable target of terrorism. More specifically, and based on the results of the pretest (detailed in section 5.1), a city hall should trigger similar thoughts with regards to security from terrorism, similar sense of security, and similar anxiety level in Texas and Israel. A shopping-mall, on the other hand, would create a greater awareness of the issue of security from terrorism, a lower sense of security and a higher anxiety level with Israelis than with Texans.

5.2.2 Research Design and Procedure

A 2 x 2 x 2 study of between-groups research design was conducted utilizing a web-based computerized system. The study tested the effects of the two building-uses (city hall and shopping mall) and two levels of terrorism threat (almost no threat vs. the highest level of security alert) on people of two different political societies (Texas and Israel). The manipulations of the current level of terrorism threat and the building-use were introduced by written descriptions of scenarios.

The participants reactions were measured along three of the four dimensions outlined in the conceptual framework: how much the issue of a terrorism threat is on the respondent's mind, how safe the respondent feels and his/her level of anxiety.

A total of 175 undergraduate students participated in the study (89 from Texas and 86 from Israel). Within each location, participants were randomly assigned to the manipulated scenarios. For a detailed description of the research design, procedure and material, see the methodology chapter, section 4.3.2.

5.2.3 Results

The statistical analysis of the data included two stages. The first stage was conducted per dependent variable: how much the issue of security from terrorism is on the respondent's mind, the respondent's sense of security, and his/her state of anxiety. The second stage of analysis looked for associations among the dependent variables within the study.

5.2.3.1 Results per Dependent Variable

5.2.3.1.1 Findings on the Level of Awareness of Security from Terrorism

An ANOVA test (α=.05) was conducted for the recorded responses to how much the issue of security from terrorism occupies the mind, i.e., to the level of awareness of the subject (Question 1.5 in the questionnaire; see screenshots in Appendix A for exact wording). Before performing the Analysis of Variance test, descriptive statistics were reviewed (see Appendix B, Table B-1) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test of equality of error variance (for .01 Type 1 error rate) was conducted to assess homogeneity of variance. This test resulted in insignificant findings, $F(7,167)=1.43$, $p>.05$.

TABLE 5.3. Study 1: Results of between-groups effects for how much the issue of security from terrorism occupies the mind.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Level of terrorism threat	11.68	1	11.68	6.64	.011	.038
Society	8.26	1	8.26	4.69	.032	.027
Building-use	.12	1	.12	.07	.799	.000
Building-use * Society	12.63	1	12.63	7.18	.008	.041
Level of terrorism threat * Society	.18	1	.18	.10	.748	.001
Building-use * Level of terrorism threat	4.212E-05	1	4.212E-05	.00	.996	.000
Building-use * Level of terrorism threat * Society	1.74	1	1.74	.99	.321	.006
Error	293.86	167	1.76			
Total	1828.00	175				

a R Squared = .110 (Adjusted R Squared = .072)

Results of the ANOVA test, shown in Table 5.3, demonstrate two significant main effects and one significant interaction, all of which had low effect sizes.

As hypothesized (hypothesis H-1.a), the analysis shows that across the two samples the manipulated level of terrorism threat yielded a significant effect on how much security from terrorism occupies the mind of the participants, $F(1, 174)=6.64$, $p<.02$. The item was rated significantly higher when the scenario described a high level of security alert ($M=3.20$) than when the scenario was of a peaceful circumstances ($M=2.66$). The effect size was *Partial* $\eta^2=.04$.

Another statistically significant main effect on how much security from terrorism occupies the mind is accredited to the society variable, $F(1, 174)=4.69$, $p<.04$, *Partial* $\eta^2=.03$. This corroborates the second research hypothesis (H-1.b). The issue of security from terrorism was generally more on the minds of the Israeli participants ($M=3.16$), which live under relatively high level of terrorism threat, than on the minds of Texans ($M=2.70$) that represent a society which is not experienced with the threat.

Hypothesis H-1.c, which speaks of the moderating effect of society on how much the current level of terrorism threat elicits thoughts about terrorism, was not supported by the findings. The interaction between the variable of society and the variable of threat of terrorism did not produce a statistically significant result, $F<1.00$.

Hypothesis H-1.d, which states that society moderates the effect of a building-use on how much security from terrorism occupies the mind, was supported by a statistically significant interaction of the two variables, $F(1, 174)=7.18$, $p<.01$, *Partial* $\eta^2=.04$.

Two additional ANOVA tests were conducted to test the simple effects within the above interaction for each of the building-uses. The results support the specific assumption detailed in hypothesis H-1.d. As illustrated in Figure 5.1, the two samples were similar in their ratings of a city hall, M=2.90 for Texans, and M=3.00 for Israelis, $F(1, 84)<1.00$. The ratings proved to be significantly different considering a shopping mall, $F(1, 89)=13.85$, $p<.01$. With respect to a shopping mall function, Israelis had security from terrorism much more on their mind, M=3.41, than Texans, M=2.41. In addition, the results show that while in Texas a city hall elicited higher ratings for how much security from terrorism is on the respondents' mind than a shopping mall, in Israel, it was the opposite.

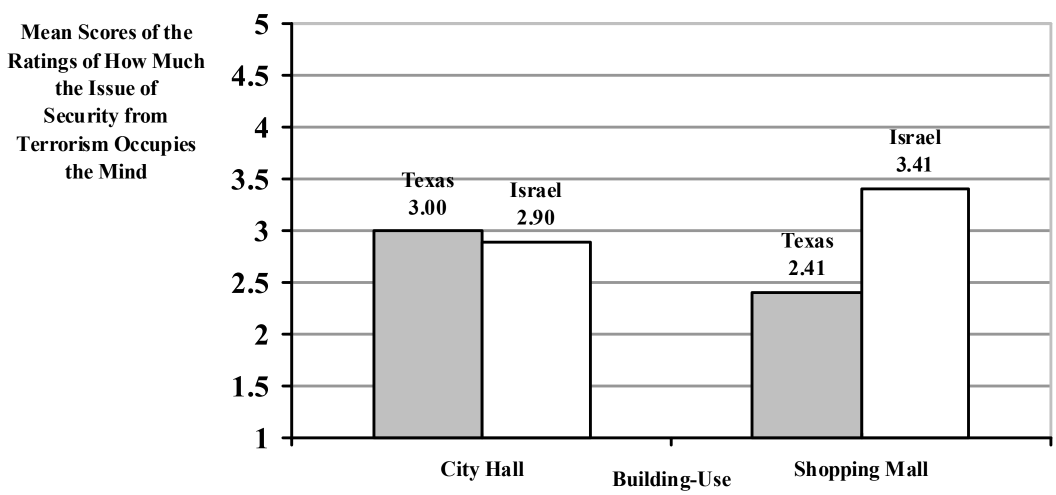


FIGURE 5.1. Study 1: Interaction of building-use and society in the ratings of how much the issue of security from terrorism occupies the mind.

5.2.3.1.2 Findings on the Sense of Security

Pearson's correlation test was conducted on the responses to the questions of how dangerous participants perceive the situation to be (Question 2 in the questionnaire, Appendix A), and how safe they would feel entering the building (Question 3 in the questionnaire, Appendix A). This test was performed to assess whether responses to these two measures can collectively inform about the overall personal sense of security. The test found a significant -.47 correlation (r) between the two indicators ($p<.01$). Due to this finding, responses to the two questions were recoded into one variable. The new value to indicate a participant's sense of security equaled the average score of the answers to the two questions (calculated with the reverse value to the answers for the question of how safe they feel). Consequently, this value ranged between 1 and 5 — a score of 1 indicating a secure feeling and 5 corresponding with a high sense of insecurity.

An ANOVA test (α = .05) was performed on the new calculated value of the sense of security/insecurity. Before performing the Analysis of Variance test, descriptive statistics were reviewed (see Appendix B, Table B-2) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test to assess homogeneity of variance in the examination of the calculated values to indicate sense of security resulted in insignificant findings, $F(7,167)=.22$, $p>.05$.

The results of the ANOVA test, shown in Table 5.4, demonstrate two significant main effects with similar effect sizes and no significant interaction.

TABLE 5.4. Study 1: Results of between-groups effects for the general sense of security.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Level of terrorism threat	12.20	1	12.20	17.06	.000	.093
Society	11.63	1	11.63	16.27	.000	.089
Building-use	.61	1	.61	.85	.358	.005
Building-use * Society	2.14	1	2.14	2.99	.086	.010
Level of terrorism threat * Society	1.20	1	1.20	1.68	.197	.005
Building-use * Level of terrorism threat	.57	1	.57	.80	.372	.018
Building-use * Level of terrorism threat * Society	.29	1	.29	.41	.525	.002
Error	119.36	167	.72			
Total	1172.00	175				

a R Squared = .202 (Adjusted R Squared = .168s)
b. Calculation of the values of the general sense of security for each participant was:
(Response to Question 2, Appendix A + Reversed values of response to Questions 3, Appendix A)/2.

The first significant main effect on the sense of security/insecurity corresponds with Hypothesis H-1.a and is attributed to the manipulated level of terrorism threat. Overall, all the participants (in both samples) exhibited greater insecurity when terrorism was a major threat (M=2.70), than when terrorism was not a threat (M=2.14), $F(1, 174)=17.06$, $p<.01$, *Partial* η^2=.09.

As hypothesized in hypothesis H-1.b, another main effect was due to the society variable, *Partial* η^2=.09. Israelis demonstrated significantly greater feeling of insecurity (M=2.69) than Texans (M=2.15), $F(1, 174)=16.27$, $p<.01$, regardless of level of threat or building-use.

The interaction of the variable of terrorism threat with the variable of society was not found to be statistically significant, $p>.05$. Hence, hypothesis H-1.c was not supported by the findings.

5.2.3.1.3 Findings on the State of Anxiety

The handling of the responses to the twenty statements from the State Anxiety Inventory followed the established procedure for evaluating it. As indicated in the methodology chapter, material and procedure section, every statement was rated on a 4 point scale (1 “not at all” to 4 “very much so”). Responses to the statements that portrayed a positive state of mind were recoded into a reversed scale. The sum of all the answers to the twenty statements was the final score to portray the participant’s state of anxiety. Thus, these final scores ranged from 20 to 80; 80 being the highest level of anxiety.

Prior to making analyses of the total score of anxiety state, two tests were conducted, one for each of the two samples, to assess the reliability of the combined index. This examination of the twenty items resulted in high reliability scores: Cronbach’s Alpha of .95 in the Texan sample and of .93 in the Israeli sample.

An ANOVA test examined the effects of the independent variables on the total score of the anxiety state. Before performing the ANOVA test, descriptive statistics were reviewed (see Table B-3 in Appendix B) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test to assess homogeneity of variance in the examination of the calculated values to indicate anxiety state resulted in insignificant findings, $F(7,167)=1.94$, $p>.05$. The α used in all ANOVA test was set to .05, the common significance level in social sciences.

As can be seen in Table 5.5, the test resulted in two statistically significant main effects and two interactions.

TABLE 5.5. Study 1: Results of between-groups effects for of the anxiety state.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Level of terrorism threat	2844.34	1	2844.34	25.39	.000	.132
Society	572.63	1	572.63	5.11	.025	.030
Building-use	8.50	1	8.50	.08	.780	.000
Building-use * Society	849.28	1	849.28	7.58	.007	.022
Level of terrorism threat * Society	426.26	1	426.63	3.81	.053	.030
Building-use * Level of terrorism threat	585.64	1	585.64	5.23	.023	.043
Building-use * Level of terrorism threat * Society	6.64	1	6.64	.06	.808	.000
Error	18710.65	167	112.04			
Total	274198.00	175				

a R Squared = .223 (Adjusted R Squared = .190s)
b. Calculation of the values for the total score of anxiety state was based on Spielberger, Gorsuch and Lushene's *Manual of the State-Trait Anxiety Inventory* (1970), and is detailed in section 4.2.3 Method.

As in the analyses of the two previous indicators of people's responses to scenarios (i.e., how much security from terrorism occupies the mind, detailed in section 5.2.3.1.1, and the general sense of security, detailed in section. 5.2.3.1.2), the two main effects on the total score of anxiety were of the manipulated level of terrorism threat and of the societal difference. The largest effect size was of the level of threat of terrorism, *Partial* η^2=.13. As hypothesized in H-1.a, all participants exhibited higher level of anxiety when presented with a scenario of high level of terrorism threat (M=41.93) than when terrorism was not a threat (M=33.73), $F(1, 174)=25.39$, $p<.01$. A lower effect size was of the variable of society (*Partial* η^2=.03). Israelis reported statistically significant higher level of anxiety than Texans [M=39.80 for Israelis vs. M=35.88 for Texans, $F(1, 174)=5.11$, $p<.03$]. This supports hypothesis H-1.b (see section 4.2.2.3).

The analysis shows a significant interaction between society and building-use, $F(1, 174)=7.58$, $p<.01$, *Partial* η^2=.02. The results, shown in Figure 5.2, support hypothesis H-1.d. A separate ANOVA test for the city hall function further emphasis the fact that the exposure of participants to this building-use created similar anxiety levels in both countries, $F(1, 84)<1.00$ (M=37.93 in Texas, and M=37.31 in Israel). The test for the shopping mall function show a significant difference between the two samples, $F(1, 89)=12.01$, $p<.01$. As exhibited in Figure 5.2, when presented with a shopping mall, Israelis were far more anxious (M=41.18) than Texans (M=33.96). The results also indicate that in Texas, a city hall elicited a higher level of anxiety than a shopping mall, while in Israel, this pattern was reversed.

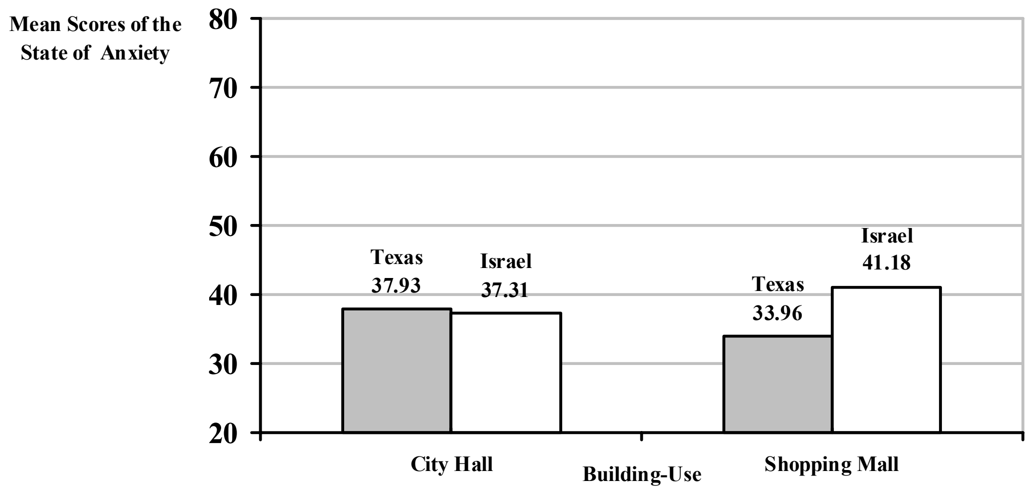


FIGURE 5.2. Study 1: Interaction of building-use and society in the self reported anxiety state.

The third interaction that was found to significantly influence the state of anxiety is of the manipulated level of terrorism threat with the manipulated building-use, F(1, 174)=5.23, p<.03, *Partial* η^2=.04. Figure 5.3 shows that when introducing a high level of terrorism threat, the anxiety associated with a city hall (M=41.63) was greater than in the case of a shopping mall (M=40.40), while when there was no threat of terrorism, a shopping mall (M=35.56) elicited more anxiety than a city hall (M=31.81).

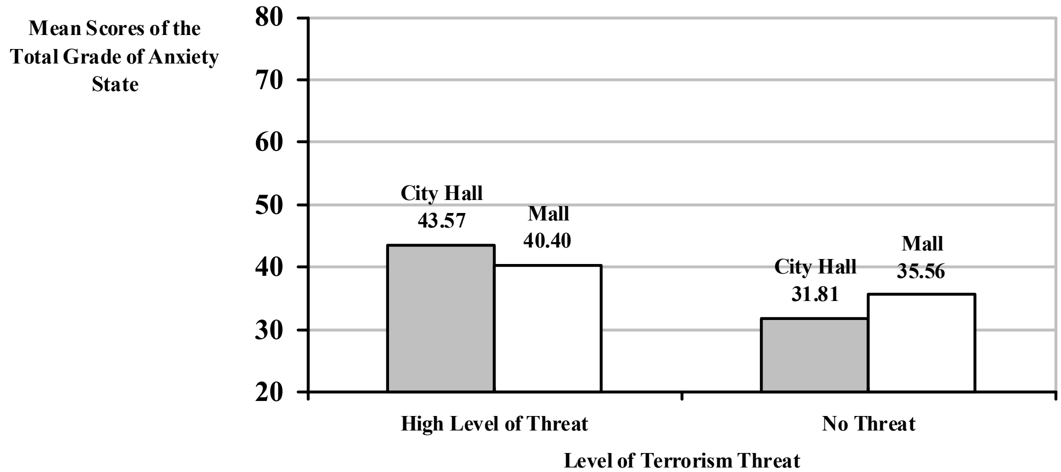


FIGURE 5.3. Study 1: Interaction of level of terrorism threat and building-use in the reported anxiety state.

5.2.3.2 Results on the Linkages among the Dependent Variables in the Study

In order to further examine the connections between the dependent variables of the conceptual model, Pearson product-moment correlation coefficient was conducted between any two dependent variables, for each sample separately (Table 5.6).

TABLE 5.6. Study 1: Results of Pearson product-moment correlation coefficients, in each of the societies.

	Sense of insecurity		State of anxiety	
	Texas	Israel	Texas	Israel
Awareness of security from terrorism	.36	.40	.41	.44
Sense of insecurity			.61	.57

a All correlations are significant at the 0.01 level (2-tailed).

For both samples, all the calculated Pearson product-moment correlation coefficients, between any two indicators of the three dependent variables, showed significant correlation at the significance level of $p<.01$. The results were quite similar for the two samples in each case. For testing the linkage between how much security from terrorism occupies the mind and the sense of security, it resulted in $r=.36$ for the Texan sample, and $r=.40$ for the Israeli sample. The correlation between how much security from terrorism occupies the mind and the state of anxiety showed $r=.41$ for Texans and $r=.44$ for Israelis. The strongest correlation was found between the sense of security and the state of anxiety: $r=.68$ for Texans and $r=.57$ for Israelis.

5.2.4 Conclusion

The findings of this stage of the investigation, which tested the effects of variations of building-use and level of terrorism threat in samples from two different societal-security-contexts, on how much the issue of security from terrorism is on the person's mind, how safe the person feels, and how anxious he/she is, support three of the four hypotheses.

This stage of the investigation demonstrated that variation in terrorism threat affected the participants' responses along the three dependent variables that were tested. The biggest effect this independent variable had was on the state of anxiety (*Partial* $\eta^2=.13$), the second biggest was on the sense of security (*Partial* $\eta^2=.09$), and the smallest effect was on the awareness of security from terrorism (*Partial* $\eta^2=.04$). Scenarios which described high level of terrorism threat elicited higher scores than the scenarios in which terrorism was not a threat in the participants' state of anxiety, their sense of insecurity, and how much security from terrorism was on their minds. These findings validate the treatments used for manipulating the level of terrorism threat.

Differences between samples were obtained along all questions and across all conditions. The biggest effect of the societal-security-context was on the sense of security (*Partial* η^2=.09), according to which, the Israeli participants had an overall lower sense of security than the Texan participants. The societal-security-context had a similar size effect on the awareness of security and the state of anxiety (*Partial* η^2=.03). The Israeli participants had security from terrorism on the mind more than the Texans, and were more anxious than the Texans. These findings, using Texas as an instance of a society with almost no experience with the threat of terrorism, and Israel as an example of a society that is accustomed to live in a relatively high level of terrorism threat corroborate the research hypotheses. These results support the notion that a person's ideas and reactions towards security are a product of the political-security society he/she is used to, regardless of a certain current level of threat or a specific building-use.

The findings did not support the hypothesis that the societal-security context moderates the effects of the level of terrorism threat on people's responses.

Additional societal differences were observed in relation to the two examined building-uses. For the Israeli participants, while both building-uses created a similar sense of security, a shopping mall elicited more thoughts about terrorism threat, and caused a greater anxiety than a city hall. For Texans, while again, the sense of security was similar in relation to the two building-uses, the city hall evoked more thoughts of terrorism than a shopping mall, and created greater anxiety. Furthermore, while the two samples were similar in all their responses to the city hall, they were very different in their level of awareness and state of anxiety considering a shopping mall. These findings demonstrate that some of the security-related responses to a specific building-use are dependant on the society and which building-uses are perceived in that society to be more or less associated with terrorism acts.

To summarize, the findings of this study provide credence to the research design that was employed in this case, and to the written manipulations that were used in the different treatments of the study. In addition, the results validate the first part of the model – effects of building-use and societal context on human responses. Thus, this phase sets the stage for the next two studies in which the effects of specific architectural treatments on people's responses as related to a certain building-use, in a certain level of terrorism threat, in two societies, have been tested.

5.3 Study 2: Reactions to Façade Design as Affected by Levels of Terrorism Threat and Building-use, in Two Societies

5.3.1 Objective and Hypotheses

The second study added to the test the conceptual framework's first architectural variable: the apparent level of fortification/openness of the façade of the building (represented in the façade's glass-solid ratio). More specifically, this study tested the effects of the level of fortification/openness of the façade, two levels of terrorism threat (almost no threat vs. the highest level of security alert), two building-uses (shopping mall vs. city hall) on participants from two societies of different exposure to the threat (Texas and Israel). In this stage, all four dependent variables were measured and analyzed: level of awareness of security from terrorism (i.e., how much security from terrorism is on the respondent's mind), the respondent's sense of security, the respondent's level of anxiety, and the respondent's propensity to enter the building.

The examination in this stage focused on the conceptual framework's second set of hypotheses, which relate to the effects of the glass-solid ratio in the façade design on people's security-related-reactions. The examination also included testing the first set of hypotheses that relate to effects of variables of the "distal" level (current level of terrorism threat, societal-security-context, and building-use), as was done in first study (these hypotheses were outlined in section 5.2.1). It should be noted that while the first set of hypotheses assumes interdependency among the dependent variables, the second set presents a more complex relationship between the dependent variables.

The following are the conceptual framework's second set of hypotheses, which relate to the architectural variable of glass-solid ratio in the façade's design.

(H-2.a) The apparent level of fortification of a building, as represented in the glass-solid ratio in the façade design, influences people's awareness of security from terrorism and their sense of security. When confronted with a building of solid façade, people have security from terrorism more on their minds while their overall sense of security is higher than when confronted with a building of extensive window area.

(H-2.b) The effects of glass-solid ratio in the façade design on a person's awareness of security from terrorism and a person's sense of security (perceived risk and feeling of security) are moderated by the current level of terrorism threat. When there is a terrorism threat, the effects are accentuated, and when there is no terrorism threat the effect is attenuated.

(H-2.c) The effects of glass-solid ratio in the façade design on a person's awareness of security from terrorism and a person's sense of security are moderated by the societal-security-context. In a society that is not used to the threat of terrorism (e.g., Texas), the variations in a person's awareness of security and sense of security as affected by the design of the façade would be greater than in a society that is accustomed to living under the threat (e.g., Israel).

(H-2.d) The effect of glass-solid ratio in the façade design on a person's stress/anxiety level is influenced by the current level of terrorism threat. When there is a terrorism threat, a person would be more anxious when confronted with a building of extensive window area (congruent with low sense of security). When there is no terrorism threat, a person would be more anxious when the building's façade is solid (as this design elevates the awareness to the issue of security).

(H-2.e) People that are not used to the threat of terrorism (e.g., Texans) tend to follow their sense of security (as affected by the building-use, the glass-solid ratio in the façade design and the current level of threat) with actions, while people who are accustomed to the threat of terrorism (e.g., Israelis) tend to use buildings regardless of their feeling of security.

5.3.2 Research Design and Procedure

The second study employed a 2 x 2 x 2 x 2 between-groups research design and was conducted utilizing a web-based computerized system. The study tested the effects of the apparent level of fortification/openness of the façade of the building (all glass façade vs. solid façade) in two building-uses (city hall and shopping mall) and two levels of terrorism threat (almost no threat vs. the highest level of security alert) on people of two different societies with different societal-security-contexts (Texas and Israel).

The manipulations of the current level of terrorism threat and the building-use were introduced by written descriptions of scenarios. The manipulation of the architectural variable was done using an image of the main façade of the building. The image depicted a facade that is mostly glass or a façade that is mostly concrete.

The participants' reactions were measured along the four dimensions outlined in the conceptual framework: how much the issue of a terrorism threat is on the respondent's mind (i.e., security awareness), the respondent's overall sense of security, his/her level of anxiety and their inclination to use the building.

A total of 362 undergraduate students participated in this examination (200 from Texas and 162 from Israel). Within each location, participants were randomly assigned to treatments. For a detailed description of the research design, the procedure and material, please see the methodology chapter, section 4.3.2.

5.3.3 Results

The statistical analysis of the data included two stages. The first stage was conducted per dependent variable: how much the issue of security from terrorism is on the respondent's mind, the respondent's sense of security, his/her state of anxiety, and the respondent's propensity to use the building. The second stage of the analysis looked for connections among the dependent variables within the study.

5.3.3.1 Results per Dependent Variable

5.3.3.1.1 Findings on the Level of Awareness of Security from Terrorism

An ANOVA test was conducted for the recorded responses to how much the issue of security from terrorism occupies the mind, i.e., to the level of awareness of the subject (Question 1.5 in the questionnaire; see screenshots in Appendix A for exact wording). Before performing the Analysis of Variance test, descriptive statistics were reviewed (see Appendix B, Table B-4) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test to assess homogeneity of variance in the examination of how much the issue of security from terrorism occupies the mind resulted in a statistical significant result, $F(15, 346)=1.71$, $p<.05$. To deal with this violation of the underlying assumption of the ANOVA, a more stringent alpha was set ($\alpha=.03$).

Results of the ANOVA test shown in Table 5.7, demonstrate two significant main effects and one significant interaction.

TABLE 5.7. Study 2: Results of between-groups effects for how much the issue of security from terrorism occupies the mind.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Facade design	.01	1	.01	.00	.956	.000
Level of terrorism threat	219.72	1	219.72	135.98	.000	.282
Society	9.37	1	9.37	5.80	.017	.016
Building-use	.62	1	.62	.38	.537	.001
Façade design * Level of terrorism threat	.00	1	.00	.00	.988	.000
Façade design * Society	.00	1	.00	.00	.971	.000
Level of terrorism threat * Society	.02	1	.02	.10	.914	.000
Façade design * Level of terrorism threat * Society	.18	1	.18	.11	.742	.000
Façade design * Building-use	.24	1	.24	.15	.703	.000
Level of terrorism threat * Building-use	1.04	1	1.04	.64	.423	.002
Facade design * Level of terrorism threat * sBuilding-use	.14	1	.14	.09	.769	.000
Society * Building-use	8.23	1	8.23	5.09	.025	.015
Façade design * Society * Building-use	3.37	1	3.37	2.08	.150	.006
Level of terrorism threat * Society * Building-use	1.24	1	1.24	.77	.381	.002
Façade design * Level of terrorism threat * Society * Building-use	5.01	1	5.01	3.10	.079	.009
Error	559.05	346	1.62			
Total	4245.00	362				

a R Squared = .310 (Adjusted R Squared = .280)

As hypothesized (hypothesis H-1.a), the analysis shows that across the two samples a significant effect, with the highest effect size (*Partial* η^2=.28), on how much security from terrorism occupies the mind can be attributed to the manipulated level of terrorism threat, $F(1, 361)=135.98$, $p<.01$. The item was rated significantly higher when the scenario described a high level of security alert (M=3.87) than when the scenario was of a peaceful circumstances (M=2.31).

Another statistically significant main effect on how much security from terrorism occupies the mind is accredited to the society variable, $F(1, 361)=5.80$, $p<.02$, *Partial* $\eta^2=.02$. This corroborates the second research hypothesis (H-1.b). The issue of security from terrorism was generally more on the minds of Israelis (M=3.27), which live under relatively high level of terrorism threat, than on the minds of Texans (M=2.93) that represent a society which is not experienced with the threat.

Hypothesis H-1.c, which speaks of the moderating effect of society on how much the current level of terrorism threat elicits thoughts about terrorism, was not supported by the findings. The interaction between the variable of society and the variable of threat of terrorism did not produce a statistically significant result, $F<1.00$. This finding is similar to the one found in study 1.

Hypothesis H-1.d, which states that society moderates the effect of a building-use on how much security from terrorism occupies the mind, was supported by a statistically significant interaction of the two variables, $F(1, 361)=5.09$, $p<.03$, *Partial* $\eta^2=.02$. This finding is also similar to the results of the first study.

The two additional ANOVA tests that were conducted for each of the building-uses further support the specific assumption detailed in hypothesis H-1.d. As illustrated in Figure 5.4, the two samples were similar in their ratings of a city hall, M=3.01 for Texans, and M=3.06 for Israelis, $F(1, 181)<1.00$. The ratings proved to be significantly different considering a shopping mall, $F(1, 181)=8.13$, $p<.01$. With respect to a shopping mall function, Israelis had security from terrorism much more on their mind, *M*=3.46, than Texans, *M*=2.85. In addition, the results show that while in Texas a city hall elicited higher ratings for how much security from terrorism is on the respondents' mind than a shopping mall, in Israel, it was the opposite. These findings in this stage of the study, in which visuals of buildings were presented to participants, replicate the ones found in study 1, which was only based on written descriptions with only a mention of a building-use.

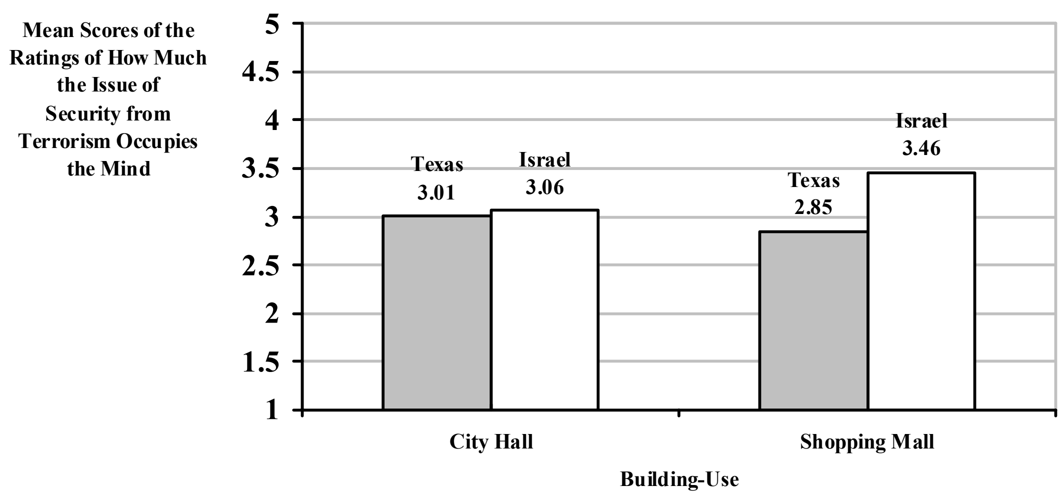


FIGURE 5.4. Study 2: Interaction of building-use and society in the ratings of how much the issue of security from terrorism occupies the mind.

With respect to the variable of glass-solid ratio in the design of the façade, the results show no main effect on the awareness of security from terrorism, $F(1, 361)<1.00$. Hence, hypothesis H.2-a was not supported.

5.3.3.1.2 Findings on the Sense of Security

Pearson's correlation test was conducted on the responses to the questions of how dangerous participants perceive the situation to be (Question 2 in the questionnaire, Appendix A), and how safe they would feel entering the building (Question 3 in the questionnaire, Appendix A). This test was performed to assess whether responses to these two measures can collectively inform about the overall personal sense of security. The test found a significant -.65 correlation (r) between the two indicators ($p<.01$). Due to this finding, responses to the two questions were recoded into one variable. The new value to indicate a participant's sense of security equaled the average score of the answers to the two questions (calculated with the reverse value to the answers for the question of how safe they feel). Consequently, this value ranged between 1 and 5 — a score of 1 indicating a secure feeling and 5 corresponding with a high sense of insecurity.

An ANOVA test was performed on the new calculated value of the sense of security/insecurity. Before performing the Analysis of Variance test, descriptive statistics were reviewed (see Appendix B, Table B-3) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test to assess homogeneity of variance in the examination of how much the issue of security from terrorism occupies the mind resulted in a statistical significant result, $F(15,346)=2.02$, $p<.05$. To deal with this violation of the underlying assumption of the ANOVA, a more stringent alpha was set ($\alpha=.03$).

The results of the ANOVA test, shown in Table 5.8, demonstrate two statistically significant main effects and three statistically significant interactions.

TABLE 5.8. Study 2: Results of between-groups effects for the general sense of security/insecurity.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Facade design	.03	1	.03	.05	.818	.000
Level of terrorism threat	115.18	1	115.18	213.08	.000	.382
Society	6.49	1	6.49	12.00	.001	.034
Building-use	1.37	1	1.37	2.53	.113	.007
Façade design * Level of terrorism threat	2.60	1	2.60	4.81	.029	.014
Façade design * Society	1.62	1	1.62	2.99	.085	.009
Level of terrorism threat * Society	.49	1	.49	.91	.341	.003
Façade design * Level of terrorism threat * Society	1.19	1	1.185	2.19	.140	.006
Façade design * Building-use	.65	1	.65	1.21	.272	.003
Level of terrorism threat * Building-use	.13	1	.13	.24	.626	.001
Facade design * Level of terrorism threat * Building-use	1.06	1	1.06	1.95	.163	.006
Society * Building-use	5.54	1	5.54	10.25	.001	.029
Façade design * Society * Building-use	.39	1	.39	.71	.399	.002
Level of terrorism threat * Society * Building-use	3.94	1	3.94	7.28	.007	.021
Façade design * Level of terrorism threat * Society * Building-use	.34	1	.34	.64	.426	.002
Error	186.49	346	.54			
Total	2621.75	362				

a R Squared = .427 (Adjusted R Squared = .402)

The two exhibited significant main effects are attributed to two "distal" level variables: The current level of terrorism threat and the society (i.e., societal-security-context). These main effects correspond with the first two hypotheses of the conceptual framework. As hypothesized in H-1.a, overall, all the participants (in both societies) exhibited greater insecurity when terrorism was a major threat (*M*=3.09), than when terrorism was not a threat (*M*=1.97), $F(1, 361)=213.08$, $p<.01$. The threat of terrorism had a considerably higher effect size than all the other effects, *Partial* $\eta^2=.38$. Supporting Hypothesis H-1.b, Israelis demonstrated significantly greater feeling of insecurity (*M*=2.68) than Texans (*M*=2.39), $F(1, 361)=16.27$, $p<.01$, *Partial* $\eta^2=.03$, regardless of level of threat or building-use.

The interaction of the variable of terrorism threat with the variable of society was not found to be statistically significant, $p>.05$. Hence, hypothesis H-1.c, which proclaims that people who are not used to the threat are more affected by the current threat level than people from a society that is used to the threat, was not supported by the findings.

Two of the statistically significant interactions include only variables of the “distal” level. These interactions do not include the architectural variable (i.e., the manipulated design of the façade) and hence refer to the first set of the conceptual framework’s hypotheses as well.

The test of the interaction between building-use and society yielded $F(1, 361)=10.25$, $p<.01$, *Partial* $\eta^2=.03$. This result shows a trend similar to the statistically significant interaction in the question of how much security from terrorism occupies the mind. Additional ANOVA tests specific for each building-use, further support hypothesis H-1.d which speaks of the moderating effect of society on how building-use influences the sense of security/insecurity. As illustrated in Figure 5.5, the difference between the samples from the two societies in the ratings of sense of insecurity with regards to the city hall function, was statistically insignificant, $F(1, 178)=.20$, $p<.66$

(M=2.43 for Texas, vs. M=2.49 for Israel). In the case of a shopping mall, Israelis exhibited significantly greater sense of insecurity (M=2.87) than Texans (M=2.34), $F(1, 181)=14.09$, $p<.01$. In addition, the Texans sense of security/insecurity was relatively similar with regards to the two building-uses, and only somewhat less secure when presented with a city hall than when presented with a mall. Israelis exhibited bigger difference in their level of insecurity as associated with the two buildings, and felt less secure when presented with a shopping mall, than when presented with a city hall. This result at this stage of the research, in which architectural solutions were shown to participants, again replicates the findings from the first study that did not include visual representation of a building.

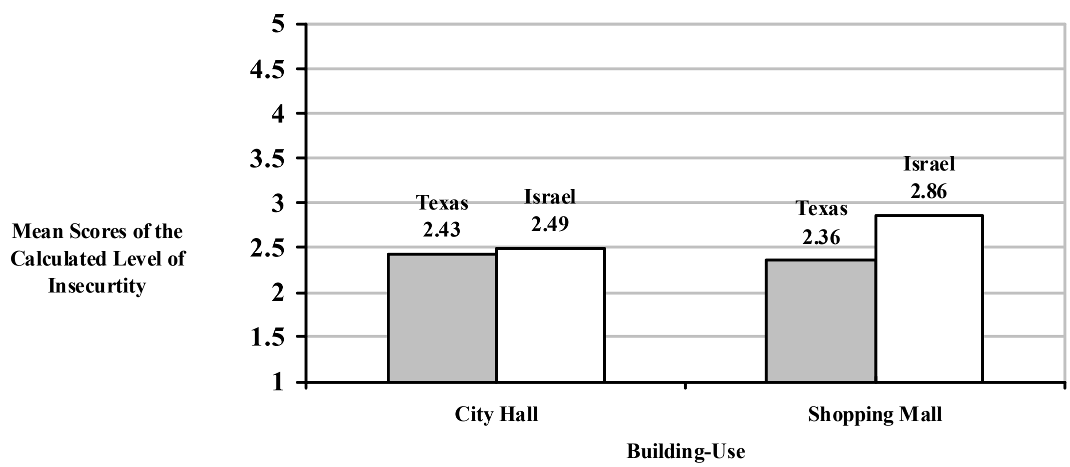


FIGURE 5.5. Study 2: Interaction of building-use and society in the overall sense of security/insecurity.

The other interaction that pertains to the "distal" level, include all three variables: Current level of terrorism threat, societal-security-context (society), and building-use, $F(1, 361)=7.28$, $p<.01$, *Partial* $\eta^2=.02$. As illustrated in Figure 5.6, the difference between the societies in the sense of insecurity as associated with a shopping mall, which speaks of a higher sense of insecurity among the Israeli sample than the Texan sample, was accentuated when the level of terrorism threat was high (M=3.56 for the Israeli sample and M=2.75 for the Texan sample). When there was no threat of terrorism, this difference was attenuated. For a city hall, when presented with a high level of terrorism threat, Texan's (M=3.10) felt less secure than Israelis (M=3.00), while when there was no threat of terrorism, the Israeli participants (M=2.00) felt less secure than Texan participants (M=1.81).

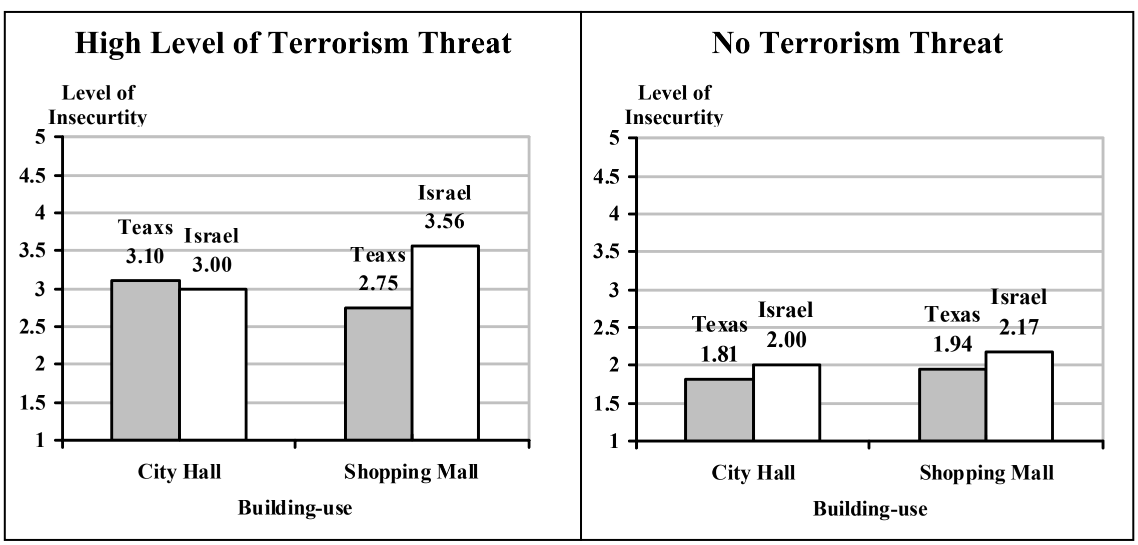


FIGURE 5.6. Study 2: Interaction of building-use, society and current level of terrorism threat in the overall sense of security/insecurity.

The influence of the architectural variable (i.e., the glass-solid ratio in the façade design) on people's general sense of security/insecurity is exhibited in one statistically significant interaction, with a low effect size, *Partial* η^2=.01.

The statistically significant interaction of the glass-solid ratio in the façade design is with the variable of current level of terrorism threat (Figure 5.7), $F(1, 361)=4.81$, $p<.03$. This interaction shows that under high level of terrorism threat, participants felt less secure when the façade was all glass (M=3.18) than when it was of solid concrete (M=3.00). In the context of no terrorism threat, on the other hand, the results show the reverse influence of the façade design on sense of security: participants felt a bit less secure when presented with a solid façade (M=2.02) than when shown a glass façade (M=1.91).

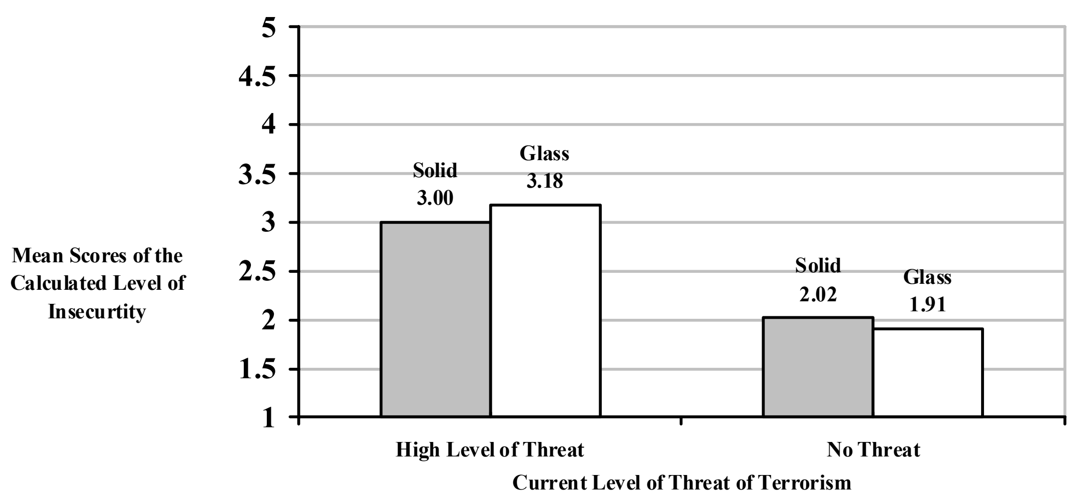


FIGURE 5.7. Study 2: Interaction of façade design and current level of terrorism threat in the overall sense of security/insecurity.

Though the first hypothesis of the second set of hypotheses, concerning the effect of the glass-solid ratio on the sense of security (H-2.a), was not supported by a statistically significant main effect, the above interaction does show a tendency which supports part of it: Respondents felt somewhat safer confronted with a solid façade than with a glass façade when the scenario described a high level of terrorism threat. In addition, these findings support the general claim in hypothesis H-2.b, which states that the effect of the glass-solid ratio in the design of the façade on people's sense of security is moderated by the current level of terrorism threat. The details of the hypothesis, speak about the current level of terrorism threat as accentuating or attenuating the hypothesized main effect of the façade design. Since the façade design did not create a statistically significant main effect on the overall sense of security, the finer details of H-2.b were not supported.

5.3.3.1.3 Findings on the State of Anxiety

The handling of the responses to the twenty statements from the State Anxiety Inventory followed the established procedure for evaluating it. As indicated in the methodology chapter, material and procedure section, every statement was rated on a 4 point scale (1 "not at all" to 4 "very much so"). Responses to the statements that portrayed a positive state of mind were recoded into a reversed scale. The sum of all the answers to the twenty statements was the final score to portray the participant's state of anxiety. Thus, these final scores ranged from 20 to 80; 80 being the highest level of anxiety.

Prior to the analyses of the total score of the state of anxiety, two tests were conducted, one for each of the two samples, to assess the reliability of the index. This statistic examination of the twenty items resulted in high reliability scores: Cronbach's Alpha of .96 in the Texan sample and of .72 in the Israeli sample.

An ANOVA test examined the effects of the independent variables on the total score of the state of anxiety. Before performing the ANOVA test, descriptive statistics were reviewed (see Table B-6 in Appendix B) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test to assess homogeneity of variance in the examination of how much the issue of security from terrorism occupies the mind resulted in a statistical significant result, $F(15,346)=7.01$, $p<.01$. To deal with this violation of the underlying assumption of the ANOVA, a more stringent alpha was set ($\alpha=.03$).

TABLE 5.9. Study 2: Results of between-groups effects for of the anxiety state.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Facade design	.04	1	.04	.00	.982	.000
Level of terrorism threat	8070.73	1	8070.73	95.98	.000	.217
Society	3773.99	1	3773.99	44.88	.000	.115
Building-use	14.96	1	14.96	.18	.673	.001
Façade design * Level of terrorism threat	68.32	1	68.32	.81	.368	.002
Façade design * Society	14.66	1	14.66	.17	.677	.001
Level of terrorism threat * Society	3574.90	1	3574.90	42.51	.000	.109
Façade design * Level of terrorism threat * Society	.56	1	.56	.01	.935	.000
Façade design * Building-use	530.63	1	530.63	6.31	.012	.018
Level of terrorism threat * Building-use	99.47	1	99.47	1.18	.278	.003
Facade design * Level of terrorism threat * Building-use	90.58	1	90.58	1.08	.300	.003
Society * Building-use	22.13	1	22.13	.26	.608	.001
Façade design * Society * Building-use	768.09	1	768.09	9.13	.003	.026
Level of terrorism threat * Society * Building-use	79.11	1	79.11	.94	.333	.003
Façade design * Level of terrorism threat * Society * Building-use	90.95	1	90.95	1.08	.299	.003
Error	29094.57	346	84.09			
Total	752074.00	362	752074.00			

a R Squared = .388 (Adjusted R Squared = .361)

The ANOVA test resulted in two statistically significant main effects and three interactions (Table 5.9). As in the analyses of the two previous indicators of people's responses to scenarios (i.e., how much security from terrorism occupies the mind, detailed in section 5.3.3.1.1, and the general sense of security, detailed in section. 5.3.3.1.2), the two main effects on the total score of anxiety were of the manipulated level of terrorism threat and of the societal-security-context. With regards to the level of threat of terrorism, as hypothesized in H-1.a, all participants exhibited higher level of anxiety when presented with a scenario of high level of terrorism threat (*M*=49.18) than when terrorism was not a threat (*M*=39.16), $F(1, 361)=8070.73$, $p<.01$, *Partial* $\eta^2=.22$. In relation to the main effect of the variable of society, the Israeli participants reported significantly higher level of anxiety than the Texan participants [*M*=47.81 for Israelis vs. *M*=41.13 for Texans, $F(1, 361)=3773.99$, $p<.01$, *Partial* $\eta^2=.12$]. This result supports hypothesis H-1.b (see section 4.2.2.3).

One statistically significant interaction was of the level of terrorism threat with the society variable, $F(1, 361)=3574.90$, $p<.01$, *Partial* $\eta^2=.11$. As illustrated in Figure 5.8, the difference between the Israeli sample and the Texan sample in the level of anxiety was relatively small considering a high level of terrorism threat (*M*=49.00 for Texans and *M*=49.40 for Israelis) while in the case of no threat of terrorism, the anxiety state of the Israeli sample was considerably higher than of Texans (*M*=46.26 vs. *M*=33.41). This trend supports hypothesis H-1.c, which claims that people's security related responses to current level of terrorism threat are moderated by the societal-security- in which they live.

No statistically significant interaction was found between the variables of building-use and the societal-security-context, $F(1,361)<1$. Consequently, hypothesis H-1.d was not supported by the findings.

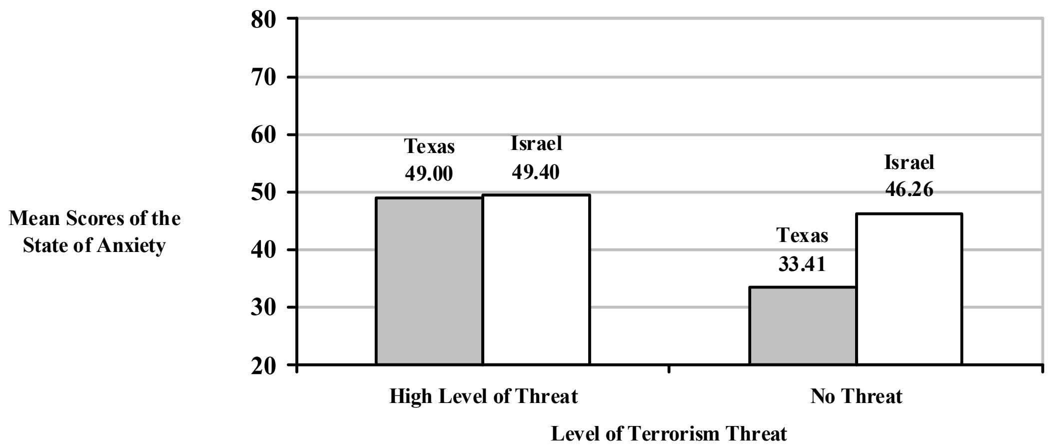


FIGURE 5.8. Study 2: Interaction of level of terrorism threat and society in the reported anxiety state.

Hypothesis H-2.d that relates anxiety level to an interaction of façade design and current level of terrorism threat was not supported by the findings as well, $F(1,361)<1$.

Two statistically significant interactions that relate to the architectural variable of glass-solid ratio in the façade design, provide insight beyond the specific hypotheses of the research. One interaction is only with the building-use variable, and the other is with the building-use variable and the society (i.e., societal-security-context) variable.

The significant interaction between façade design and building-use [$F(1,361)=6.31$, $p<.02$, *Partial* $\eta^2=.02$], shown in Figure 5.9 shows that, overall, participants were more anxious seeing a glass façade ($M=45.41$) than a solid façade when it belonged to a city hall ($M=42.96$). When participant were presented with a shopping mall building, they reported higher anxiety when confronted with a solid façade ($M=45.40$) than a glass façade ($M=42.85$).

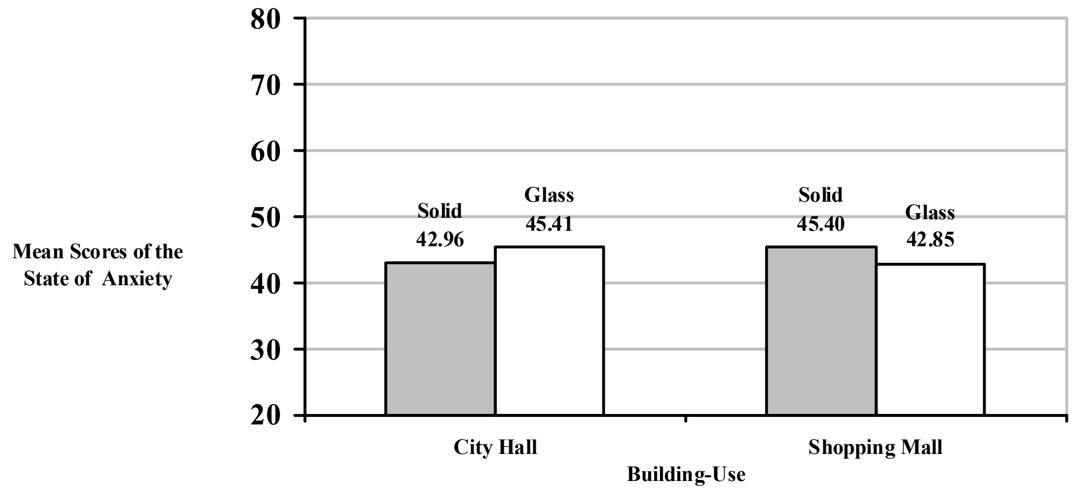


FIGURE 5.9. Study 2: Interaction of façade design and building-use in the self reported anxiety state.

The third significant statistical interaction, $F(1,361)=9.13$, $p<.01$, *Partial* $\eta^2=.03$, further qualifies the previous one, by differentiating between the samples from the two societies in terms of how façade design and building-use influence the state of anxiety. As illustrated in Figure 5.10, the self reported anxiety level in the Texan sample follows the pattern that was indicated by the previous interaction. This means that in the case of a city hall, participants were more anxious when viewing a glass façade (M=43.56) than a solid, concrete façade (M=39.16). And in the case of a shopping mall, Texan participants were more anxious when exposed to a solid façade (M=43.77) than to a glass façade (M=38.23). On the other hand, the reported anxiety level at the Israeli sample, wasn't affected much by the either the building-use or the façade design (M ranged between 47.46 and 48.27).

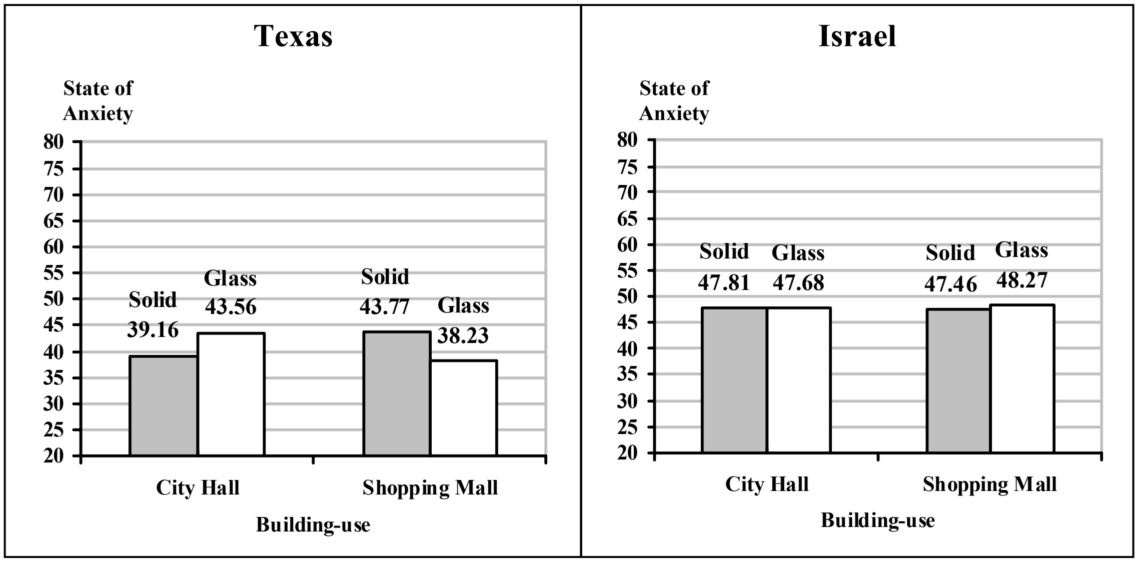


FIGURE 5.10. Study 2: Interaction of façade design, building-use, and society in the self reported anxiety state.

5.3.3.1.4 Findings on the Propensity to Enter/Avoid the Building

Pearson's correlation tests were conducted on every two of the three questions that were to collectively inform about the respondents' propensity to enter the building. All three tests resulted in statistically significant correlations: (1) r =-.41, p<.01, for the rated reservations about going to the facility and the rated likelihood to enter the building; (2) r =.64, p<.01, for the rated reservations about going to the facility and whether they prefers to meet the friend at a different location; and (3) r =-.50, p<.01, for the rated likelihood to enter the building and whether they prefers to meet the friend at a different location.

Following these findings, responses to the three questions were recoded into one variable. The new value to indicate a participant's propensity to use the building equaled the average score of the answers to the three questions (calculated with the reverse value to the answers for the question of how likely they are to enter the building). Consequently, this value ranged between 1 and 5 — a score of 1 indicating an inclination to use the building and 5 corresponding with a propensity to avoid the building.

An ANOVA (α = .05) test was performed on the new calculated value of the propensity to avoid/enter the building. Before performing the Analysis of Variance test, descriptive statistics were reviewed (see Table B-7, Appendix B) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) to assess homogeneity of variance resulted in insignificant findings, $F(15,346)=1.25$, $p>.05$.

The results of the ANOVA test, shown in Table 5.10, demonstrate one statistically significant main effect and three statistically significant interactions with regards to participants' propensity to avoid/enter the building.

TABLE 5.10. Study 2: Results of between-groups effects for the propensity to avoid/enter the building.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Facade design	2.50	1	2.50	3.68	.056	.011
Level of terrorism threat	53.31	1	53.31	78.57	.000	.185
Society	.25	1	.25	.37	.544	.001
Building-use	.00	1	.00	.00	.956	.000
Façade design * Level of terrorism threat	3.85	1	3.85	5.68	.018	.016
Façade design * Society	.09	1	.09	.14	.711	.000
Level of terrorism threat * Society	.74	1	.74	1.09	.298	.003
Façade design * Level of terrorism threat * Society	.01	1	.01	.02	.890	.000
Façade design * Building-use	.76	1	.76	1.13	.290	.003
Level of terrorism threat * Building-use	1.28	1	1.28	1.89	.170	.005
Facade design * Level of terrorism threat * Building-use	.08	1	.08	.12	.735	.000
Society * Building-use	3.01	1	3.01	4.44	.036	.013
Façade design * Society * Building-use	.17	1	.17	.25	.619	.001
Level of terrorism threat * Society * Building-use	3.48	1	3.48	5.13	.024	.015
Façade design * Level of terrorism threat * Society * Building-use	.11	1	.11	.17	.683	.000
Error	234.75	346	.68			
Total	2385.78	362	2385.78			

a R Squared = .221 (Adjusted R Squared = .187)

With regard to the research's first set of hypotheses that relate to the "distal" level variables, the only main effect on the propensity to avoid/enter a building was of the current level of terrorism threat, $F(1, 361)=78.57$, $p<.01$. This main effect, which had the greatest effect size compared to the other independent variables on the propensity to enter/avoid a building, *Partial* $\eta^2=.19$, corresponds with H-1.a. Overall, all the participants (in both societies) exhibited greater tendency to avoid entering both building-uses when terrorism was a major threat (M=2.78), than when terrorism was not a threat (M=2.03). The test did not corroborate hypothesis H-1.b that assumed a difference between the societies in people's propensity to enter a building; nor did it support hypothesis H-1.c that assumed an interaction between the variables of current level of terrorism threat and society.

Two statistically significant interactions were found with regards to variables of the "distal" level. One was between the societal-security-context and the building-use factor, $F(1,361)=4.44$, $p<.04$, *Partial* $\eta^2=.01$. Figure 5.11 shows that in the case of a city hall, the Texan participants exhibited greater tendency to avoid the building (M=2.50) than the Israelis participants (M=2.28). In the case of a shopping mall, it was the opposite – Israelis tended to avoid it (M=2.47) more than Texans (M=2.35).

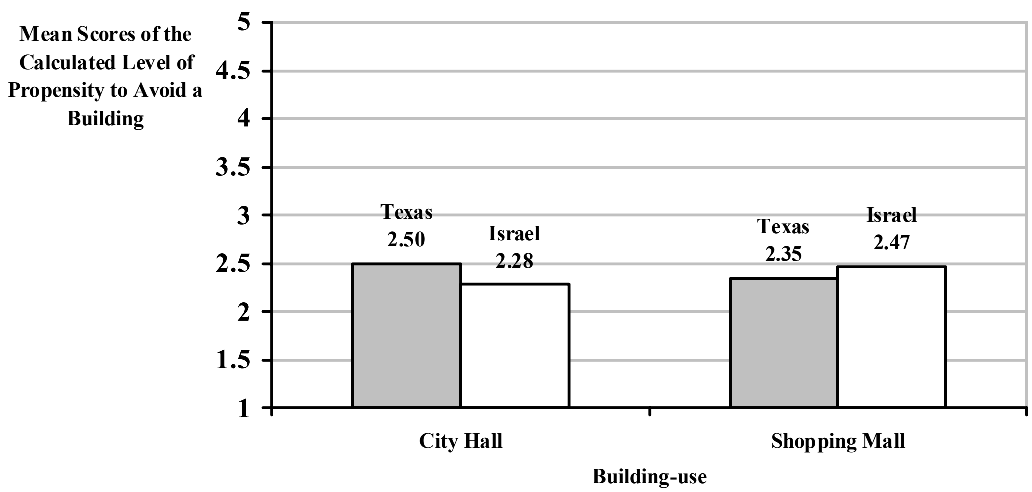


FIGURE 5.11. Study 2: Interaction of building-use and society in the propensity to avoid/enter a building.

The additional statistically significant interaction of the "distal" level, further qualifies the findings of the first one. This interaction adds to the society and building-use interaction a distinction between the two tested levels of current terrorism threat, $F(1,361)=5.13$, $p<.03$, *Partial* $\eta^2=.02$. As illustrated in Figure 5.12, in high level of terrorism threat the propensity to avoid the building followed the pattern that was outlined in the first interaction. I.e., in the case of a city hall – the Texan sample ($M=2.88$) tended to avoid it more than Israeli sample ($M=2.55$), and in the case of a shopping mall – Israelis ($M=3.06$) tended to avoid it more than Texans ($M=2.54$). However, in the scenarios of no terrorism threat, for both building-uses, Texans ($M=2.15$ for city hall, $M=2.04$ for a shopping mall) tended to avoid them more than Israelis ($M=2.02$ for city hall, $M=1.88$ for a shopping mall).

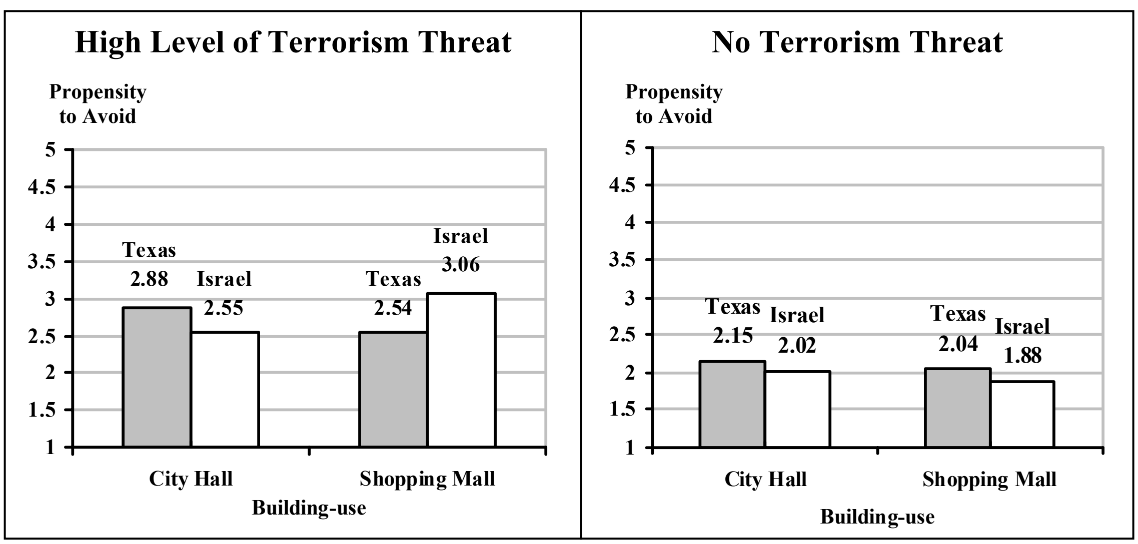


FIGURE 5.12. Study 2: Interaction of building-use, society and current level of terrorism threat in the propensity to avoid/enter a building.

These results support the basic premises in hypotheses H-1.c and H-1.d, as they corroborate that people's action propensity is influenced by the societal-security-context and is interlinked to the current level of terrorism threat (H-1.c) and to the factor of building-use (H-1.d). However, the majority of the details of the hypotheses was not supported, and was further qualified by the findings.

More specifically, hypothesis H-1.c assumed that the fluctuations in a person's willingness to enter a building due to changes in the current level of threat is greater in a society that is not accustomed to live under high level of terrorism threat (e.g., Texas), than in a society that usually lives with high level of threat (e.g., Israel). The results per building-use show an opposite trend regarding a shopping mall building for which the variation in the Israelis' propensity to enter/avoid a building (from M=3.06 in high level of terrorism threat to M=1.88 in low level of terrorism threat) was much greater than the Texans' (from M=2.54 in high level of terrorism threat to M=2.04 in low level of terrorism threat). With respect to the city hall function – the variation in the tendency to avoid the building was only slightly bigger at the Texans' sample (from M=2.88 in high level of terrorism threat to M=2.15 in low level of terrorism threat) than the Israeli (from M=2.55 in high level of terrorism threat to M=2.02 in low level of terrorism threat).

In addition, hypothesis H-1.d assumed that a city hall would trigger a similar inclination to enter/avoid the building in Texas and Israel. A shopping-mall, according to hypothesis H-1.d should be avoided more by Israelis than by Texans. The latter assumption regarding a shopping mall function was only confirmed in the case of high level of terrorism threat (M=3.06 in Israel, and M=2.54 in Texas). When there was no terrorism threat, the Texan participants reported greater propensity to avoid the building (M=2.04) than the Israeli participants (M=1.88). The assumption concerning a city hall was not confirmed at all, as across the two levels of terrorism threat, the Texan sample exhibited higher inclination to avoid the building than the Israeli sample (M=2.50 in Texas, and M=2.28 in Israel).

With regards to the influence of the architectural variable of glass-solid ratio in the façade design on people's propensity to avoid/enter the building, the ANOVA test found a statistically significant interaction with the variables of society (i.e., societal-security-context) and current level of terrorism threat, $F(1,361)=5.68$, $p<.02$, *Partial* $\eta^2=.02$. The interaction, illustrated in Figure 5.13, shows that participants were more inclined to avoid buildings with glass façade (M=2.97) than with solid façade (M=2.61) only in the case of high level of terrorism threat. When presented with scenario of no terrorism threat, participants responded similarly to a building with a glass façade (M=2.00) and a building with a solid façade (M=2.05).

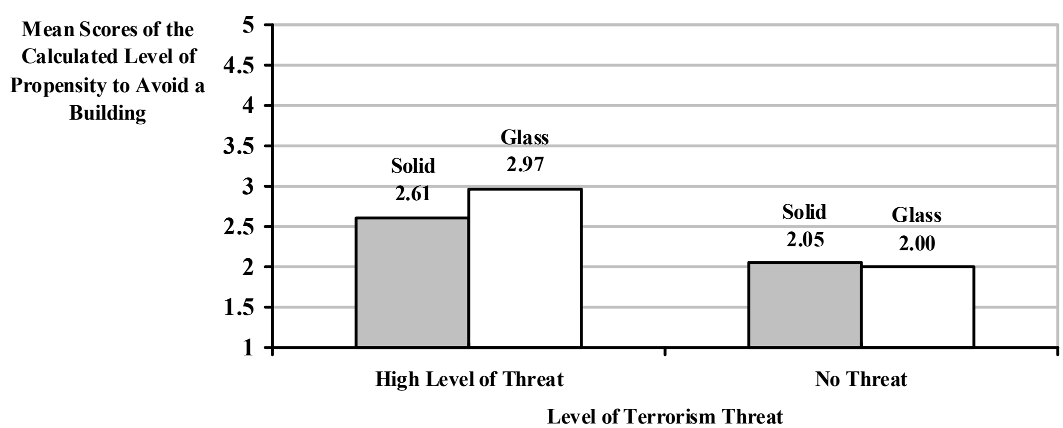


FIGURE 5.13. Study 2: Interaction of façade design and level of terrorism threat in the propensity to avoid/enter a building.

5.3.3.2 Results on the Linkages among the Dependent Variables in the Study

In order to further examine the connections between the dependent variables of the conceptual framework, Pearson product-moment correlation coefficient was conducted between any two dependent variables of the four, for each sample separately.

TABLE 5.11. Study 2: Results of Pearson product-moment correlation coefficients, in each of the societies.

	Sense of insecurity		State of anxiety		Propensity to avoid the building	
	Texas	Israel	Texas	Israel	Texas	Israel
Awareness of security from terrorism	.45	.64	.39	.33	.36	.49
Sense of insecurity			.71	.50	.68	.69
State of anxiety					.66	.50
Propensity to avoid the building						

a All correlations are significant at the 0.01 level (2-tailed).

For each of the samples, as detailed in Table 5.11, all the calculated Pearson product-moment correlation coefficients, between any two dependent variables, showed significant correlation at the significance level of $p<.01$. For the Texas sample, the highest correlations, $r = .66, .68, .71$, were found among the three dependent variables of sense of security, the state of anxiety and the propensity to avoid the building. For the Israeli sample, the highest correlations, $r = .64, .69$, were found between how much security from terrorism was on their mind (i.e., awareness of security from terrorism) and the sense of insecurity, and between the sense of insecurity and the propensity to avoid the building. Correlations of the state of anxiety with all three other dependent variables were consistently lower at the Israeli sample than in the case of the Texan sample.

The results of the correlation coefficient tests show that a similar, high correlation, in both societies was between the sense of insecurity and the propensity to avoid the building, r = .68 in the Texan sample, and r = .69 in the Israeli sample. This finding partially contradict hypothesis H-2.e, which speaks of a difference between a society that is accustomed to the threat, and a society that is not accustomed to the threat in the way their actions correspond with their feelings. Hypothesis H-2.e assumes that people which are not used to the threat of terrorism (e.g., Texans) tend to follow their sense of security (as affected by the glass-solid ratio in the façade design and the current level of threat) with actions, while people who are accustomed to the threat of terrorism (e.g., Israelis) tend to use buildings regardless of their feeling of security. While the results of the correlation coefficient test support the hypothesis assumption about the Texan sample, it seems that it casts doubt on the hypothesis about the Israelis.

With that in mind, we have to consider the fact that Pearson product-moment correlation coefficient as a statistical test tells about a general tendency in the relationship between two variables. However, it does not speak of the actual values for each variable. A high correlation between two variables can exist even if one variable has low values and the other receives high values, as long as they change correspondingly.

For that reason, and in order to further examine hypothesis H-2.e, repeated measures ANOVA test was performed. The two dependent variables of the sense of insecurity and the propensity to avoid the building were defined as the within subject factor. This test, allowed to compare the mean ratings for these dependent variables, as affected by the independent variables. This examination was made possible with the available data, as the measurement for both dependent variables ranged on a similar 5 point scale. As detailed in Table 5.12, the test of the within-subjects contrasts resulted in a few interesting findings.

TABLE 5.12. Study 2: Results of within-subjects contrasts for the sense of security/insecurity and the propensity to avoid/enter the building.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Within factor * Façade design	.91	1	.91	3.62	.058	.010
Within factor * Level of terrorism threat	5.72	1	5.72	22.87	.000	.062
Within factor * Society	4.83	1	4.83	19.32	.000	.053
Within factor *Building-use	.66	1	.66	2.65	.104	.008
Within factor * Façade design * Level of terrorism threat	.84	1	.84	.34	.563	.001
Within factor * Façade design * Society	1.15	1	1.15	4.58	.033	.013
Within factor * Level of terrorism threat * Society	.02	1	.02	.10	.757	.000
Within factor * Façade design * Level of terrorism threat * Society	.42	1	.42	1.66	.198	.005
Within factor * Façade design * Building-use	1.969E-07	1	1.969E-07	.00	.999	.000
Within factor * Level of terrorism threat * Building-use	1.02	1	1.02	4.06	.045	.012
Within factor * Facade design * Level of terrorism threat * Building-use	.24	1	.24	.94	.333	.003
Within factor * Society * Building-use	.16	1	.16	.63	.430	.002
Within factor * Façade design * Society * Building-use	.01	1	.01	.04	.833	.000
Within factor * Level of terrorism threat * Society * Building-use	.02	1	.02	.07	.793	.000
Within factor * Façade design * Level of terrorism threat * Society * Building-use	.37	1	.37	1.48	.225	.004
Error (Within factor)	86.31	345	.25			

One of the statistically significant interactions of the within-subject factor was with the level of terrorism threat, $F(1,345)=22.87$, $p<.01$, *Partial* $\eta^2=.06$. This finding, illustrated in Figure 5.14, shows that when exposed to scenario of high level of terrorism threat, participants' ratings of insecurity were indeed higher, $M=3.09$, than their propensity to avoid a building, $M=2.78$. However, in the case of no threat of terrorism, the reported level of insecurity and the propensity to avoid the building were about the same, $M=1.97$ for insecurity, and $M=2.02$ for propensity to avoid the building.

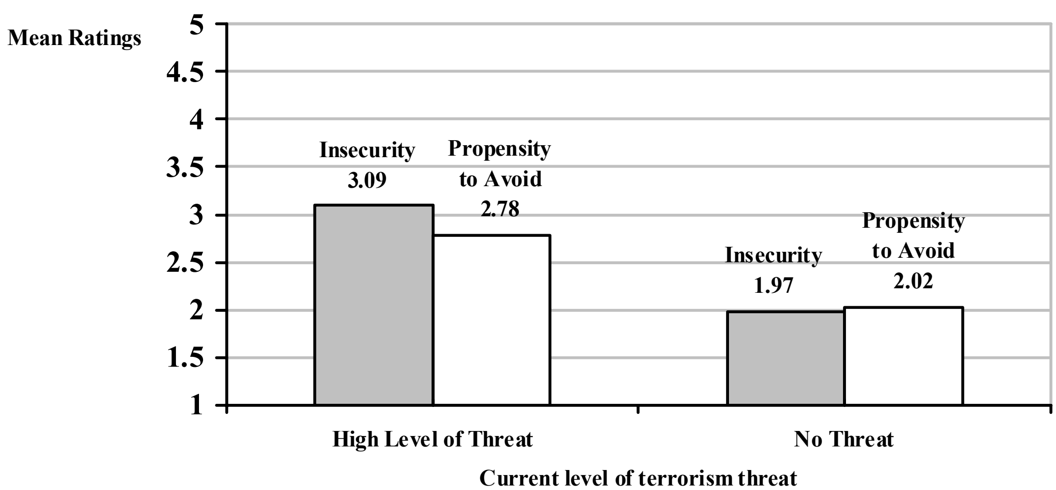


FIGURE 5.14. Study 2: Interaction of current level of terrorism threat and the within factor, which included ratings of the sense insecurity/security and the propensity to avoid/enter a building.

Another statistically significant interaction of the within factor was with the current level of terrorism threat and the building-use variables, $F(1,345)=4.06$, $p<.05$, *Partial* $\eta^2=.01$ (Figure 5.15). This interaction shows that, as indicated above, in a high level of terrorism threat, the propensity to avoid the building was rated lower than the sense of insecurity for both a city hall as well as for a shopping mall. However, in the case of no terrorism threat, while in a shopping mall, the ratings of the two dependent variables were similar (*M*=2.04 for sense of insecurity and *M*=1.97 for the propensity to avoid the building), in the case of city hall, people's ratings of the propensity to avoid the building (*M*=2.08) was higher than their sense of insecurity (*M*=1.89).

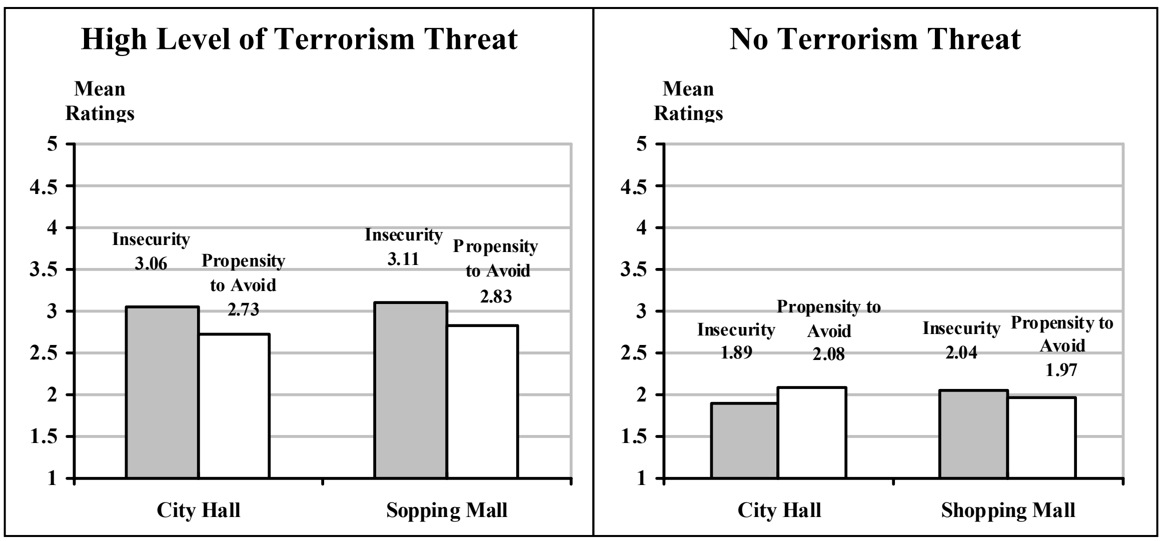


FIGURE 5.15. Study 2: Interaction of current level of terrorism threat, building-use and the within factor, which included ratings of the sense insecurity/security and the propensity to avoid/enter a building.

Other interesting statistically significant interactions of the within factor were with the society variable, the glass-solid ratio in the façade design, as well as an interaction of all three factors.

The interaction with the society variable (i.e., societal-security-context), $F(1,345)=19.32$, $p<.01$, *Partial* $\eta^2=.05$, exhibited in Figure 5.16, shows that in Texas the ratings of insecurity and the ratings for the propensity to avoid the building were similar ($M=2.39$ for sense of insecurity and $M=2.42$ for the propensity to avoid the building). In Israel, the propensity to avoid a building ($M=2.37$) was lower than the rated sense of insecurity ($M=2.68$). This finding supports the assumption in H-2.e.

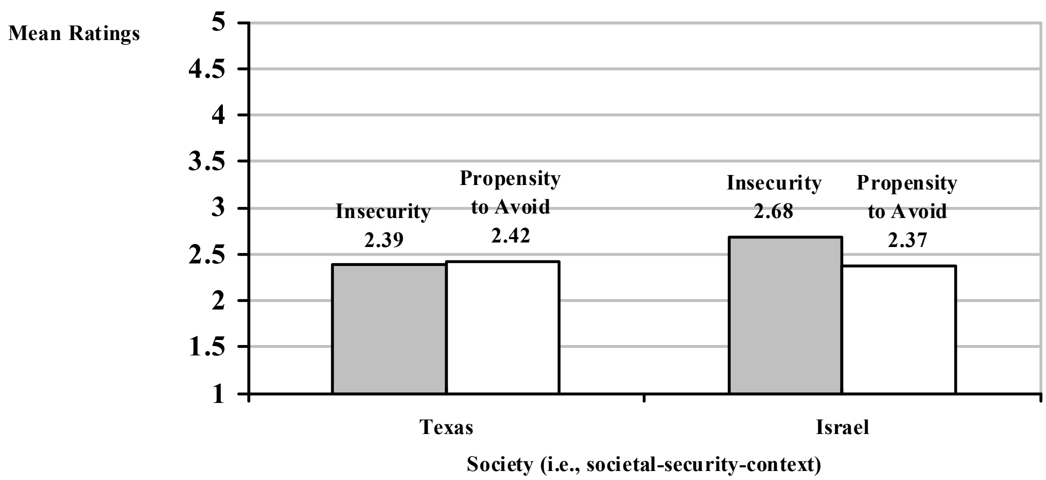


FIGURE 5.16. Study 2: Interaction of society and the within factor, which included ratings of the sense insecurity/security and the propensity to avoid/enter a building.

Figure 5.17 illustrates the three-way interaction of the within-subject factor, the façade design and the society. This statistically significant interaction, $F(1,345)=4.58$, $p<.04$, *Partial* $\eta^2=.01$, shows that in Texas there was no difference between the ratings of insecurity and the propensity to avoid the building, regardless of the façade design. In Israel, the difference, in which insecurity was rated higher than the propensity to avoid the building, was much greater regarding a solid façade than in the case of an all-glass façade. In other words, in Israel respondents were inclined to enter a building of solid façade, even though they were afraid, and in glass façade their tendency to enter the building was closer to their sense of security.

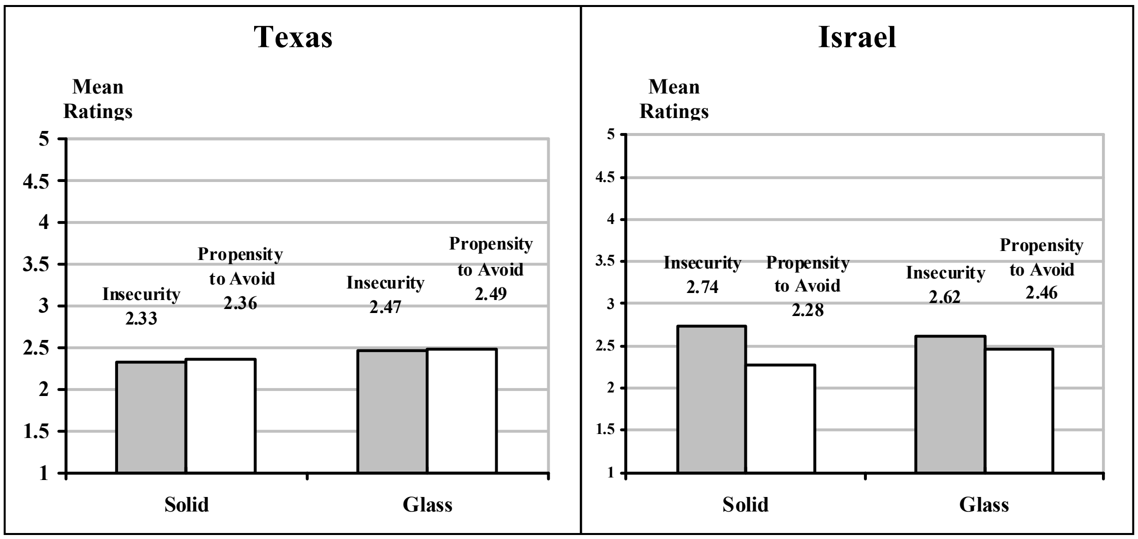


FIGURE 5.17. Study 2: Interaction of façade design, society and the within factor, which included ratings of the sense insecurity/security and the propensity to avoid/enter a building.

5.3.3.3 Results of the Additional Questions about the Security in the Building

To achieve a better understanding of how the visual architectural variables affect the participants' perception of the security of buildings, three more ANOVA tests (for α =.05) were performed on each of the last three additional questions (questions 8, 9 and 10 in Appendix A). The questions asked: how sophisticated is the security in the building; whether the design triggers thoughts about terrorism; and how effective is the design in deterring terrorists.

For each ANOVA test, descriptive statistics were reviewed and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) was used to assess homogeneity of variance.

Among the three ANOVA tests, only one resulted in significant findings that relate to the architectural variable of façade design (see Appendix B for descriptive statistics of the responses to all three questions and the results of between-groups ANOVA tests). The findings relate to the question of how effective is the design to deter terrorists (question 10 in Appendix A). In the responses to this question, a statistically significant main effect was attributed to the façade design, $F(1,361)=24.04$, $p<.01$. Solid façade was rated as more effective than glass in deterring terrorists ($M=2.96$ for solid façade, $M=3.39$ for glass façade, on a scale of 1, very effective to 5 very ineffective).

The analysis also shows a statistically significant interaction of the façade design with the variable of society (i.e., societal-security-context), $F(1,361)=4.14$, $p<.05$. This interaction (Figure 5.18) shows that while samples from both societies perceived similarly the effectiveness of a solid façade in deterring terrorists ($M=2.96$ in both samples), they were different in their perception of the effectiveness of a glass façade. Texans rated glass façade as more effective in deterring terrorists than Israelis did ($M=3.22$ in the Texan sample, $M=3.59$ in the Israeli sample, on a scale of 1 very effective to 5 very ineffective).

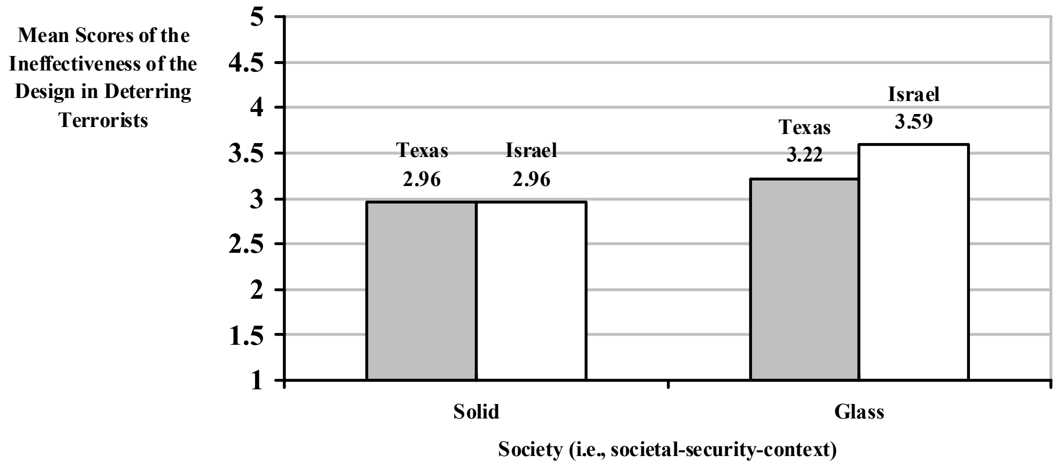


FIGURE 5.18. Study 2: Interaction of façade design and society in the ratings of how effective/ineffective the design is in deterring terrorists.

5.3.4 Conclusion

This stage of the study tested the effects of variations in the glass-solid ratio in the façade design, variations in the level of terrorism threat, two different building-uses, in two societies, on how much the issue of security from terrorism is on the person's mind, how safe the person feels, how anxious he/she is and his/her tendency to use the building. As such, this stage addressed the first and the second set of the research hypotheses. The first set of hypotheses refers to the effects of only the "distal level" variables — current level of terrorism threat, societal-security-context and building-use — on people's range of reactions. The second set of hypotheses addresses how people are impacted by the architectural variable of the glass-solid ratio in the façade design (from the "proximate level"), and a combination of it with the "distal level" variables.

The following summary of the findings of this stage of the study is organized according to the research hypotheses.

The findings fully support hypothesis H-1.a, as variation in terrorism threat had statistically significant main effects on participants' responses along the four dependent variables that were tested. Scenarios which described high level of terrorism threat elicited higher scores than the scenarios in which terrorism was not a threat in how much security from terrorism was on the respondents' mind, the respondents' sense of insecurity, their level of anxiety, and their tendency to avoid the building. As in the first study, these findings also validate the treatments used for manipulating the level of terrorism threat.

Moreover, looking at the effect sizes of these main effects, we find that the variation of the current level of terrorism threat had much greater effects on all levels of people's responses, compared to the effects of the other independent variables. The effect sizes (*Partial* η^2) of the current level of terrorism threat ranged from .38 on the sense of security, to .28 on the awareness of security from terrorism, .22 on the state of anxiety, to .19 on the propensity to enter.

Similar to the results of the first study, statistically significant overall differences between samples, across all manipulated scenarios, were obtained along the first three dependent variables of the conceptual model. The Israeli participants had security from terrorism on their mind more than participants from Texas, and felt less safe and more anxious than the Texans. Among these three main effects of the societal-security-context, the greatest effect size was on the state of anxiety (*Partial* η^2=.11). These findings corroborate most of hypothesis H-1.b. The part in the hypothesis regarding a difference between the societies in the propensity to avoid/enter a building was not supported by the findings, as there was no statistically significant difference (main-effect) between the societies in their responses.

Hypothesis H-1.c, which speaks of the moderating effect of the societal-security-context (i.e., society) on responses to variations in the current level of terrorism threat, was only supported in the findings with regards to the reported level of anxiety. The findings show that while the variations in treatment of level of terrorism threat produced a large difference in the level of anxiety of the Texan sample, Israeli participants were less sensitive to the change in the threat level. This was strengthened with the finding that correlations of the state of anxiety with the other three dimensions of responses were consistently lower at the Israeli sample than in the case of the Texan sample. This may illustrate that the anxiety level of a person that is conditioned to live in a high level of terrorism threat is less influenced by a reduction in the level of threat, while a person that is not used to live under the threat of terrorism exhibits a higher sensitivity to changes of threat.

Hypothesis H-1.d which speaks of differences in the four dimensions of responses between societies as related to the specific building-uses was partially supported by the findings. For the Israeli participants, a shopping mall elicited more thoughts about terrorism threat, and caused a greater sense of insecurity, than a city hall. For the Texan sample the effect was reversed. In addition, while the two samples were similar in their responses to the city hall, they were very different in their responses to a shopping mall. Unlike the first study, this tendency was not expressed at the anxiety level. With respect to the propensity to avoid/enter a building, the general tendency within each society corresponds with the ratings of the awareness of security from terrorism and the overall sense of security: Israelis tended to avoid more a shopping mall, while Texans tended to avoid more a city hall. In addition, in the case of a shopping mall—Israelis tended to avoid it more than Texans, and in the case of a city hall—it was the opposite. An additional correlation between the propensity to enter a building and the threat level indicates that the latter tendency occurred in high level of terrorism. However, in low level of terrorism, for both building uses, the Texan participants were less inclined to use them than the Israelis.

With respect to the second set of hypotheses that relates to the influence of the architectural variable on the four dimensions of people's responses, the examination resulted with the following.

The findings do not support a statistically significant main effect of the variable of façade design on any of the four dimensions of people's responses. This disagrees with the general notion of Hypothesis H-2.a, which claims that the glass-solid ratio in the façade design has a main effect on the awareness of security from terrorism and the sense of security. The hypothesis speaks about a different effect regarding the two dimensions of responses. The hypothesis states that when confronted with a building of solid facade, people tend to have security from terrorism more on their minds at the same time that they feel safer than when confronted with a building of extensive window area.

The findings did not show any significant effects of the façade design on awareness of security (how much it was on the mind). However, a statistically significant interaction of the variables of façade design and current level of terrorism threat was found in regards to the sense of security, and hence supports part of hypothesis H-2.b. Though, it should be noted that the effect size of this interaction was very low (*Partial* η^2=.01). In high level of terrorism threat, a solid façade created a greater sense of security than a glass facade. In the case of no terrorism threat, a glass façade elicited a higher sense of security than a solid facade for both samples and across building-uses.

The findings that in high level of terrorism threat solid façade created a greater sense of security than a glass facade goes along with the additional finding according to which all participants rated solid façade as more effective than glass in deterring terrorists.

For hypothesis H-2.c, the findings do not support the claim that the effects of glass-solid ratio in the façade design on a person's awareness of security from terrorism and a person's sense of security are moderated by the societal-security-context. The findings do not indicate any difference between the societies in how the glass-solid ratio of the facades affected their awareness of security from terrorism or their sense of security.

Hypothesis H-2.d, which proclaims that the effect of glass-solid ratio in the façade design on a person's stress/anxiety level is influenced by the current level of terrorism threat, was not supported by the findings. However, other interactions of the glass-solid ratio were found statistically significant in influencing the respondents' state of anxiety. An interaction with the building-use and societal-security-context variables shows that in Texas, city hall elicited higher anxiety among participants when the façade of the building was all glass than when it was solid concrete. In the case of a shopping mall, solid façade elicited higher anxiety levels than a glass façade. In Israel, on the other hand, the anxiety level was not affected by façade design, or by building-use. This supports the conclusion that anxiety level of a person that is conditioned to live in a high level of terrorism threat is less sensitive to changes in the built environment ("distal"/"proximate"), while a person that is not used to live under the threat of terrorism exhibits a higher sensitivity to variations.

Hypothesis H-2.e speaks of assumed differences between people that are not used to the threat of terrorism (e.g., Texans) and people who are used to the threat of terrorism in the connection of their action propensity (avoid/use the building) to their general sense of security. The hypothesis claims that Texans tend to follow their sense of security (as affected by the glass-solid ratio in the façade design, the building-use and the current level of threat) with actions, while Israelis tend to use buildings regardless of their feeling of security.

The initial, separate, examinations of each of the dimensions—of the sense of security and of the propensity to enter/avoid the building—show that across societies, the interaction of glass-solid ratio in the façade design and current level of terrorism threat, produced similar tendencies in the reported sense of security/insecurity and in the propensity to avoid/enter the building. Generally, in a high level of terrorism threat, all participants of both samples felt less secure and avoided more a building with glass façade compared to a building of solid façade. In scenarios of no terrorism threat, there was almost no difference between a glass and a solid façade in the respondents' sense of security as well as in the respondents' inclination to enter/avoid the building.

In addition, with respect to the building-use variable, the tendency in each sample to feel less secure when confronted with one building-use and more secure with the other seemed to translate to their tendency to enter/avoid the buildings. In Israel, participants felt less secure confronted with a shopping mall than with a city hall, and tended to avoid a shopping mall more than a city hall. In Texas the attitude towards the two building-uses was opposite (though the differences between the building-uses were small for both dimensions).

These finding, along with the fact that a high correlation, in both samples, was found between the sense of insecurity/security and the propensity to avoid/enter the building supports the claim in hypothesis H-2.e regarding the Texan sample, and seem to contradict the assumption regarding the Israeli sample.

A direct comparison between the ratings of sense of insecurity/security and the propensity to avoid the building provided additional insight on the linkage between the two dimensions of responses in the two societies. This analysis clearly indicates that in Texas, the participants' ratings for the propensity to avoid a building went hand in hand with their sense of insecurity, regardless of the design of the façade or the current level of terrorism threat. In Israel, the propensity to avoid a building was constantly lower than the reported sense of insecurity, more so in respect to a solid façade than to a glass façade. This finding gives credence to hypothesis H-2.e and the claim that people who are not accustomed to live with the threat of terrorism, tend to follow their sense of security (as affected by the glass-solid ratio in the façade design and the current level of threat) with actions, while people who are used to the threat tend to use buildings regardless of their feeling of security.

To summarize, the findings of this stage of the study provide credence to the research design that was employed in this case. The results confirm the findings from the first study on people's responses to "distal" level variables, providing additional insight with regards to people's behavioral disposition. In addition, the results validate the second part of the model, looking at a specific "proximate" level variable that influences a first impression of a building—the design of the façade. More specifically, focusing on the level of fortification vs. openness as represented in the façade design (i.e., glass-solid ratio) and its effects on human responses in the context of terrorism threat. This phase sets the stage for the third study that tests how people are affected by another variable that participates in a first encounter with a public building: the conspicuousness of the access control security measures in the overall architectural design of the entrance.

5.4 Study 3: Reactions to Entrance Design as Affected by Façade Design and Building-use, in Two Societies

5.4.1 Objective and Hypotheses

The third study added to the test the model's second architectural variable: the conspicuousness of the access control security measures in the overall architectural design of the entrance (designed vs. temporary stationed machines). More specifically, this stage tested the effects of the conspicuousness of the access control security measures in the overall architectural design of the entrance (designed vs. temporary stationed machines) and the level of fortification/openness of the façade (glass-solid ratio), as related to two building-uses (shopping mall vs. city hall) on people of two societies of different exposure to the threat (Texas and Israel).

The variation in the current level of terrorism threat was eliminated in this study, and all the experimental conditions were set to a high level of security alert from terrorism. In this study, as in the second study, all four of the dependent variables of the conceptual model were measured and analyzed: level of awareness of security from terrorism (i.e., how much security from terrorism is on the respondent's mind), the respondent's sense of security, the respondent's level of anxiety, and the respondent's propensity to enter the building.

The examination in this stage focused on the conceptual framework's third set of hypotheses which addresses how the four dimensions of people's responses are influenced by the new variable that was introduced in this examination: the conspicuousness of the access control security measures in the overall architectural design of the entrance. The examination also included hypotheses from the second and first sets, excluding the ones that address the variable of current level of terrorism, which was not tested in this study (see the detailed hypotheses in section 5.2.1 and 5.3.1).

The following is the third set of hypotheses, focusing on the effects of the design of access control security measures on people's security-related reactions. It should be noted that while the presented assumptions discuss the main effects that this variable has on the four dimensions of people's reactions, it is expected that these effects are moderated by the "distal variables". The statistical analyses of this study look to see what these interactions are, and whether there are additional interactions with the architectural variable of glass-solid ratio in the façade design.

(H-3.a) Having access control security measures at the entrance to a building (whether designed or as temporary stationed machines) increases people's awareness of the issue of security from terrorism.

(H-3.b) When confronted with conspicuous security measures that appear as temporary stationed machines people's overall sense of security is reduced and their anxiety level is increased. Well-designed measures, which seem as part of the entrance, enhance the sense of security (i.e., reduce perceived risk and increase perception of personal safety) and reduce the level of anxiety.

(H-3.c) People that are not used to the threat of terrorism (e.g., Texans) tend to follow their sense of security (as affected by the design of access control security measures and building-use) with actions, while people who are accustomed to the threat of terrorism (e.g., Israelis) tend to use buildings regardless of their sense of security.

5.4.2 Research Design and Procedure

The third study employed a 2 x 2 x 2 x 2 between-groups research design and was conducted utilizing a web-based computerized system. The study tested the effects of the conspicuousness of the access control security measures in the overall architectural design of the entrance (designed vs. temporary stationed machines), and the apparent level of fortification/openness of the façade of the building (all glass façade vs. solid façade) as related to two building-uses (city hall and shopping mall) on people of two different societies with different societal-security-contexts (Texas and Israel).

All manipulated scenarios included a written description and two images. The written description in all the scenarios was of a high level of terrorism alert. From the two images, one showed the main façade of the building. The image depicted a facade that is mostly glass or a façade that is mostly concrete. The second image zoomed on the entrance to the building. This one presented an entrance in which the access control security measures are temporary stationed machines, or the same entrance with designed security measures that appear as part of the overall design.

The participants' reactions were measured along the four dimensions outlined in the conceptual model: how much the issue of a terrorism threat is on the respondent's mind (i.e., security awareness), the respondent's overall sense of security, his/her level of anxiety and their inclination to use the building.

A total of 399 undergraduate students participated in this examination (229 from Texas and 171 from Israel). Within each location, participants were randomly assigned to treatments. For a detailed description of the research design, procedure and material, please see the methodology chapter, section 4.3.2.

5.4.3 Results

The statistical analysis of the data included two stages. The first stage was conducted per dependent variable: how much the issue of security from terrorism is on the respondent's mind, the respondent's sense of security, his/her state of anxiety, and the respondent's propensity to use the building. The second stage of analysis looked for connections among the dependent variables within the study.

5.4.3.1 Results per Dependent Variable

5.4.3.1.1 Findings on the Level of Awareness of Security from Terrorism

An ANOVA test (α=.05) was conducted for the recorded responses to how much the issue of security from terrorism occupies the mind, i.e., to the level of awareness of the subject (Question 1.5 in the questionnaire; see screenshots in Appendix A for exact wording). Before performing the Analysis of Variance test, descriptive statistics were reviewed (see Appendix B, Table B-14) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test to assess homogeneity of variance in the examination of how much the issue of security from terrorism occupies the mind resulted in an insignificant result, $F(15, 383)<1$. Results of the ANOVA test shown in Table 5.13, demonstrate one significant main effect and two significant interactions, all with a low effect size.

The analysis shows that across the two societies a significant effect on how much security from terrorism occupies the mind can be attributed to the societal-security-context variable, $F(1, 398)=4.83$, $p<.03$, *Partial* $\eta^2=.01$. This corroborates the research hypothesis H-1.b. The issue of security from terrorism was generally more on the minds of Israeli participants (M=3.58), which live under relatively high level of terrorism threat, than on the minds of Texan participants (M=3.31) that represent a society which is not experienced with the threat.

TABLE 5.13. Study 3: Results of between-groups effects for how much the issue of security from terrorism occupies the mind.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Entrance design	1.40	1	1.40	.84	.360	.002
Facade design	3.66	1	3.66	2.19	.140	.006
Society	8.09	1	8.09	4.83	.029	.012
Building-use	.00	1	.00	.00	.960	.000
Entrance design * Façade design	.25	1	.25	.15	.702	.000
Entrance design * Society	17.79	1	17.79	10.63	.001	.027
Facade design * Society	.28	1	.28	.17	.684	.000
Entrance design * Façade design * Society	3.40	1	3.40	2.03	.155	.005
Entrance design * Building-use	1.56	1	1.56	.93	.335	.002
Façade design * Building-use	.18	1	.18	.10	.747	.000
Entrance design * Façade design * Building-use	1.65	1	1.65	.99	.321	.003
Society * Building-use	6.89	1	6.89	4.12	.043	.011
Entrance design * Society * Building-use	.45	1	.45	.27	.606	.001
Façade design * Society * Building-use	5.90	1	5.90	3.52	.061	.009
Entrance design * Façade design * Society * Building-use	.06	1	.06	.04	.851	.000
Error	641.055	383	1.67			
Total	5380.00	399				

a R Squared = .071 (Adjusted R Squared = .034)

A statistical significant interaction of the societal-security-context variable with the building-use variable supports hypothesis H-1.d, $F(1, 398)=5.09$, $p<.03$, *Partial* $\eta^2=.01$. As illustrated in Figure 5.19, participants from the two societies were similar in their ratings of a city hall, $M=3.42$ for Texans, and $M=3.45$ for Israelis. The ratings proved to be significantly different considering a shopping mall. With respect to a shopping mall function, the Israeli participants had security from terrorism much more on their mind, $M=3.72$, than the Texans, $M=3.22$. In addition, the results show that while in Texas a city hall elicited higher ratings for how much security from terrorism is on the respondents' mind than a shopping mall, in Israel, it was the opposite.

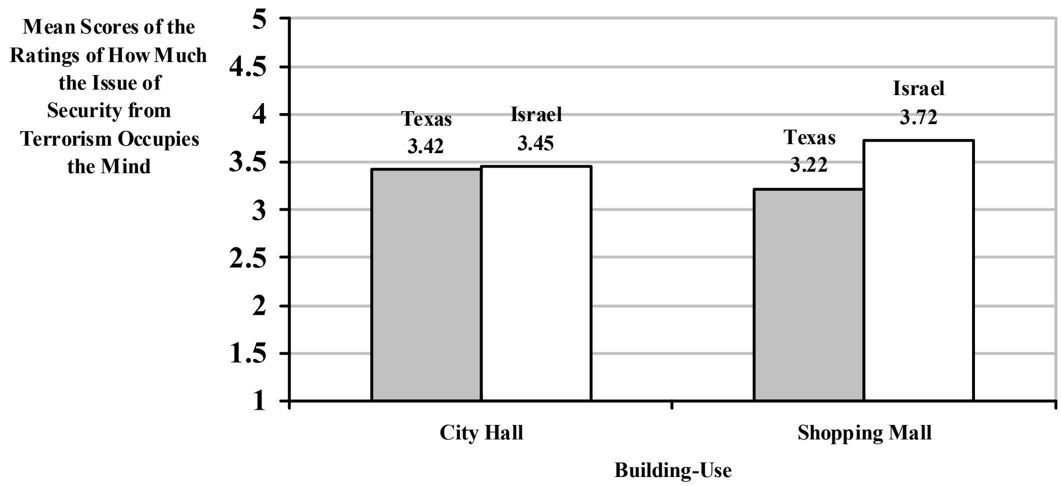


FIGURE 5.19. Study 3: Interaction of building-use and society in the ratings of how much the issue of security from terrorism occupies the mind.

With respect to the variable of glass-solid ratio in the design of the façade, the results show no main effect on the awareness of security from terrorism, $F(1,398)=2.19$, $p>.05$. Hence, hypothesis H.2-a was not supported.

Another statistically significant interaction was found between the variables of society and the design of the access control security measures at the entrance, $F(1, 398)=10.63$, $p<.01$, *Partial* $\eta^2=.03$. As illustrated in Figure 5.20, the ratings of how much security from terrorism occupies the mind as affected by the design of the entrance was different in the two samples. For the Texan sample, an entrance with temporary stationed machines ($M=3.55$) elicited more thoughts of terrorism than an entrance in which the access control security measures that appeared as part of the overall design ($M=3.04$). In Israel it was the opposite effect ($M=3.44$ for temporary machines and $M=3.74$ for designed entrance).

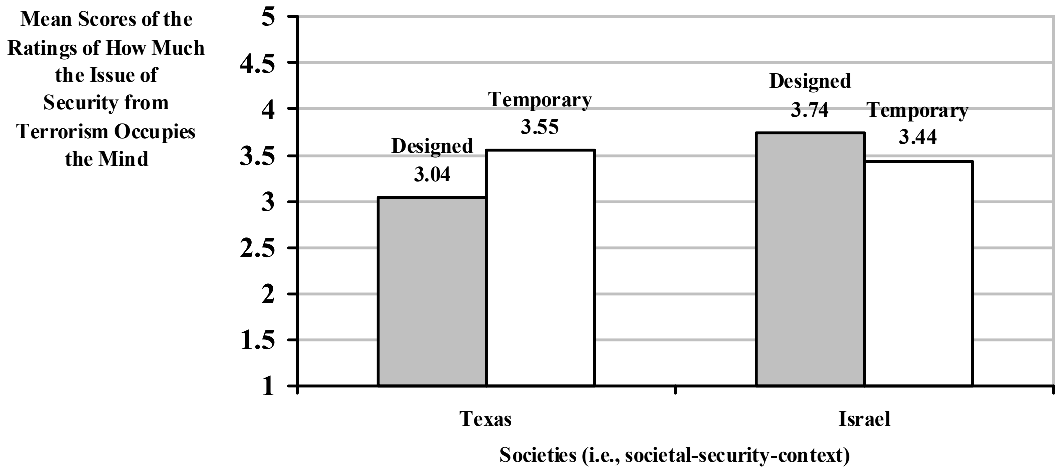


FIGURE 5.20. Study 3: Interaction of the design of the access control security measures at the entrance and society in the ratings of how much the issue of security from terrorism occupies the mind.

Hypothesis H-3.a states that any access control security measures at the entrance to a building increase people's awareness of the issue of security from terrorism. In order to examine this statement, another ANOVA test was performed between the data collected at this stage and the data collected in study 2 for high level of threat of terrorism, before any access control security measures were introduced. The only effect that was tested was of the two studies. The results show a significant effect of the difference between studies, $F(1,577)=14.31$, $p<.01$. In a high level of terrorism threat, the existence of access control security measures at the entrance to the building (study 3) resulted in lower ratings for how much security from terrorism was on the respondents minds, $M=3.43$, than when there were no visible access control security measures at the entrance (study 2), $M=3.87$. These findings show an opposite trend to what was expected according to hypothesis H-3.a.

5.4.3.1.2 Findings on the Sense of Security

Pearson's correlation test was conducted on the responses to the questions of how dangerous participants perceive the situation to be (Question 2 in the questionnaire, Appendix A), and how safe they would feel entering the building (Question 3 in the questionnaire, Appendix A). This test was performed to assess whether responses to these two measures can collectively inform about the overall personal sense of security.

The test found a significant -.60 correlation (r) between the two indicators ($p<.01$). Due to this finding, responses to the two questions were recoded into one variable. The new value to indicate a participant's sense of security equaled the average score of the answers to the two questions (calculated with the reverse value to the answers for the question of how safe they feel). Consequently, this value ranged between 1 and 5 — a score of 1 indicating a secure feeling and 5 corresponding with a high sense of insecurity.

An ANOVA test (for a .05 Type 1 error rate) was performed on the new calculated value of the sense of security/insecurity. Before performing the Analysis of Variance test, descriptive statistics were reviewed (see Appendix B, Table B-15) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test to assess homogeneity of variance in the examination of the calculated values to indicate sense of security resulted in insignificant findings, $F(15,383)=1.32$, $p>.05$.

TABLE 5.14. Study 3: Results of between-groups effects for the general sense of security/insecurity.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Entrance design	.53	1	.53	.72	.396	.002
Facade design	1.15	1	1.15	1.57	.211	.004
Society	2.94	1	2.94	4.03	.045	.010
Building-use	3.33	1	3.33	4.56	.033	.012
Entrance design * Façade design	1.15	1	1.15	1.58	.210	.004
Entrance design * Society	.30	1	.30	.41	.525	.001
Facade design * Society	.72	1	.72	.98	.323	.003
Entrance design * Façade design * Society	.50	1	.50	.68	.409	.002
Entrance design * Building-use	2.18	1	2.18	2.99	.085	.008
Façade design * Building-use	.02	1	.02	.02	.876	.000
Entrance design * Façade design * Building-use	.82	1	.82	1.12	.292	.003
Society * Building-use	2.95	1	2.95	4.04	.045	.010
Entrance design * Society * Building-use	.00	1	.00	.00	.959	.000
Façade design * Society * Building-use	.64	1	.64	.88	.350	.002
Entrance design * Façade design * Society * Building-use	.70	1	.70	.96	.328	.003
Error	279.89	383	.73			
Total	3625.75	399				

a R Squared = .057 (Adjusted R Squared = .020)

The results of the ANOVA test, shown in Table 5.14, demonstrate two statistically significant main effects and one statistically significant interaction, all with small effects sizes.

The two statistically significant main effects are attributed to the two "distal" level variables: societal-security-context and building-use. Supporting Hypothesis H-1.b, Israeli participants demonstrated significantly greater feeling of insecurity (M=2.99) than the Texan participants (M=2.81), $F(1, 398)=4.03$, $p<.05$, *Partial* $\eta^2=.01$. The effect of the building-use variable was beyond the research hypotheses, and shows that across both samples, people felt less secure with regards to a shopping mall (*M*=2.96) than to a city hall (*M*=2.81), $F(1, 398)=4.56$, $p<.04$, *Partial* $\eta^2=.01$.

The latter finding was further qualified with the statistically significant interaction of the building-use variable with the societal-security-context variable (Figure 5.21), $F(1, 398)=4.04$, $p<.05$, *Partial* $\eta^2=.01$. Similar to the findings in study 2, the two samples were close in the ratings of sense of insecurity with regards to the city hall function (*M*=2.80 for Texas, and *M*=2.81 for Israel). In the case of a shopping mall, the Israeli participants exhibited a greater sense of insecurity (*M*=3.16) than the Texans (*M*=2.83). In addition, sense of security/insecurity in the Texan sample was relatively similar with regards to the two building-uses. Israelis exhibited bigger difference in their level of insecurity as associated with the two buildings, and felt less secure when presented with a shopping mall, than when presented with a city hall. These findings corroborate hypothesis H-1.d.

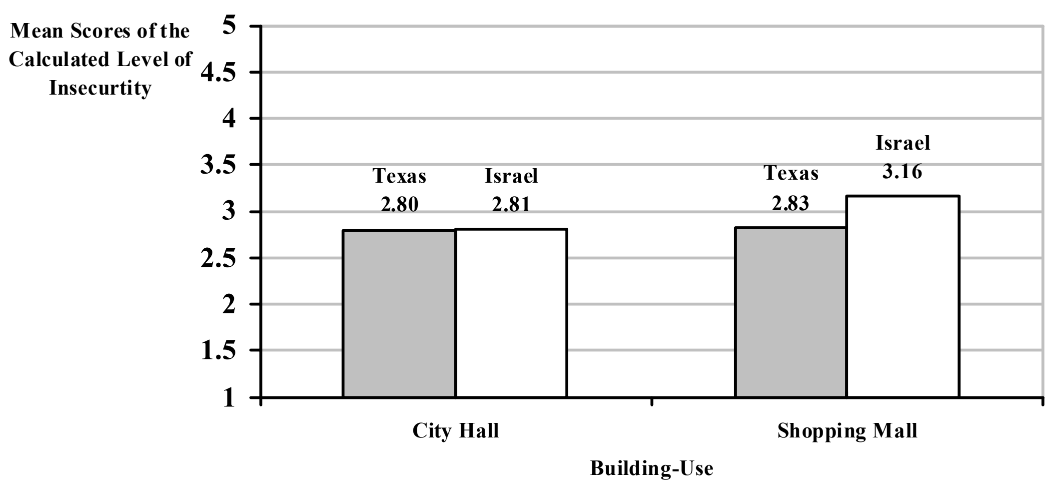


FIGURE 5.21. Study 3: Interaction of building-use and society in the overall sense of security/insecurity.

Hypotheses H-2.a and H-2.c were not supported by the findings as no effects were attributed to the design of the façade. Since the analysis did not indicate a main effect for the variable of the design of the security measures at the entrance, hypothesis H-3.b was not supported as well.

5.4.3.1.3 Findings on the State of Anxiety

The analysis of the responses to the twenty statements from the State Anxiety Inventory was conducted as in the first two studies (sections 5.3.3.1.3 and 5.2.3.1.3). The statistic examination of the twenty items resulted in high reliability scores: Cronbach's Alpha of .96 in the Texan sample and of .71 in the Israeli sample.

An ANOVA test examined the effects of the independent variables on the total score of the anxiety state. Before performing the ANOVA test, descriptive statistics were reviewed (see Table B-16 in Appendix B) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test to assess homogeneity of variance in the examination of how much the issue of security from terrorism occupies the mind resulted in a statistical significant result, $F(15,383)=10.88$, $p<.01$. To deal with this violation of the underlying assumption of the ANOVA, a more stringent alpha was set ($\alpha=.03$).

As indicated in Table 5.15, the results of the test show no statistically significant effect or interactions. These findings contradict any of the hypotheses concerning the level of anxiety (H-1.b, H-1.d, H-2.d, H-3.b).

TABLE 5.15. Study 3: Results of between-groups effects for of the total score for anxiety state.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Entrance design	4.70	1	4.70	.04	.844	.000
Facade design	85.95	1	85.95	.07	.401	.002
Society	55.81	1	55.81	.46	.498	.001
Building-use	7.72	1	8.72	.07	.789	.000
Entrance design * Façade design	96.27	1	96.27	.79	.374	.002
Entrance design * Society	13.34	1	13.34	.11	.741	.000
Facade design * Society	26.03	1	26.03	.21	.644	.001
Entrance design * Façade design * Society	37.14	1	37.14	.31	.581	.001
Entrance design * Building-use	121.49	1	121.49	1.00	.318	.003
Façade design * Building-use	286.31	1	286.31	2.36	.126	.006
Entrance design * Façade design * Building-use	10.23	1	10.23	.08	.772	.000
Society * Building-use	6.90	1	6.90	.06	.812	.000
Entrance design * Society * Building-use	175.19	1	175.81	1.44	.231	.004
Façade design * Society * Building-use	265.68	1	265.68	2.19	.140	.006
Entrance design * Façade design * Society * Building-use	6.836	1	6,836	.06	.813	.000
Error	46554.29	383	121.55			
Total	958269.00	399				

a R Squared = .032 (Adjusted R Squared = -.006)

5.4.3.1.4 Findings on the Propensity to Enter/Avoid the Building

Pearson's correlation tests were conducted on every two of the three questions that were to collectively inform about the respondents' propensity to enter the building. All three tests resulted in statistically significant correlations: (1) r =-.41, p<.01, for the rated reservations about going to the facility and the rated likelihood to enter the building; (2) r =.59, p<.01, for the rated reservations about going to the facility and whether they prefers to meet the friend at a different location; and (3) r =-.46, p<.01, for the rated likelihood to enter the building and whether they prefers to meet the friend at a different location**.**

Following these findings, responses to the three questions were recoded into one variable. The new value to indicate a participant's propensity to use the building equaled the average score of the answers to the three questions (calculated with the reverse value to the answers for the question of how likely they are to enter the building). Consequently, this value ranged between 1 and 5 — a score of 1 indicating an inclination to use the building and 5 corresponding with a propensity to avoid the building.

An ANOVA (for .05 Type 1 error rate) test was performed on the new calculated value of the propensity to avoid/enter the building. Before performing the Analysis of Variance test, descriptive statistics were reviewed (see Table B-17, Appendix B) and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) to assess homogeneity of variance resulted in insignificant findings, $F(15,383)=0.77$, $p>.05$.

The results of the ANOVA test, shown in Table 5.16, demonstrate two statistically significant main effects and one statistically significant interaction with regards to the participants' propensity to avoid/enter the building, all with low effect sizes.

TABLE 5.16. Study 3: Results of between-groups effects for the propensity to avoid/enter the building.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Entrance design	1.31	1	1.32	1.95	.164	.005
Facade design	4.09	1	4.09	6.04	.014	.016
Society	2.03	1	2.03	3.00	.084	.008
Building-use	6.16	1	6.16	9.09	.003	.023
Entrance design * Façade design	1.02	1	1.02	1.50	.222	.004
Entrance design * Society	1.37	1	1.37	2.03	.156	.005
Facade design * Society	.18	1	.18	.26	.611	.001
Entrance design * Façade design * Society	.47	1	.47	.70	.404	.002
Entrance design * Building-use	.17	1	.17	.25	.617	.001
Façade design * Building-use	.11	1	.11	.16	.686	.000
Entrance design * Façade design * Building-use	.70	1	.70	1.03	.310	.003
Society * Building-use	5.35	1	5.35	7.89	.005	.020
Entrance design * Society * Building-use	.60	1	.60	.88	.349	.002
Façade design * Society * Building-use	.51	1	.51	.75	.388	.002
Entrance design * Façade design * Society * Building-use	1.69	1	1.69	2.50	.115	.006
Error	259.44	383				
Total	3097.22	399				

a R Squared = .083 (Adjusted R Squared = .047)

The results indicate a statistically significant main effect of the building-use variable on the propensity to enter or avoid buildings, $F(1, 398)=9.09$, $p<.01$, *Partial* $\eta^2=.02$. Overall, respondents from both samples and across all experimental conditions tended to avoid more a shopping mall than a city hall.

However, this finding is qualified by a statistically significant interaction of the building-use variable with the society factor, $F(1, 398)=7.89$, $p<.01$, *Partial* $\eta^2=.02$., which has relevance to hypothesis H-1.d. Hypothesis H-1.d assumes that a city hall triggers a similar inclination to enter/avoid the building in Texas and Israel. A shopping-mall, according to the hypothesis is avoided more by Israelis than by Texans. The general tendency of the found interaction, illustrated in Figure 5.22, seems to support hypothesis H-1.d with respect to a shopping mall (M=2.80 for Israelis, M=2.73 for Texans), and to oppose it regarding a city hall (M=2.34 for Israelis, M=2.70 for Texans).

In order to clarify whether the differences between the samples of the two societies per building-use are statistically significant, additional ANOVA tests were performed for each of the building-uses. The tests show that for a shopping mall, the difference between the samples in the ratings of the propensity to avoid/enter it was insignificant, $F(1, 208)<1$, $p>.05$. The test for a city hall, confirmed that the difference between the samples was statistically significant, $F(1, 189)=9.171$, $p<.01$. For both building uses, these findings are different than what was hypothesized in H-1.d. In addition, the interaction also indicates that while the Texan's tendency to avoid/enter the building was similar for both building-uses, in Israel, respondents tended to avoid a shopping mall more than they did with respect to a city hall.

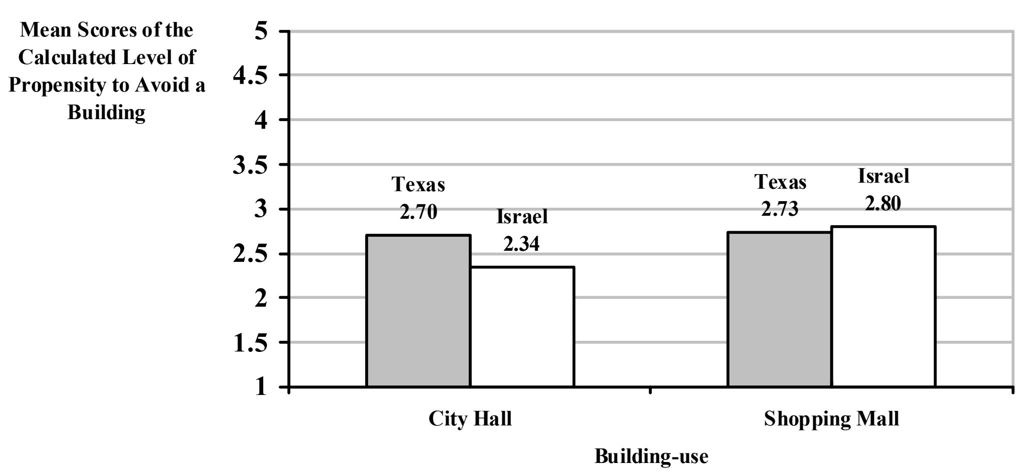


FIGURE 5.22. Study 3: Interaction of building-use and society in the propensity to avoid/enter a building.

With regards to the influence of the architectural variable of façade design (i.e., glass-solid ratio) on people's propensity to avoid/enter the building, the ANOVA test found a statistically significant main effect attributed to this variable, $F(1,398)=7.89$, $p<.01$, *Partial* $\eta^2=.02$. The main effect shows that overall, participants were more inclined to avoid buildings with solid façade ($M=2.76$) than with glass façade ($M=2.55$). This finding is opposite to the effect that was found in study 2, and to the additional finding in study 2 which indicates that participants rated solid façade as more effective in deterring terrorists than glass facade.

No statistically significant effect on the propensity to avoid/enter the building was found with relation to the conspicuousness of the access control security measures at the entrance (designed vs. temporary machines).

5.4.3.2 Results on the Linkages among the Dependent Variables in the Study

In order to further examine the connections between the dependent variables of the conceptual model, Pearson product-moment correlation coefficient was conducted between any two dependent variables of the four, for each sample separately. The results resembled the ones found in study 2.

TABLE 5.17. Study 3: Results of Pearson product-moment correlation coefficients, in each of the samples.

	Sense of insecurity		State of anxiety		Propensity to avoid the building	
	Texas	Israel	Texas	Israel	Texas	Israel
Awareness of security from terrorism	.36	.56	.34	.33	.36	.45
Sense of insecurity			.61	.47	.74	.67
State of anxiety					.71	.48
Propensity to avoid the building						

a All correlations are significant at the 0.01 level (2-tailed).

For each of the samples, as detailed in Table 5.17, all the calculated Pearson product-moment correlation coefficients, between any two dependent variables, showed significant correlation at the significance level of $p<.01$. For the Texas sample, the highest correlations, $r = .61, .74, .71$, were found among the three dependent variables of sense of security, the state of anxiety and the propensity to avoid the building. For the Israeli sample, the highest correlation, $r = .56, .67$, were found between how much security from terrorism was on their mind (i.e., awareness of security from terrorism) and the sense of insecurity, and between the sense of insecurity and the propensity to avoid the building. Correlations of the state of anxiety with all three other dependent variables were consistently lower at the Israeli sample than in the case of the Texan sample.

The results of the correlation coefficient tests show that the highest correlation, in both samples, was between the sense of insecurity and the propensity to avoid the building, $r = .74$ in the Texan sample, and $r = .68$ in the Israeli sample. This finding partially contradict hypothesis H-2.e, which speaks of a difference between a society that is accustomed to the threat, and a society that is not accustomed to the threat in the way their actions correspond with their feelings. Hypothesis H-2.e assumes that people which are not used to the threat of terrorism (e.g., Texans) tend to follow their sense of security (as affected by the glass-solid ratio in the façade design and the current level of threat) with actions, while people who are accustomed to the threat of terrorism (e.g., Israelis) tend to use buildings regardless of their feeling of security. While the results of the correlation coefficient test support the hypothesis assumption about the Texan sample, it seems to disprove the premise about the Israelis.

With that in mind, we have to consider the fact that Pearson product-moment correlation coefficient as a statistical test tells about a general tendency in the relationship between two variables. However, it does not speak of the actual values for each variable. A high correlation between two variables can exist even if one variable has low values and the other receives high values, as long as they change correspondingly.

For that reason, and in order to further examine hypothesis H-2.e, repeated measures ANOVA test was performed. The two dependent variables of the sense of insecurity and the propensity to avoid the building were defined as the within subject factors. This test, allowed to compare the mean ratings for these dependent variables, as affected by the independent variables. This examination was made possible with the available data, as the measurement for both dependent variables ranged on a similar 5 point scale. As detailed in Table 5.18, the test of the within-subjects contrasts resulted in a few interesting findings.

TABLE 5.18. Study 3: Results of within-subjects contrasts for the sense of security/insecurity and the propensity to avoid/enter the building.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*	*Partial* η^2
Within factor * Entrance design	.09	1	.09	.43	.514	.001
Within factor * Facade design	.45	1	.45	2.17	.142	.006
Within factor * Society	4.93	1	4.93	23.62	.000	.058
Within factor * Building-use	.22	1	.22	1.03	.311	.003
Within factor * Entrance design * Façade design	.00	1	.00	.01	.918	.000
Within factor * Entrance design * Society	.20	1	.20	.94	.332	.002
Within factor * Facade design * Society	.09	1	.09	.44	.508	.001
Within factor * Entrance design * Façade design * Society	.00	1	.00	.00	.976	.000
Within factor * Entrance design * Building-use	1.79	1	1.79	8.56	.004	.022
Within factor * Façade design * Building-use	.02	1	.02	.10	.757	.000
Within factor * Entrance design * Façade design * Building-use	.00	1	.00	.01	.919	.000
Within factor * Society * Building-use	.18	1	.18	.65	.358	.002
Within factor * Entrance design * Society * Building-use	.33	1	.33	1.59	.208	.004
Within factor * Façade design * Society * Building-use	.00	1	.00	.02	.891	.000
Within factor * Entrance design * Façade design * Society * Building-use	.11	1	.11	.51	.474	.001
Error (Within factor)	79.96	383	.21			

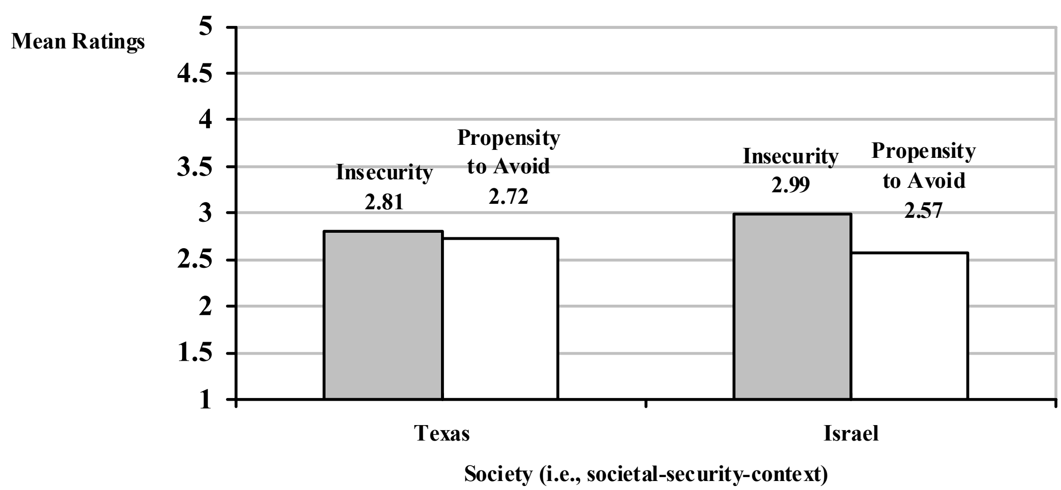


FIGURE 5.23. Study 3: Interaction of society and the within factor, which included ratings of the sense insecurity/security and the propensity to avoid/enter a building.

A significant interaction between the within factor and the society variable (i.e., societal-security-context) was found, $F(1,383)=23.62$, $p<.01$, illustrated in Figure 5.23. The interaction shows that while in both samples the ratings of insecurity were higher than the propensity to avoid the building, this trend was attenuated in the Texas sample (M=2.81 for sense of insecurity and M=2.72 for the propensity to avoid the building) and accentuated in the Israeli sample (M=2.99 for sense of insecurity and M=2.57 for the propensity to avoid the building). These finding support hypothesis H-2.e, illustrating that the behavioral disposition of the Texan participants tended to followed their sense of security more than in the case of the Israeli sample.

Another statistically significant interaction of the within factor was found with the building-use variable and the variable of the conspicuousness of access control security measures at the entrance (designed vs. temporary machines), $F(1,383)=8.56$, $p<.01$. This interaction, shown in Figure 5.24, shows that the general tendency of the ratings of the propensity to avoid a building to be lower than the ratings of insecurity has fluctuated based on the building-use and entrance design.

In the case of a city hall, the difference between the ratings of the two dimensions was higher when the access control security measures were part of the overall design, vs. when they appeared as temporary stationed machines. In addition, for a city hall, while the ratings of insecurity were higher for inconspicuous (i.e., designed) security measures (M=2.91) than in the case of conspicuous temporary machines (M=2.71), the tendency to avoid the building was about the same for both cases (M=2.58 for inconspicuous security measure, and M=2.51 for conspicuous).

In the case of a shopping mall, the difference between the ratings of the propensity to avoid the building and the ratings of insecurity was attenuated in relation to inconspicuous access control security measures (i.e., designed) and accentuated with relation to conspicuous security measure (i.e., temporary machines). In this case, while the ratings of insecurity for the two variations in the design of the security measures were close (*M*=2.92 for inconspicuous security measure, and *M*=3.00 for conspicuous), the propensity to avoid the building was greater with relation to conspicuous, temporary security measures (*M*=2.83) than to the inconspicuous designed ones (*M*=2.71).

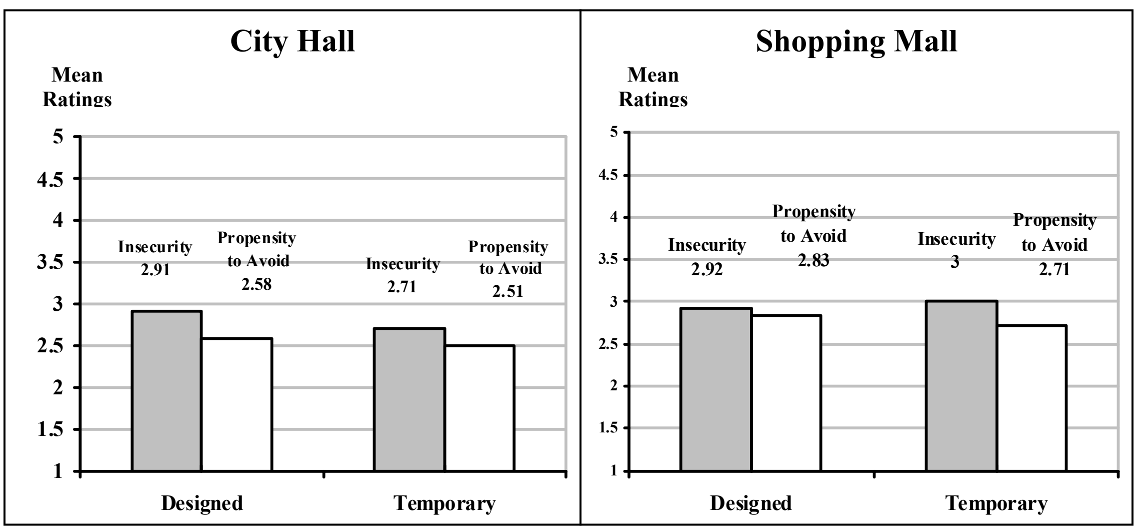


FIGURE 5.24. Study 3: Interaction of the design of the access control security measures at the entrance, society and the within factor, which included ratings of the sense insecurity/security and the propensity to avoid/enter a building.

5.4.3.3 Results of the Additional Questions about the Security in the Building

To achieve a better understanding of how the visual architectural variables affect the participants' perception of the security of the buildings, three more ANOVA tests (α =.05) were performed on each of the last three additional questions (questions 8, 9 and 10 in Appendix A). The questions asked: how sophisticated is the security in the building; whether the design triggers thoughts about terrorism; and how effective is the design in deterring terrorists.

For each ANOVA test, descriptive statistics were reviewed and statistical assumptions for a fixed effect research design were examined. Independence within and between groups was assumed. Levene's test (for .01 Type 1 error rate) was used to assess homogeneity of variance.

All three ANOVA tests resulted in significant findings that relate to the architectural variables of façade design (i.e., solid-glass ratio) and the entrance design (i.e., designed vs. temporary access control security measures). Descriptive statistics of the responses to all three questions and the results tables of the between-groups ANOVA tests appear in Appendix B.

The question of how sophisticated is the security in the building (question 8 in Appendix A) resulted in one statistically significant interaction between building-use and entrance design, $F(1,398)=3.90$, $p<.05$. This interaction (Figure 5.25) shows an opposite trend for each of the building-uses, in how the perception of level of sophistication of security in the building was influenced by the conspicuousness of access control security measures at the entrance. For a shopping mall, access control security measures that appeared as part of the overall design of the entrance (*M*=2.76) elevated the perceived sophistication of security, compared to temporary stationed machines (*M*=3.03). In a city hall, it was the opposite effect, though the difference in responses to the two options of entrance design was attenuated compared to the case of a shopping mall (*M*=2.96 for designed security measures, *M*=2.86 for temporary security measures).

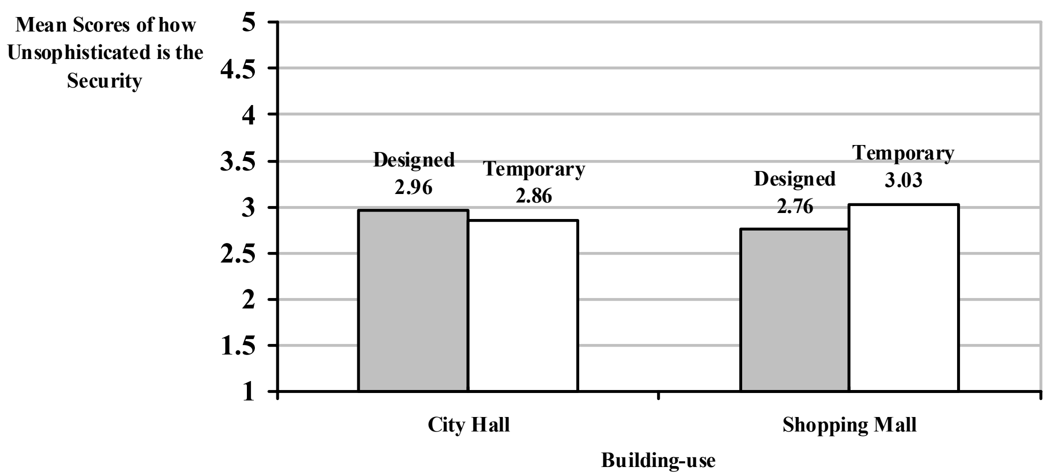


FIGURE 5.25. Study 3: Interaction of the design of the access control security measures at the entrance and building-use in the ratings of how sophisticated is the security in the building (1 - very sophisticated, 5 - very unsophisticated).

To the question on whether the design triggers thoughts about terrorism (question 9 in Appendix A), the test resulted in one significant interaction that involved the façade design (glass-solid ratio). This interaction was again with the building-use variable, $F(1,398)=5.71$, $p<.02$. As illustrated in Figure 5.26, for a city hall, glass façade (*M*=2.58) triggered more thought about terrorism than solid façade (*M*=2.23). The opposite effect happened in the case of a shopping mall (*M*=2.38 for glass and *M*=2.60 for solid façade). This interaction brings an interesting point, especially when compared to the previous findings regarding the perceived sophistication of security in the building. In this examination, when the design of the façade created a perception of a sophisticated security, it also triggered more thoughts about terrorism, and when the more the design of the façade created a perception of an unsophisticated security, the less it triggered thoughts about terrorism.

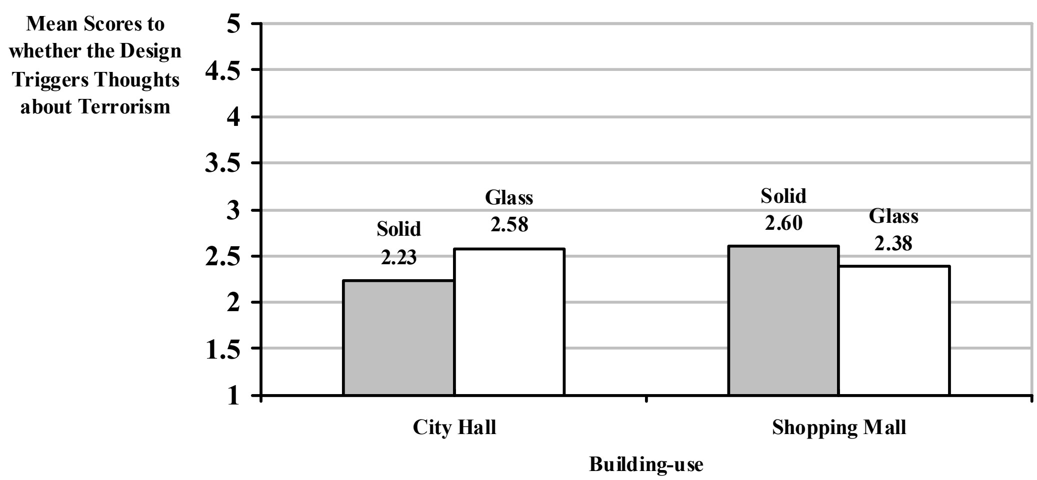


FIGURE 5.26. Study 3: Interaction of the glass-solid ratio in the façade design and building-use in the ratings of whether the design triggers thoughts about terrorism (1 – not at all, 5 – vary much).

The ANOVA test to the last question on how effective is the design to deter terrorists (question 10 in Appendix a) resulted in two statistically significant findings that relate to the two architectural variables of the study.

As found in study 2, a main effect was attributed to the façade design, $F(1,398)=6.60$, $p<.02$. Solid façade was rated as more effective than glass façade in deterring terrorists ($M=3.11$ for solid façade, $M=3.33$ for glass façade on a scale of 1 being very effective to 5 being very ineffective).

The second finding was an interaction between building-use and the conspicuousness of the security measure at the entrance (designed vs. temporary), $F(1,398)=5.00$, $p<.03$. The interaction (Figure 5.27) shows that for a city hall, inconspicuous, designed, access control security measures ($M=3.38$) were rated as less effective than conspicuous temporary machines ($M=3.04$) in deterring terrorists. In a shopping mall there was no significant difference in the ratings of the two alternative designs for the access control security measures ($M=3.20$ for designed access control security measures and $M=3.25$ for temporary machines).

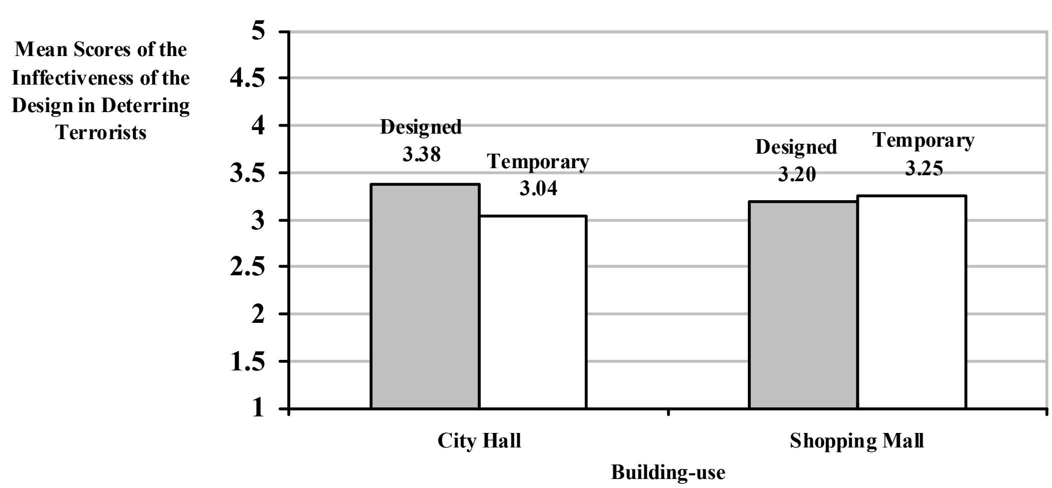


FIGURE 5.27. Study 3: Interaction of the design of the access control security measures at the entrance and building-use in the ratings of how effective/ineffective the design is in deterring terrorists (1 - very effective, 5 - very ineffective).

5.4.4 Conclusion

This stage of the study tested the effects of variations of two visible architectural elements at the approach to a public building as related to two different public building-uses, on people from two different societal-security-contexts, when the current level of threat is of high alert from terrorism. The two architectural elements that were tested are the conspicuousness of the access control security measures in the entrance (designed vs. temporary machines) and the façade's apparent level of fortification (glass-solid ratio in the façade design). The examined effects were along four dimensions of people's responses: (1) how much the issue of security from terrorism is on the person's mind, (2) how safe the person feels, (3) how anxious he/she is, and (4) his/her tendency to use the building.

The examination addressed all three sets of the research hypotheses, excluding the specific hypotheses that address a variation of the level of terrorism threat, which was not tested at this stage. The hypotheses that were tested from the first set address the effects of two of the "distal level" variables—the societal-security-context and building-use—on people's range of reactions. The hypotheses from the second set address how people are impacted by the architectural variable of the glass-solid ratio in the façade design (from the "proximate level"), and a combination of it with the "distal level" variables. The third set of hypotheses focus on the effects of the conspicuousness of the access control security measures at the entrance (designed vs. temporary machines) on people's range of reactions. The following summary of the findings of this stage of the study is organized according to the research hypotheses. It should be noted that all the effects that were found statistically significant in this study had a small effect size (*Partial* η^2 ranged from .01 to .03).

The first hypothesis that was addressed in this examination, H-1.b, was only partially confirmed by the findings. Statistically significant overall differences between samples, across all manipulated scenarios, were obtained along the first two dependent variables of the conceptual model: Israelis had security from terrorism on their mind more than Texans, and their overall sense of security was lower than the Texans'. The societal-security-context did not have the hypothesized main effect on the state of anxiety and the propensity to enter the building.

Hypothesis H-1.d which speaks of differences in the four dimensions of responses between societies as related to the specific building-uses was also partially supported by the findings. As in the case of hypothesis H-1.b, the results support the hypothesis with regards to the two dimensions of responses—the awareness of security from terrorism and the sense of security. The city hall elicited similar ratings among the Texan and Israeli samples on how much security from terrorism was on their minds and their overall sense of security. As hypothesized, in the case of a shopping mall, security from terrorism was more on the minds of the Israeli participants than the Texan participants, while their sense of security was lower than of the Texans. These findings are similar to the ones in the previous two studies.

As in study 2, no statistically significant interaction was found between the building-use and the society with regards to the anxiety state. With respect to the propensity to enter/avoid a building, the findings are different than what was hypothesized. With regards to a shopping mall, participants from the two societies were similar in their inclination to use/avoid the building. With regards to a city hall, the results show that Texans tended to avoid it more than the Israelis. Additional findings regarding the two building-uses show that across both samples, a shopping mall created lower sense of security and a greater tendency to avoid it than a city hall.

With respect to the second set of hypotheses that relates to the influence of the glass-solid ratio in the façade design on the four dimensions of people's responses, the examination resulted with the following.

The analysis did not find a statistically significant effect of the variable of façade design on how much security from terrorism is on the mind or on the sense of security. This disagrees with the Hypothesis H-2.a, which claims that when confronted with a solid façade, people tend to have security from terrorism more on their minds at the same time that they feel safer than when confronted with a building of extensive window area. Consequently, Hypothesis H-2.c which refers to a moderating effect that the societal-security-context has on the influence of glass-solid ratio in the façade on people's awareness of security from terrorism and their sense of security, was not supported as well.

The glass-solid ratio in the façade design was found to influence only the propensity to enter/avoid a building. The statistically significant main effect shows that across samples and building-uses, participants reported a greater inclination to avoid a solid façade than a glass façade.

With respect to the effect of the access control security measures at the entrance on people, the general claim in hypothesis H-3.a that the mere existence of such measures at the entrance to a building increases people's awareness of the issue of security from terrorism was disproved. The overall ratings for how much security from terrorism was on the respondents' minds were compared to the ratings collected in study 2 for scenarios of high level of terrorism threat, in which no security measures were shown. The results show an opposite tendency to what was hypothesized: In a high level of terrorism threat, the existence of access control security measures at the entrance to the building (study 3) resulted in lower ratings for how much security from terrorism was on the respondents minds, than when there were no visible access control security measures at the entrance (study 2).

Additional findings concerning the awareness of security from terrorism show that the two samples responded differently to the variation in the conspicuousness of the access control security measures. For the Texan sample, an entrance with temporary stationed machines elicited more thoughts of terrorism than an entrance in which the access control security measures appeared as part of the overall design. In Israel it was the opposite.

Hypothesis H-3.b proclaims that when confronted with conspicuous security measures that appear as temporary stationed machines people's overall sense of security is reduced and their anxiety level is increased. Designed measures, which seem as part of the entrance, enhance the sense of security (i.e., reduce perceived risk and increase perception of personal safety) and reduce the level of anxiety. This hypothesis was not supported as the design of the access control security measures was not found to influence the sense of security or the anxiety level.

Hypotheses H-2.e and H-3.c specify a certain relation, which is society-dependent, between the behavioral disposition to avoid/enter the building and the sense of security as affected by a combination of the proximate and distal level variables. The hypotheses claim that Texans tend to follow their sense of security (as affected by the glass-solid ratio in the façade design and the conspicuousness of the access control security measures at the entrance) with actions, while Israelis tend to use buildings regardless of their feeling of security.

The initial, separate, examinations of each of the dimensions—of the sense of security and of the propensity to enter/avoid the building—show that the only effect that was due to an architectural variable was of the façade design on the propensity to use the building. And that effect was across samples.

Differences between participants from the two societies were found in regards to the particular building-uses. However, the connection between the effect on sense of security and the tendency to enter suggests that in both societies the participants' action propensity followed their sense of security as related to the building-use. In Israel, participants reported lower sense of security in regards to a shopping mall and wanted to avoid it more than a city hall. In Texas, both building-uses received similar ratings in the sense of security and similar ratings in the propensity to use/avoid them.

A direct comparison between the ratings of sense of insecurity/security and the propensity to avoid the building provided additional insight on the relationship between the two dimensions of responses in the two samples. The analysis does not indicate the building-use variable or the two architectural variables as elements that create a difference between the two samples. However, the findings indicate a general difference between the two samples in their responses to the two dimensions. In Texas, the ratings for the propensity to avoid a building were close to the overall sense of insecurity. In Israel, the propensity to avoid a building was considerably lower than the reported sense of insecurity. This finding gives credence to hypotheses H-2.e H-3.c and the claim that people who are not accustomed to live with the threat of terrorism, tend to follow their sense of security with actions, while people who are used to the threat tend to use buildings regardless of their feeling of security.

The comparison of the propensity to avoid/enter the building and the reported sense of insecurity/security adds additional insight with respect to the specific building-uses and the conspicuousness of the access control security measures at the entrance. The findings show that while for both building-uses and both variations of entrance design the propensity to avoid a building was lower than the sense of insecurity; this difference was almost non-existent in the case of a shopping mall with inconspicuous designed access control security measures. For that specific case – the difference in the sense of insecurity and the propensity to avoid was statistically insignificant.

Ratings of additional measurements further elaborate on the respondents' perception of security as related to the different building-uses and the different variations in the architectural variables of the study. These findings show that in the case of a shopping mall, the two façade designs were rated similarly on how sophisticated is the security in the building, while solid façade seemed to trigger more thoughts about terrorism than glass. Temporary machines were rated as more sophisticated than designed access control measures, while both entrance designs were rated similarly on their effectiveness to deter terrorists. In the case of a city hall, solid façade was rated higher for how sophisticated is the security in the building, while glass façade triggered more thoughts about terrorism. For a city hall, designed control security measures were rated as more sophisticated and more effective than temporary machines.

5.5 Summary of the Main Findings

The results of the first two studies corroborate the hypothesis concerning the effect of the current level of terrorism threat on people along all the dependent variables. High level of terrorism threat (compared with scenarios in which terrorism was not a threat) increased the awareness to the issue of security from terrorism, reduced the sense of security, increased the level of anxiety and the tendency to avoid the building in samples from both societal-security-contexts, across building-uses and façade designs. These findings also validate the treatments used for manipulating the level of terrorism threat.

In addition, the size effect associated with current level of terrorism threat, as indicated in Table 5.19, were greater than the effect sizes of the other independent variables. This finding emphasizes the importance of this variable in influencing perceptions of security. Moreover, the fact that the effect size of the current level of terrorism threat was considerably greater in the second study than in the first, suggests that the magnitude of the threat is amplified by a visual representation of the environment. In other words, seeing the building and the visual cues of the environment made the threat much more vivid.

TABLE 5.19. Summary of main findings.

Study	Dependent variable	Independent Variable	*F*	*Sig.*	*Partial* η^2
Study 1	Awareness of security	Level of terrorism threat	6.64	.011	.038
		Society	4.69	.032	.027
		Society * Building-use	7.18	.008	.041
	Sense of security	Level of terrorism threat	17.06	.000	.093
		Society	16.27	.000	.089
	State of Anxiety	Level of terrorism threat	25.39	.000	.132
		Society	5.11	.025	.030
		Level of terrorism threat * Building-use	5.23	.023	.043
		Society * Building-use	7.58	.007	.022
Study 2	Awareness of security	Level of terrorism threat	135.98	.000	.282
		Society	5.80	.017	.016
		Society * Building-use	5.09	.025	.015
	Sense of security	Level of terrorism threat	213.08	.000	.382
		Society	12.00	.001	.034
		Society * Building-use	10.25	.001	.029
		Level of terrorism threat * Society * Building-use	7.28	.007	.021
		Façade design * Level of terrorism threat	4.81	.029	.014
	State of Anxiety	Level of terrorism threat	95.98	.000	.217
		Society	44.88	.000	.115
		Level of terrorism threat * Society	42.51	.000	.109
		Façade design * Building-use	6.31	.012	.018
		Façade design * Building-use * Society	9.13	.003	.026
	Propensity to enter	Level of terrorism threat	78.57	.000	.185
		Society * Building-use	4.44	.036	.013
		Level of terrorism threat * Society * Building-use	5.13	.024	.015
		Façade design * Level of terrorism threat	5.68	.018	.016
Study 3	Awareness of security	Society	4.83	.029	.012
		Society * Building-use	4.12	.043	.011
		Entrance design * Society	10.63	.001	.027
	Sense of security	Society	4.03	.045	.010
		Building-use	4.56	.033	.012
		Society * Building-use	4.04	.045	.010
	State of Anxiety	No statistically significant effects			
	Propensity to enter	Building-use	9.09	.003	.023
		Society * Building-use	7.89	.005	.020
		Façade design	6.04	.014	.016

With regards to the hypothesized differences between the two examined societies, the results only partially support the assumed main effect, and indicate a more complex pattern of reactions that is affected by the societal-security-context. In all three studies, the findings show that the expected differences between societies were obtained with regards to the first two dependent variables: Israelis had security from terrorism on their mind more than Texans, and their overall sense of security was lower than the Texans', regardless of the other independent variables. However, the expected differences between samples of the two societies in their overall anxiety level and their propensity to enter/avoid were not found in all three studies.

With regards to the anxiety level, while as expected, the Israeli participants were more anxious than participants from Texas across all conditions in the first and second studies, no difference between the samples was found in the third study. Digging into the reason behind this result, we find an interaction, in the second study, of the societal-security-context and the current level of terrorism threat. This interaction indicates that in scenarios of no terrorism threat, Texans were considerably less anxious than Israelis, while in scenarios of high level of terrorism threat the societies' anxiety levels were similar. The later finding is consistent with the results of the third study, which included only scenarios of high level of terrorism threat.

In addition, focusing on each of the societal-security-contexts, the results of the second study indicate that the anxiety level of the Texan sample was considerably greater when there was high level of terrorism threat vs. when there was no threat. The anxiety level of the Israeli participants, on the other hand, was not affected much by the change in the current level of threat. These findings regarding the anxiety level support part of the hypothesis which claims that people who are not used to the threat (i.e., Texans) are more affected by a change in the current threat level than people who usually live under a high level of terrorism threat (e.g., Israel).

With regards to the propensity to enter the building, and how it is affected by the societal-security-context, the expected result for Texans to be generally more inclined to enter a building than Israelis was not corroborated by the findings.

The hypothesis which speaks of differences between societies as related to the specific building-uses was supported for the most part, with further qualifications. As hypothesized, in all three studies, a shopping mall elicited more thoughts of security from terrorism among the Israeli participants compared to the Texan participants. And in the second and third studies, also a lower sense of security for the Israeli participants compared to the Texans. In addition, city hall elicited similar ratings by participants from both societal-security-contexts for the awareness of security from terrorism and the overall sense of security.

With regards to the anxiety level, the results of the first study follow the first two dimensions of reactions and corroborate the research hypothesis: shopping mall created higher anxiety among participants from Israel compared Texans, while city hall elicited similar ratings of anxiety among the two samples. The second and third studies show no statistically significant interaction between the building-use and the societal-security-context with regards to the anxiety state.

The findings suggest a different pattern than hypothesized concerning the propensity to enter/avoid a building, In the case of a city hall, instead of the assumed similar reaction by both samples, the results show that in study 2 (across the two levels of threat), as well as in study 3 (which was only high threat), the Texan participants tended to avoid it more than the Israelis.

The results concerning the shopping mall were more complicated. In the second study, in low level of terrorism threat, the Texan participants avoided a shopping mall building more than the Israeli participants. In high level of terrorism threat, the tendency was opposite – Israelis avoided a shopping mall more than the Texans. However, in the third study, which dealt only with high level of terrorism, the samples from the two societies were similar in their inclination to use/avoid a shopping mall.

Looking at the mean ratings of these findings, we find that the action propensity of the Israeli sample was more affected than the Texans' by the change in threat level as well as by the visibility of access control security measures. A high level of terrorism elevated the Israelis tendency to avoid a shopping mall more than it affected the Texans. The existence of visible access control security measures (regardless of their design) decreased the Israelis tendency to avoid the building, while it seemed to somewhat elevate the tendency to avoid a shopping mall by the Texan sample.

These findings suggest that the action propensity of people that are used to living in a high level of terrorism threat is more influenced by changes of threat level. In addition, the level of familiarity with security measures seems to influence the tendency to use the environment.

With respect to the second set of hypotheses that relate to variations in how fortified the building appears to be, based on the glass-solid ratio of the façade, the results did not corroborate the hypothesized main effect of this variable on the awareness of security and the sense of security. However, the expected interactions between this variable, the current level of terrorism threat and the societal-security-context were partially supported and other interactions were found.

In both study 2 and 3, the variable of façade design did not in influence the awareness of security from terrorism at all. Concerning the sense of security, and the propensity to enter/avoid the building, the results of studies 2 and 3 show different tendencies. The variation of the glass-solid ratio in the façade design in the second study created an opposite effect as related to the two examined levels of threat. When the threat of terrorism was high, a solid façade created a greater sense of security and participants were more inclined to enter the building than when the façade was all glass. When terrorism was not a threat, a glass façade elicited a slightly higher sense of security than a solid façade for all participants and for all building-uses while the tendency to enter/avoid building was not affected at all by the façade design. The results for high level of terrorism were not corroborated in the third study, as no statistically significant differences were found in the sense of security as related to the two façade designs. In addition, in the third study, people were more inclined to enter buildings with glass façade than with solid facades.

The discrepancies in the two studies regarding the effect of the glass-solid ratio on the sense of security and the tendency to avoid/enter a building when the threat of terrorism was high suggest that the mere existence of access controls security measures in study 3 changed the effect. As long as the respondents did not see access control security measures (study 2), they felt safer with a solid façade and were more inclined to enter a building of a solid façade than of a glass façade. Seeing the access control security measures (study 3) seemed to reassure the participants enough to have the same sense of security towards both façade designs, and even make them more inclined to enter the glass façade than the solid façade. Further research should focus on verifying this proposition.

The hypothesis which posits that the effect of glass-solid ratio in the façade design on a person's stress/anxiety level is influenced by the current level of terrorism threat was not supported by the findings. In study 2, a different interaction with the building-use and society variables was found statistically significant in influencing the respondents' state of anxiety. In the Texan sample, city hall elicited higher anxiety when the façade of the building was all glass than when it was solid concrete. In the case of a shopping mall, solid façade elicited higher anxiety levels than a glass façade. In Israel, on the other hand, the participants' anxiety level was not affected by façade design, or by building-use. This suggests that the anxiety level of a person that is used to living in a high level of terrorism threat is less sensitive to changes in the built environment (whether "distal" or "proximate"), while a person that is not used to the threat of terrorism exhibits higher sensitivity to variations.

With respect to the effect of the access control security measures at the entrance, the general hypothesis that the mere existence of such measures at the entrance to a building (whether designed or as temporary stationed machines) increases people's awareness of the issue of security from terrorism was disproved for high level of terrorism threat. A comparison between the second study (for scenarios with high level of terrorism), which did not include access control security measures, and the third study, which did, showed that when the level of the threat was high, the existence of access control security measures at the entrance to the building reduced thoughts about terrorism. Additional findings concerning the awareness of security from terrorism show that the two samples responded differently to the variation in the conspicuousness of the access control security measures. For the Texan sample, an entrance with temporary stationed machines elicited more thoughts of terrorism than an entrance in which the access control security measures appeared as part of the overall design. In Israel the pattern of results was the opposite.

The findings do not support the proposition that the design of access control security measures influence the level of anxiety or the sense of security.

The assumption that people who are not accustomed to live with the threat of terrorism (i.e., Texans), tend to follow their sense of security with actions, while people who are used to the threat (i.e., Israelis) tend to use buildings regardless of their feeling of security was generally supported by the findings in both the second and the third studies. Both studies show that in Texas, the participants' ratings for the propensity to avoid a building were generally close to the overall sense of insecurity. In Israel, the participants' propensity to avoid a building was considerably lower than the reported sense of insecurity.

Following the detailed descriptions and results of all the stages of the research, the next chapter provides a comprehensive summary and discussion. The review in the concluding chapter encompasses the goals of the research, the methodology that was employed and the main findings. The discussion of the findings consolidates the results of different stages and examines their implications to the conceptual framework and to the methodology. The chapter provides further inference on the applicability of the main findings in the real world, the ethical implication of using them and looks into potential and essential future research.

CHAPTER VI

SUMMARY AND CONCLUSION

The underlying question of this dissertation concerns the role of the built environment in influencing people's perceptions of security from terrorism and their consequential responses. In order to address this question, a conceptual framework was developed and examined. More specifically, and based on the details of the conceptual framework, the examination focused on how the building-use and the visible design elements of the façade and entrance of buildings, in conjunction with a certain level of threat and the individual's societal background, influence people. The effects were examined along four dimensions of people's responses: how much the issue of terrorism threat is on a person's mind, how safe and how anxious the individual feels, and how likely he/she is to use the building.

The project and its findings contribute to the current body of knowledge along several levels: First, this dissertation deals with a question that has never been addressed before, and a question that, based on the literature review, is worth asking. Second, the dissertation developed and used a conceptual model that is based on an interdisciplinary body of existing literature. Third, a rigorous methodology that employs the latest tools and platforms to empirically examine and illustrate the conceptual model and its related hypotheses was implemented. In addition, the research design, procedure and instruments allow future replications of this research in other social-political-contexts, as well as examinations of other architectural design elements and/or building-uses and their effect on people.

The following section presents the development of the research question and the rationale behind it, while outlining the ethical dilemma that accompanies them (section 6.1). Section 6.2 summarizes the formation of the conceptual framework, its components and related hypotheses. A short review of the methodology is presented in section 6.3. This chapter concludes with a synopsis of the main findings of the research, as well as expresses the limits of the conclusions and directions for future research (section 6.4).

6.1 The Research Question and Its Ethical Implications

Architecture has always been a form of response to the practical and political concerns of the time, and often, these involved issues of security. In our era, the growing public concern for terrorism has made it a salient issue despite its relative rarity. The terrorism threat, with its lethality, abundance of potential targets and forms of attack, and the ability to adapt to protective means, introduces unique challenges to the design profession.

One challenge to the design field is rooted in the fact that terrorism can happen anywhere, anytime, without warning. The literature offers different ways to deal with this challenge by prioritizing which buildings to protect against terrorist attack and to what extent. This is done through the assessment of the specific security needs for a certain place at a certain context. In addition, the literature recommends different measures of security to help prevent, mitigate and facilitate a desired response in the event of a terrorism attack. The measures of security range from: specific elements of design, techniques to achieve structural hardening, resilient materials and additional technological equipment, to - certain operational policies.

These efforts to counter terrorism in the built environment are targeted at providing the users of the environment with physical security from terrorism. However, considering the terrorists' goal to terrorize, and being that this threat is particularly dreaded by the public and one that is so socially amplified, it is also important to consider the psycho-emotional implications of the protective measures. The existing body of knowledge indicates that people search for threatening cues in the environment. Moreover, such visual cues influence people's levels of stress, psycho-emotional states, and consequently their physical-well-being and high-order cognitive functioning, thereby linking to a resulting behavior.

In this lies another challenge to the design profession in the face of terrorism, one that has been relatively neglected: How to introduce security measures into the built environment in ways that can promote the overall well-being of the public, and attend to people's psycho-emotional needs as well as to their physical need of security?

The latter challenge brings out acute ethical questions: Considering the well-being of people who face the threat of terrorism—is it better that they remain stressed and alert rather than be reassured by the architectural design, and therefore would tend to keep away from certain buildings? Or, should the design reduce the level of stress and facilitate some sense of safety that, to some extent, may be false?

On the one hand, it can be argued that the design profession should not always be about making people feel better. A more important goal is to keep people safe from harm's way. And since there is no absolute security from terrorism, a design that is perceived as less secure might be the moral solution—keeping people away from a prospective target.

On the other hand, when we consider the rarity of the threat of terrorism, promoting healthy, active communities by attending to the psycho-emotional needs of security (i.e., making people feel safe) might be the right thing to do – as long as the selected design solutions also provide the desired level of protection according to the assessment of the specific security needs of the building. This claim can be further supported by the notion that in the face of the dreadful threat of terrorism, architecture only plays a supportive role. The findings of this dissertation show that the mere existence of the threat of terrorism, and a person's long-term exposure to the threat (i.e., familiarity), are key factors in influencing one's perception of security and consequential responses. These two factors can be considered as more influential than the specifications of the built environment. If that is the case, and the fear of terrorism is so predominant, why not use the design of the environment to ease at least some of the concern?

While recognizing the above ethical dilemma, this dissertation does not attempt to answer it. Instead, the research focuses on the question that stands behind this discussion, looking at whether the built environment—and specific elements of it—can alter people's perception of security from terrorism.

6.2 The Conceptual Framework

6.2.1 The Basis

To be able to address the research question, a broad interdisciplinary literature review was conducted. The review began with existing theories on human perception in general and specifically with regards to aspects of security. This part of the review helped in outlining the basic elements of the conceptual model: What are the general factors that influence people's reactions to security threats in a certain built environment, and the range of reactions that should be taken into account. The discussion brought up an interesting question regarding the relationship between people and the threat of terrorism: Is there an innate global pattern of reactions to the threat, and to what extent are people's reactions to it based on personal familiarity? This question influenced the second section of the literature review which concentrated on the threat of terrorism, and resulted in a comparison of two societies that differ in their exposure to it: Texas and Israel.

Consequently, the review of the threat itself included characteristics of the threat of terrorism, its manifestation in different parts of the world (e.g., Texas and Israel), what the potential targets are, and what aspects in the environment can influence the vulnerability to it. In addition, the review of the nature of the threat linked the struggle against terrorism with former historical strategies of defense against enemies, as well as with modern theories of crime prevention.

The latter two subjects were then investigated in the third part of the literature review which concentrated on the continuous link between architecture and security. This historical review of the architecture of security extracted key concepts and strategies that have always been pertinent for achieving a secure built environment while placing the research as relevant in the context of history. The key concepts of security were then used in the analysis of the current policies and recommendations for dealing with the threat of terrorism. This last part ended the literature review and pointed to the architectural elements that were included in the conceptual model.

6.2.2 The Components

The conceptual model focuses on how the users of public buildings are affected by factors of the built environment in the context of terrorism threat. The model identifies five independent variables. Three of them relate to the conceptual "distal" level, and two refer to what was identified in the literature as the tangible "proximate" level, i.e., visible elements in the built environment.

The first independent variable is the current level of threat. This research focuses on terrorism of explosives, the most common type of terrorism. In addition, the measures that are used to counter this form of terrorism in the design of the built environment have the potential to affect the image of a building (e.g., resilient envelope, simple geometry, no overhangs, access control). This research examines two levels of the current threat of terrorism: whether bombing attacks are currently considered as a major threat in the area of the facility (state/country) or are not a threat at all.

The conceptual model presents the second and third independent variables as two interrelated factors that moderate people's responses to architectural elements in the context of terrorism threat.

The second independent variable is the social-security-context that expresses the level of exposure and experience a certain society has with the threat of terrorism of explosives and with counter measures. This societal background may condition members of that society to security issues and may influence their reactions to a current level of threat as well as to elements of the built-environment. In addition, the level of familiarity with the threat and with 'living in its shadow' may taint the individual's emotional endurance to variations in risk, and ultimately affect decisions on whether to avoid or use the environment. In this dissertation, College Station, Texas, and Tel Aviv, Israel, were chosen to represent different security contexts: A society with a very low exposure (almost none) to the threat of terrorism vs. a society which for many years has been experiencing a high exposure to the threat of explosives.

The third independent variable, linked to the experience a certain society has with the threat of terrorism, is building-use. This research focuses on buildings of a public nature. These represent the most probable targets of terrorism, and it is for such buildings that issues of accessibility and projected image are important. Within this general group of buildings, the research looks into which building-uses the public in each of the examined societies perceives to be associated with terrorism.

The two additional independent variables that the conceptual model outlines are two groups of visual cues that can be detected in the built environment: The physical/structural cues of the environment (i.e., design elements), and the social cues. This research only examines the physical/structural cues of the environment. The design elements that were tested in this dissertation are related to the façades and entrances of buildings. These two design components have major security functions and can also impact the first impression of a building.

Within the general concept of façade and entrance design, the specific foci of this dissertation were elements that, as indicated in the literature review, are extremely relevant to security from terrorism as well as to the question of human perception: The level of fortification/openness as represented in the façade design (i.e., solid-glass ratio), and the conspicuousness of the access control security measures in the overall architectural design of the entrance (to what extend the access control security measures appear as part of the overall design or look as temporarily stationed machines).

The model specifies four dependent variables which resonate with the range of people's responses. This range of responses includes cognitive processes (i.e., thought and resulted feeling), level of emotional comfort (i.e., stress level), and behavioral disposition (i.e., action propensity).

The first dependent variable relates to the level of awareness of security from terrorism, i.e., how much this issue is on the person's mind. This variable indicates whether the specific building-use and design trigger thoughts about the threat of terrorism without placing judgment on how secure a person considers the environment to be.

The second dependent variable is the person's overall sense of security. The model suggests that the overall sense of security is comprised of two intertwined appraisals of a situation. One refers to the perceived probability of a terrorist attack in a specific building-use and with specific design features. The other appraisal relates directly to how safe the individual feels in that environment.

The third dependent variable proposed in the conceptual model is the individual's level of stress, i.e., his/her state of anxiety. Examination of this factor may show what instances of the independent variables can be considered as stress inducing stimuli and what may facilitate a reduction in the stress level, particularly as we examine different design alternatives.

The fourth dependent variable is the person's behavioral disposition as a reaction to the independent variables. This includes the person's level of motivation and likelihood to enter the facility and use the building.

6.2.3 The Hypotheses

Two levels of research hypotheses were included in the conceptual framework. The first level assumes interdependency among the dependent variables when people are exposed to the independent variables of the distal level (i.e., the current level of threat, the societal-security-context and the building-use variables). This interdependency links a rise in the awareness of the issue of security to a reduction in the sense of security (elevation in perceived risk and in feeling insecure), and to an increase in the level of anxiety and the tendency to avoid entering the building.

The hypotheses of the first level assume main effects to the current level of terrorism threat and the societal-security-context, as well as an interaction between these two variables in influencing all four dependent variables. With respect to the current level of threat, the assumption is that the greater it is, the more the issue of security from terrorism occupies the person's mind, the lower the sense of security, and the higher the anxiety level and the tendency to avoid entering the building. Regarding the societal-security-context, a similar tendency was hypothesized in the case of a society that is usually under a high level of terrorism threat (e.g., Israel) vs. a society that is not accustomed to living under such a threat (e.g., Texas). The assumed interaction claims that the extent to which the current level of terrorism threat influences all aspects of people's reactions is moderated by how accustomed the person is to such a reality. People who are not used to the threat (i.e., Texans) are more affected by the current threat level than people who usually live under a high level of terrorism threat (e.g., Israel).

This level of hypotheses also interlinks the effects of building-use on people's reactions with the societal-security-context. The more a building-use is perceived in a certain society as a probable target of terrorism, the more the issue of security from terrorism is on a person's mind, the lower the sense of security, the higher the anxiety level, and the greater the inclination to avoid the building. More specifically, and based on the results of the pretest (detailed in section 5.1), a city hall should trigger similar thoughts with regards to security from terrorism, a similar sense of security, and a similar anxiety level both in Texas and in Israel. A shopping-mall, on the other hand, would create a greater awareness of the issue of security from terrorism, a lower sense of security and a higher anxiety level with Israelis than Texans.

The second level of hypotheses relates to the tangible, visible elements in the environment, and speaks of what happens when people approach a building. These hypotheses elaborate on the assumed effects that each of the two visual architectural variables (i.e., the solid-glass ratio in the façade design and the conspicuousness of the access control security measures in the overall architectural design of the entrance) in combination with the distal level variables have on the four different dependent variables. This level of hypotheses presents a different, more complex relationship between the dependent variables.

Focusing on the examined variable of façade design, it is hypothesized that people's awareness of security from terrorism and their sense of security are both higher when confronted with a building that looks more fortified, with a mostly solid concrete façade than when approaching a building of extensive window area. The magnitude of this effect is assumed to be affected by both the current level of terrorism threat as well as by the societal-security-context. With respect to the threat level, the higher the threat of terrorism is—the greater the effect is presumed to be. Focusing on the societal-security-context, the variations in a person's awareness of security and sense of security as affected by the design of the façade would be greater in a society that is not used to the threat of terrorism (e.g., Texas), than in a society that is accustomed to living under the threat (e.g., Israel).

Another hypothesis interlinks the variable of glass-solid ratio in the façade design to the current level of terrorism threat, in the way that these influence a person's stress/anxiety level. When there is a terrorism threat, a person would be more anxious when confronted with a building of extensive window area (congruent with low sense of security). When there is no terrorism threat, a person would be more anxious when the building's façade is solid (as this design elevates the awareness to the issue of security).

Focusing on the architectural variable of the access control security measures at the entrance to a building, it is assumed that the mere existence of visible measures (whether designed or temporary stationed machines) increases people's awareness of the issue of security from terrorism. With respect to variations in this variable, the hypothesis is that when confronted with conspicuous security measures that appear as temporary stationed machines, people's overall sense of security is reduced and their anxiety level is increased. Well-designed measures, which seem as part of the entrance, enhance the sense of security and reduce the level of anxiety.

For both examined architectural variables, the assumption is that people that are not used to the threat of terrorism (e.g., Texans) tend to follow their sense of security with actions, while people who are accustomed to the threat of terrorism (e.g., Israelis) tend to use buildings regardless of their sense of security.

6.3 Examining and Illustrating the Conceptual Framework

The methodology used to empirically test and illustrate the conceptual framework entailed a cross-national examination, and was composed of three main studies and a pretest. The three studies constituted a sequence of progressive phases where each study replicated and extended the previous one, putting another variable to the test.

The pretest, which was the first step of the empirical examination of the conceptual model, identified for each society the building-uses that are perceived to be associated with terrorism threat. Participants in both societies rated the probability of a bombing attack occurrence in each of 20 given building-uses on a 0% to 100% scale. The statistical analysis of the collected data utilized Analysis of Variance (ANOVA) tests, as well as Spearman Rank Order Correlation Coefficients. The results of this survey guided the selection of two building-uses that were subsequently included in the series of studies.

The subsequent three studies, administered in both countries, utilized a quasi-experimental procedure. The use of this procedure enabled full control of the variations in critical variables in correspondence with the conceptual model. First, the procedure facilitated the testing of the effects of two specific building-uses, two variations of each of the two examined architectural elements, in two different levels of terrorism threat. Second, the procedure made it possible to have the exact same examination in two societies of different exposure to the threat (hence “quasi-“). The research included a total of 1071 participants. These were convenience samples of undergraduate students from College Station, Texas and Tel Aviv, Israel.

The three studies utilized computer-based web driven research platforms. The computer program randomly assigned participants from both societies to different scenarios. Each scenario described a "reality" of a high or low level of terrorism threat in the country and a certain public building to which the respondent was about to go and meet a friend. The scenarios in the first study consisted of written descriptions, while the second and third studies included images of the building as well. After reviewing a scenario, each participant was asked to answer several questions.

The complete questionnaire, used in studies 2 and 3, included seven questions pertaining to the four dependent variables of the conceptual model. These questions were devised to test how important the issue of a terrorism threat is in the respondent's mind, the respondent's sense of security, his/her state of anxiety, and the respondent's tendency to use the environment in light of the given situation. The first study included the same questions except for the questions regarding the tendency to enter the building, since no visual manipulations were included. The second and third studies included three additional questions at the end of the questionnaire to clarify the respondent's basic impression of the building's security as affected by the visual manipulation.

The first study explored how a specific building-use moderates the effects of variations in the current threat of terrorism on people from two societies of different exposure to the threat (Texas vs. Israel). As such, this was a 2 x 2 x 2 between-groups research design. The examination pertained only to the distal level hypotheses, focusing on the conceptual characteristics of a building, before architectural solutions are introduced. This examination also allowed to test whether the treatments that defined the current level of terrorism threat worked.

The second study added the architectural variable of façade design. This phase was a 2 x 2 x 2 x 2 between-groups research design and tested the effects of the glass-solid ratio in the façade design as related to two building-uses in two possible levels of terrorism threat (high threat vs. no threat) and on respondents from two societies of different exposure to the threat (Texas vs. Israel). The two variations to the architectural variable were achieved using the same basic image and manipulating only the examined variable. One image showed an all-solid concrete façade, the other displayed an all-glass façade.

The third study set the variable of terrorism threat level at the high level, and added to the investigation the variable of the conspicuousness of the security measures in the overall design of the entrance. Therefore, the third study employed a 2 x 2 x 2 x 2 between-groups research design with four independent variables: building-use, societal-security-context, glass-solid ratio in the façade design and the conspicuousness of the security measures in the overall design of the entrance. Each participant was exposed to a scenario depicting a high level of threat, a certain building-use (one of two possible), and two images—one of the façade (showing an all-glass or a solid façade) and a close-up image of the entrance of the building (showing access-control security measures that appear as part of the overall architectural design of the entrance or those that look as temporary stationed machines). As in the second study, the manipulation of each architectural variable consisted of a basic image that varied only in the examined element.

The material for the three studies was developed utilizing techniques that have been recognized as effective in previous social sciences research, political science and architecture research (please see section 4.3.2.3.1 for details). The questionnaire was carefully developed using scales that have been proven as reliable and valid for self-reported responses in social research (please see section 4.3.2.3.2 for details). The reliability of measurement was further strengthened using multiple questions to test each of the dependent variables. Statistical examinations were performed to confirm the level of reliability or association between indicators of the same variable.

The statistical analysis of the data collected in the three studies was conducted in a few stages. The first stage of the statistical analysis for each study was conducted per dependent variable. The main statistical examination in each case was a univariate Analysis of Variance (ANOVA). The second stage of analysis looked for connections among the dependent variables within each study. For that purpose bi-variate Pearson product-moment correlations were performed for each sample separately. In the second and third studies, further examination of the specific links between the tendency to avoid/enter a building and the sense of security was done using a repeated-measure ANOVA. Additional analysis focused on the questions that were intended to clarify the effect of the visual architectural manipulations on the perception of the level of security in the building.

6.4 Discussion of Main Findings, Inferences and Concerns

The results of the studies show that the existence of the threat of terrorism, i.e., the knowledge that terrorism is or is not an imminent threat, is predominant in influencing all levels of people's security-related responses: How much it is on their mind, their sense of security, their level of anxiety and their inclination to use/avoid public buildings (see Table 6.1). This notion highlights an issue that has been mentioned in the literature review as relevant and important: the power of the media as it alarms the population about terrorism attacks. The results also illustrate the fact that the characteristics of the built environment have only a small role in influencing feelings of security in the context of terrorism threat.

It can be argued that these findings support the legitimacy of using architectural design in ways that promote people's psycho-emotional well-being (i.e., make them feel better by reducing their fear). In other words, in light of the overwhelming effect that the threat of terrorism has on people, architectural design does not have the power to revoke the fear altogether, but may alleviate some of the concern.

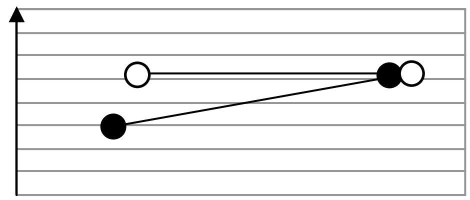
Concerning the globalism that is associated with the threat of terrorism, the findings exemplify several levels of differences between the samples of the two examined societies (i.e., Texas and Israel). The first level relates to general differences in the scope of reactions. The second concerns differences between the participants from the two societies with regards to the specific building-uses that were tested in the research. The third level refers to differences that were found in the participants' reaction to the mere existence of access control security measures at the entrance.

These findings support the notion that people's reactions to the threat of terrorism in the context of the built environment are to some extent based on over-time familiarity with the threat. This can be linked back to the *learning proposition* that was presented in the literature review, which emphasizes the importance of familiarity with a certain threat and with the physical conditions which can either facilitate or hinder it.

Nonetheless, other findings indicate similarities in the responses of participants from the two societies. These similarities were found in particular with relation to the specific design configurations of the architectural elements that were tested throughout the research.

The resemblance in the responses of participants from Texas and Israel, as related to visual cues of the environment may provide credence to the *innate proposition*, discussed in the literature review. These findings suggest that people from different cultures/societies around the world, with very different experiences with the threat of terrorism, still react similarly to some cues of the environment. Following this line of thought, this may imply that there is some sort of a global pattern of reactions to architectural cues in the context of terrorism threat.

TABLE 6.1. Summary of the general findings that relate to the effects of variations in the levels of terrorism threat, and variations in the societal-security-context on all the participants' examined security-related responses.

Dependent variables	Independent variables		
	Current level of terrorism threat	Societal-security-context	
Perceived probability of attack (examined in the pretest)		Texas < Israel	
Awareness (how much security from terrorism is on the mind)	High threat > Low threat	Texas < Israel	
Anxiety state	High threat > Low threat	In low level of threat (studies 1, 2): Texas < Israel	In high level of threat (studies 2, 3): Texas = Israel
			
Sense of insecurity	High threat > Low threat	Texas < Israel	
Tendency to avoid the building	High threat > Low threat	Texas = Israel	

“>/<“ symbol indicates which of the two variations of the independent variable elicited statistically significant higher ratings in the dependent variable compared to the other optional variation.

“=” symbol indicates that no statistical significance was found between the ratings of the two variations of the variable.

● Indicates the mean ratings of the Texan sample ○ Indicates the mean ratings of the Israeli sample

The overall differences between the participants from the two societies were exhibited along the different parameters of human reaction. As shown in Table 6.1, participants from the two societies exemplified difference in the general assessment of terrorism risk which corresponds to the actual occurrence rate in each of the societies: The Israeli participants perceived the probability of a terrorism attack as higher than Texans, regardless of the current threat level or the characteristics of the built environment. In addition, the results show that the Israeli participants, who are used to life with the threat of terrorism, had security from terrorism on their minds more than the Texan participants and had a lower sense of security than the Texan participants who are not used to the threat.

With regards to the anxiety state, as Table 6.1 indicates, participants from the two societies were similar in their responses when terrorism was a major concern. However, when terrorism was not a concern, the Texans exhibited a much lower anxiety level than the Israelis. The anxiety level of the Israeli participants was quite high and did not change due to changes in any of the examined independent variables—whether "distal": current level of threat and building-use, or "proximate": architectural variables. The anxiety level of the Texan participants was more sensitive to variations in these variables.

The findings also support the notion that people who are not accustomed to living with the threat of terrorism (i.e., Texans), tend to follow their sense of security with actions, while people who are used to the threat (i.e., Israelis) tend to use buildings regardless of their feeling of security. The latter finding has implications especially with regards to commercial buildings whose purpose is to attract people.

Differences between participants from the two societies with regards to the specific building-uses were observed in the participants' assessment of risk of terrorism, in their awareness of security from the threat, in their overall sense of security and in their tendency to use the building.

In the pretest, the Israeli participants, having experienced the threat, seemed to associate terrorism with building-uses that had been targeted in their country, and considered bus stations and dining facilities as the most probable targets. The Texan perception of risk of terrorism as associated with building-uses seemed to be based on the participants' recollection of the September 11 attack, as well as on ideas that movies and TV shows propagate. Texan participants exhibited the highest sensitivity to transportation terminals (particularly airports) and large sports venues (stadiums). Government facilities, with the exception of a city hall, were found to be perceived as moderately probable targets in Texas, relative to other building-uses, and the least probable targets in Israel. The analysis of the pretest concluded with the selection of city hall and a shopping mall as the two building-uses on which the subsequent three studies focused.

With regards to the particular building-uses of a city hall and a shopping mall, participants from both societies were similar in their perceived probability of attack as associated with a city hall, while the Israelis rated a shopping mall as of higher probability of attack than the Texans did (pretest).

Following this notion, the main examination found that a city hall had a similar effect on the participants from the two societal-security-contexts with respect to how much security from terrorism was on their mind, their general sense of security and their anxiety level. A shopping mall elicited more thoughts of terrorism and greater insecurity at the Israeli participants, compared to the Texans.

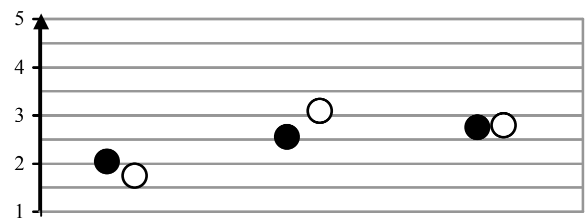
The action propensity was the only measure that did not follow these general patterns. In the case of a city hall, instead of the assumed similar reaction by participants from both societies, the results show that the Texan participants tended to avoid it more than the Israeli participants. The results concerning the shopping mall show that in the second study, in low level of terrorism threat, the Texan participants avoided it more than the Israeli participants. In high level of terrorism threat, the tendency was opposite – Israelis avoided a shopping mall more than the Texans. However, in the third study, which dealt only with high level of terrorism, the samples from the two societies were similar in their inclination to use/avoid a shopping mall.

Looking at the mean ratings of these findings (Table 6.2), we find that the action propensity of the Israeli sample was more affected than the Texans' by the change in threat level as well as by the visibility of access control security measures. A high level of terrorism elevated the Israelis tendency to avoid a shopping mall more than it affected the Texans. The existence of visible access control security measures (regardless of their design) decreased the Israelis tendency to avoid the building, while it seemed to somewhat elevate the tendency to avoid a shopping mall by the Texan sample.

These findings suggest that the action propensity of people that are used to living in a high level of terrorism threat is more influenced by changes of threat level. In addition, the level of familiarity with security measures seems to influence the tendency to use the environment.

TABLE 6.2. Summary of the findings that relate to effects of the interaction between the building-use and the societal-security-context on all the participants' examined security-related responses.

Dependent variables	Building-use			
	City hall	Shopping mall		
Perceived probability of attack	In pretest: Texas = Israel	In pretest: Texas < Israel		
Awareness (how much security from terrorism is on the mind)	Across all conditions (studies 1, 2, 3): Texas = Israel	Across all conditions (studies 1, 2, 3): Texas < Israel		
Anxiety state	Across all conditions (studies 1, 2, 3): Texas = Israel	Before seeing the building (study 1): Texas < Israel		After seeing the building (studies 2, 3): Texas = Israel
Sense of insecurity	Across all conditions (studies 1, 2, 3): Texas = Israel	Before seeing the building (study 1): Texas = Israel		After seeing the building (studies 2, 3): Texas < Israel
Tendency to avoid the building	Across all conditions (studies 2, 3): Texas > Israel	Low threat & See façade (study 2): Texas > Israel (2.04) (1.88)	High threat & See façade (study 2): Texas < Israel (2.56) (3.06)	High threat & See façade and access control measures (study 3): Texas = Israel (2.73) (2.80)



">/<"symbol indicates which of the two variations of societal-security-context elicited statistically significant higher ratings in the dependent variable compared to the other optional variation.

"=" symbol indicates that no statistical significance was found between the ratings of the two variations of the variable.

● Indicates the mean ratings of the Texan sample ○ Indicates the mean ratings of the Israeli sample

With respect to the effects of the visual/architectural cues of the environment, the results show some general patterns that were similar between participants from the two societies, and others, more specific per building-use or level of terrorism threat, that were different.

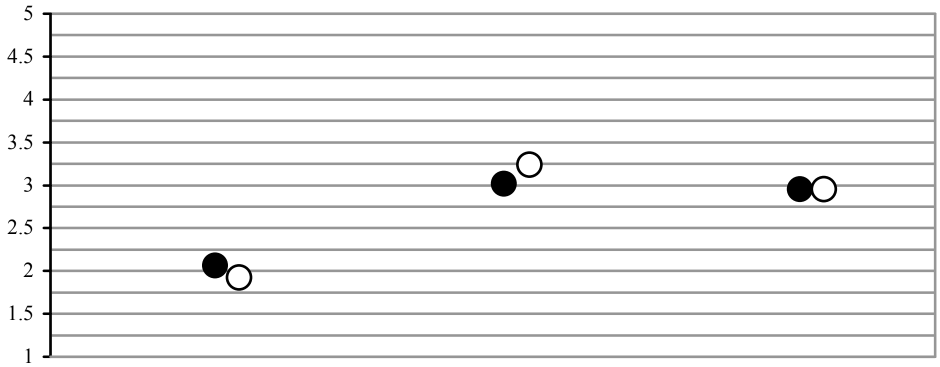
The glass-solid ratio of the façade did not influence the awareness of security from terrorism of participants from both societies and across the different studies (studies 2, 3).

Nonetheless, the design of the façade was found to influence the sense of security and the tendency to use the building of participants from the two societies. The effects were similar across societies, though different for the variations of the level of terrorism threat and of the existence of access control security measures.

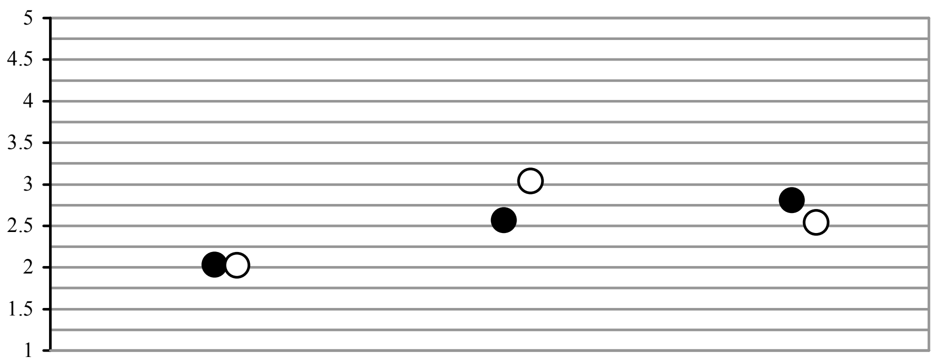
As illustrated in Table 6.3, for participants from both societies, and for both building-uses, when terrorism was not a threat and there were no visible access control security measures (study 2), a glass façade elicited a higher sense of security than a solid façade, though the tendency to avoid/enter the building was similar for both façade designs. When the threat of terrorism was high, and as long as the access control security measures were not visible to the participants (study 2), a solid façade elicited a higher sense of security and all the respondents had a higher propensity to enter the building than when the façade was all glass. However, when access control security measures were visible to participants (regardless of their design) in high level of terrorism threat (study 3), then the two façade designs elicited similar ratings of security/insecurity, while participants from both societies tended to enter more a glass façade than a solid concrete façade.

TABLE 6.3. Summary of the effects of the glass-solid ratio in the façade design on the participants' sense of security and tendency to enter the building, across societal-security-contexts and building-uses, in variations in the current level of terrorism threat and in the existence of access control security measures.

Dependent variables	Variation in current level of terrorism threat and in the existence of access control security measures		
	Low threat & No access control security measures (study 2)	High threat & No access control security measures (study 2)	High threat & Some access control security measures (study 3)
Sense of insecurity	Solid façade > Glass façade (2.02) (1.91)	Solid façade < Glass façade (3.00) (3.18)	Solid façade = Glass façade (2.94) (2.84)



Dependent variables	Low threat & No access control security measures (study 2)	High threat & No access control security measures (study 2)	High threat & Some access control security measures (study 3)
Tendency to avoid	Solid façade = Glass façade (2.05) (2.00)	Solid façade < Glass façade (2.61) (2.97)	Solid façade > Glass façade (2.76) (2.55)



">/<" symbol indicates which variation of the façade design elicited statistically significant higher ratings in the dependent variable compared to the other design alternative.

"=" symbol indicates that no statistical significance was found between the ratings of the dependent variable due to the two variations of façade design.

● Indicates the mean rating of a solid façade ○ Indicates the mean rating of a glass facade

Focusing on the influence of the variable of façade design on the anxiety level, the results indicate differences between participants from the two societies. The anxiety level of the Israeli participants was not affected by the façade design (or by any other variable). However, in Texas, as exhibited in Table 6.4, for both levels of terrorism threat, as long as there was no indication of access control security measures, a city hall elicited higher anxiety when the façade of the building was all glass than when it was solid concrete. In the case of a shopping mall, a solid façade elicited higher anxiety levels than a glass façade.

TABLE 6.4. The effects of the glass-solid ratio in the façade design on the participants' anxiety level, per societal-security-context and building-use, in variations of the current level of terrorism threat and in the existence of access control security measures.

Societal-security-context	Building-use	Variation in current level of terrorism threat and in the existence of access control security measures		
		Low threat & No access control security measures (study 2)	High threat & No access control security measures (study 2)	High threat & Some access control security measures (study 3)
Texas	City hall	Solid façade < Glass façade	Solid façade < Glass façade	Solid façade = Glass façade
	Shopping mall	Solid façade > Glass façade	Solid façade > Glass façade	Solid façade = Glass façade
Israel	Both building-uses	Solid façade = Glass façade	Solid façade = Glass façade	Solid façade = Glass façade

">/<" symbol indicates which variation of the façade design elicited statistically significant higher ratings of anxiety compared to the other design alternative.
"=" symbol indicates that no statistical significance was found between the ratings of anxiety due to the two variations of façade design.

Concerning the variable of access control security measures, the results show that when the threat of terrorism was high, the mere existence of such measures (regardless of their design) changed the effects that variations in the façade design had on several levels of the participants' responses. As illustrated in Table 6.4, the effect of the façade design on the anxiety level of the Texan participants was attenuated. The results shown in Table 6.3 suggest that being able to see any type of access control security measures while approaching the building reassured all participants enough to have the same sense of security towards both façade designs, and even make them more inclined to enter the glass façade than the solid façade.

The last few results illustrate how different combinations of threat level, façade design and location of access control security measures may affect people's perceptions of security and their consequential responses in different ways. For example, in a reality where terrorism is a major concern and access control security measures need to be used and are seen from the outside of the building, the design would attract people more if the access control security measures are associated with a glass façade. At the same time, if the access control security measures are internal and cannot be detected from the outside, a building would foster greater sense of security and be more attractive when the façade is solid and looks more fortified. Further research should focus on verifying and further establishing this proposition.

This example, and other propositions that may emerge from the findings, may provide a basis to the development of design guidelines. Such guidelines may direct new designs and assist in the adaptation of existing buildings to a change in the level of terrorism threat.

With this in mind, it should be noted that this research did not test the effect of access control security measures in scenarios where terrorism was not a threat. Hence, the calming effect it had on the participants that were facing a glass façade might not take place or even be reversed in a reality in which terrorism is not a concern. Further study should examine the effect of access control security measures on people in a peaceful, terrorism-free context.

The analysis of these results can also be addressed on a more theoretical level, referring to concepts and theories of security and perception of security that have been reviewed in the literature review. As indicated by many sources, the basic physical attributes of a place that are considered to influence perception of security are: *prospect* (visual openness), *escape* and *refuge* (Appleton, 1975; Fisher and Nasar, 1992; Holahan, 1982; Kaplan, *et al*., 1998; Nasar and Jones, 1997; Newman, 1972; Tijerino, 1998; Ulrich, 1993). Using that terminology, a solid, concrete façade, may seem to provide a greater *refuge*, i.e., greater level of protection that the building appears to provide against an attack, compared to a glass façade. However, a glass façade, compared to a solid concrete façade, can be considered as of better *prospect* as it provides a greater visual openness. In addition, a glass façade may indicate less entrapment in the event of attack, and hence provide a greater opportunity to *escape*, than in the case of a solid concrete façade.

Continuing this line of thought, the results of the research suggest that different qualities of the building (as represented in the façade design) influenced the sense of security and the attractiveness of the building as a factor of the level of terrorism threat. In low level of terrorism threat, the qualities of *escape* and *prospect* were more prominent than the quality of *refuge* in fostering a sense of security. However, when the threat of terrorism was high, then the quality of *refuge*, i.e., the apparent level of fortification, became more important in fostering a greater sense of security and even in attracting the participants to the building.

In addition, the introduction of visible access control security measures at the entrance, in the context of high level of terrorism, seemed to balance the "security qualities" of the building in a way that made both façade designs foster similar sense of security, and event make a glass façade be more attractive than a solid concrete facade. It can be argued that access control security measures contributes to the quality of *refuge* of a building (as it elevates protection), and also regulates some sort of social surveillance and therefore relates to the quality of *prospect*.

These theoretical propositions can be furthered investigated and developed, through the examination of other social-security-context, other architectural design elements and possibly – other levels of terrorism threat.

In looking at the two examined designs of the access control security measures, the results show that the difference between them influenced only the participants' awareness of security. The effect on the awareness of security from terrorism was different in the two societies though similar for both building-uses. As shown in Table 6.5, for the Texan sample, an entrance with temporary stationed machines elicited more thoughts of terrorism than an entrance in which the access control security measures appeared as part of the overall design. In Israel it was the opposite.

TABLE 6.5. Summary of the effects of the design of the access control security measures at the entrance to the building on the participants' awareness of security from terrorism (i.e., how much it was on the mind), per societal-security-context, across building-uses.

Societal-security-context	High level of terrorism threat & Some indication of access control security measures (study 3)
Texas	Access control security measures that seem part of the design < Temporary machines
Israel	Access control security measures that seem part of the design > Temporary machines

“>/<“ symbol indicates which variation of the façade design elicited statistically significant higher ratings in how much security from terrorism was on the mind compared to the other design alternative.
“=” symbol indicates that no statistical significance was found between the ratings of in how much security from terrorism was on the mind due to the two variations of façade design.

As we near the end of this discussion, additional comments need to be made about the limitations of this research. Some relate to the conceptual framework while others concern the constraints of the methodology and design.

The conceptual framework presented in this dissertation concentrates on how the use and image of public buildings moderate perceived threats to personal security associated with terrorism. For that purpose, an attempt to develop a comprehensive conceptual model was made, through detailing its components and narrowing the specific investigation to certain controllable variables. Though the model addresses a host of cultural/political variables as well as architectural elements, it might not be exhaustive, and might not capture the complexity of the real world. For example, one can add additional variables that may influence individual's perception of safety. For example: demographic characteristics that relate to specific knowledge regarding security issues, age, or personal family status that may influence the sense of responsibility and level of cautiousness. In addition, though the model tries to cover the spectrum of people's reactions to threatening situations, other and more detailed nuances may be found.

In examining characteristics of the built-environment this dissertation focuses on very specific design elements in the façade and entrance of two very specific building-uses. There is a need to examine other building-uses under the framework, as well as consider other architectural elements that may influence perceptions of security. These include: proportions of facades, proportions of fenestrations and entrances, colors, materials, etc. In addition, with the intent to simulate a first experience with a building, the focus on façade and the entry in that façade are not necessarily representative to all the possible "viewsheds" for a first encounter with a building. Other scenarios of first encounter with buildings may include different architectural elements, as some public buildings have garages underneath or may be accessed directly through a public transportation compound. Finally, the element of social cues, represented in the scheme of the conceptual model as a factor of possible influence on people's security-related-reactions, was not developed or tested in this research. Future research should test this factor as well.

Concerning the methodology that was used in this research, a few cautionary notes must be made. The use of quasi-experimental methodology, while allowing attribution of causality, and facilitating the cross-cultural aspect of the investigation, may not be able to create conditions that replicate a complex phenomenon in the real world. In order to minimize this problem, the research utilized a phased design (three studies and a pretest) that allowed for a thorough investigation in which every phase added another variable to the test. Furthermore, the material used in the studies was carefully developed to account for as realistic variations as possible of the independent variables, utilizing techniques that have been recognized as effective in previous research. The questionnaire was devised using scales and type of questions that have been proven as reliable and valid for self-reported responses in social research. The reliability of measurement was further strengthened using multiple questions to test each of the dependent variables, and statistical examinations were performed to confirm the level of reliability or association between indicators of the same variable.

The generalizability of the findings requires another cautionary note due to the use of convenience samples comprising college students who were aware of being in a study. Though, as indicated in the literature, when testing the merit of a theoretical proposition, if the examined sample is a part of the population to which the theoretical proposition relates, then it should work on that sample (Aronson *et al.*, 1995; McDermott, 2002; Mook, 1983). In addition, the research design facilitated the exposure of each participant to only one treatment and reduced the risk that participants would change their responses in order to conform to what they think the researcher's expectations are.

The focus of the research on only two societies with two extreme levels of threat exposure helped in reaching significant statistical results. Still, this factor was an additional constraint to the generalizability of the results. The two specific communities that were tested, each with its own cultural and societal "baggage", may have produced findings that cannot be generalized to other places around the world. To further substantiate the findings of this research, and to be able to make general claims on how architecture influences people's responses to the global threat of terrorism, future research should be conducted in other societal-political-contexts around the world.

In conclusion, while recognizing the above limitations, the results of this research illustrate that while the characteristics of the built environment are only supportive actors in influencing people's perceptions of security in the face of the threat of terrorism - they do count. Hopefully, this research will serve as a first step in exploring how buildings, with their specific use and design, and how security measures and their design influence all levels of people's well-being.

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APPENDIX A

MATERIAL USED IN THE INVESTIGATION

Consent Form, English Version

Version 3, 12/12/06

CONSENT FORM

You have been asked to take part in a research study on people's security related responses to architectural elements, which will be the basis for Gali Zilbershtein's research in architecture at Texas A&M University. You have been selected to be a possible participant because you are a student at Texas A&M University, Texas, or at Tel Aviv University, Israel, one of up to 1,200 college students who will participate in this study. The purpose of this study is to better understand the influence of the built environment on people's perception of personal safety in the face of current world events.

If you agree to be part of this study you will be asked to review a scenario which includes a written description of a situation within a hypothetical reality and an image of a building associated with that description; you would be asked to place yourself within the scenario and answer questions regarding your response to the building in the scenario. It should take about 10-20 minutes to finish the exercise, which will be conducted via computer. Since the experiment deals with issues of security in today's reality, you should be aware that the scenario may be to some extent sensitive in nature. Nevertheless, there are no risks associated with participation in this study greater than those ordinarily encountered in daily life.

This Study is anonymous. To ensure your anonymity, your name will not appear on any documents in this packet and all your responses in this experiment will be coded. The records of this study will be kept private and no identifiers linking you to the study will be included in any sort of report that may be published. Research records will be stored securely, and only Gali Zilbershtein and Dr. Andrew Seidel will have access to the records. Your decision whether or not to participate in this study will not affect your current or future relations with Texas A&M University or with Tel Aviv University. If you decide to participate, you are free to refuse to answer any of the questions that may make you uncomfortable. You can withdraw at any time without your relations with the university, your job, benefits, etc., being affected. You will receive no monetary compensation or any other kind of benefits for your participation.

If you have any questions regarding the study and/or your participation in it, you should contact Gali Zilbershtein at the address listed below. Alternatively, I may also contact Dr. Andrew Seidel at the address listed below with any questions regarding the study and/or your participation in it.

This research study has been reviewed and approved by the Institutional Review Board -Human Subjects in Research, Texas A&M University, and the appropriate authority at the Tel Aviv University (the Ethics Committee). For research-related problems or questions regarding subjects' rights, you can contact the Institutional Review Board through Ms. Angelina M. Raines, Director of Research Compliance, Office of Vice President for Research at (979) 458-4067 (araines@vprmail.tamu.edu). Additionally, you may contact Student Counseling Services at (979) 845-4427 to discuss this experience.

> Please be sure you have read the above information, asked questions and received answers to your satisfaction. You will be given a copy of this consent document for your records. By signing this document you consent to participate in the study.

Signature of Participant: ____ Date: _______________
Signature of Researcher: ____ Date: _______________

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Consent Form, Hebrew Version

Version 3, 12/12/06

מסמך הסכמה מדעת

התבקשת לקחת חלק במחקר העוסק בתגובות אנושיות הקשורות לנושאי ביטחון ולאלמנטים ארכיטקטונים. מחקר זה הינו חלק מעבודת מחקר בתחום הארכיטקטורה, המתבצעת ע"י גלי זילברשטיין באוניברסיטת Texas A&M. נבחרת כמשתתף/פת במחקר זה, כיוון שהנך סטודנט/ית באוניברסיטת תל אביב או באוניברסיטת Texas A&M, אחד/אחת מ – 1,200 סטודנטים, באוניברסיטת תל אביב ובאוניברסיטת Texas A&M, שייקחו חלק במחקר זה. מטרת המחקר היא להגיע להבנה טובה יותר של השפעות הסביבה הבנויה על תפישת הביטחון האישי של האדם בתקופתנו הנוכחית.

אם תסכים/מי לקחת חלק במחקר זה, תתבקש/י לסקור תסריט הכולל תיאור כתוב של מצב במציאות דמיונית, ותמונה של בנין המקושרת לתיאור זה; תתבקש/י לדמיין את עצמך במציאות המתוארת בתסריט, ולענות על שאלות באשר לתגובותיך למבנה המופיע בתסריט. ההשתתפות בסקר, שיתבצע דרך מחשב, אמורה להמשך בין 10 ל - 20 דקות. מאחר שהמחקר עוסק בנושאי ביטחון במציאות של ימנו, התסריט עשוי להיות רגיש בטבעו. למרות זאת, ההשתתפות במחקר אינה כרוכה בסיכון גדול מזה בו נתקלים בחיי היום-יום.

מחקר זה הוא אנונימי. להבטחת האנונימיות, שמך לא יופיע בשום מסמך הכלול בניסוי זה, וכל תשובותיך לסקר יקודדו. פרטים מזהים הקושרים בינך למחקר זה לא יכללו באף פרסום הנוגע למחקר. רשומות המחקר ישמרו באופן מאובטח, כשהגישה אליהם מוגבלת לגלי זילברשטיין ולפרופסור אנדרו סיידל (Andrew Seidel) בלבד. החלטתך באם לקחת חלק במחקר, או לא לקחת חלק בו, לא תשפיע בהווה או בעתיד על יחסיך עם אוניברסיטת תל אביב. אם תחליט/י להשתתף, תהיי/ה רשאי/ת לסרב לענות לשאלות הגורמות לך לחוסר נוחות, ותהיי/ה רשאי/ת להפסיק את השתתפותך בכל שלב, ללא חשש שיחסיך עם המוסד האקדמי, עבודתך, וכד' יפגעו.

בכל שאלה בדבר המחקר ו/או השתתפותך בו, פנה/י לגלי זילברשטיין, שכתובתה מצוינת בתחתית עמוד זה. לחילופין, עומדת בפניך האפשרות לפנות לפרופסור אנדרו סיידל, שאף כתובתו מצוינת בזאת.

מחקר זה אושר ע"י ועדת האתיקה של אוניברסיטת תל אביב למחקר בבני אדם במדעי ההתנהגות והסמכות המקבילה באוניברסיטת Texas A&M (Institutional Review Board-Human Subjects).לשאלות/בעיות הקשורות למחקר או לזכויות משתתפים, פנה/י לפרופסור פרופ' עמירם רביב, ראש החוג לפסיכולוגיה, 6409693 (03), raviv@post.tau.ac.il. בנוסף, תוכל/י לפנות לשרות הייעוץ לסטודנט, 6408505-03, psycho@post.tau.ac.il, לדון בהתנסות זו.

בבקשה היי/ה בטוח/ה שקראת את המידע הנ"ל, ששאלת שאלות וקבלת תשובות לשביעות רצונך. ינתן לך עותק של מסמך הסכמה זה, לצורך רשומותיך הפרטיות. בחתימתך על מסמך זה הנך נותן/נת את הסכמתך להשתתף במחקר.

חתימת המשתתף/ת: ______________________________ תאריך: ____________
חתימת החוקר: ______________________________ תאריך: ____________

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Pretest: Survey Material, English Version

Page 1 (Introduction, description of procedure, demographic information):

Date: ______________________
Gender (please circle): M / F
Age: ______________________

Introduction

As we all know, life holds a lot of uncertainty. This uncertainty is often considered as the risks faced in our everyday living. There are risks due to forces of nature; there are health related risks that concern our personal choices and habits; there is the risk of malfunction of technology or equipment we use; risks of accidents due to human error or coincidences; and risks of becoming a victim to an act committed by another human being. The latter relate to acts of crime as well as to terrorism attacks which are part of our world.

In this study we would like to learn how people form their perception of risks associated with terrorism, and how these risks relate to specific locations.

In the next pages you will be presented with a list of locations. We ask you to record what you consider as the probability of a terrorism activity occurring in every one of those places.
Please read the instructions carefully before you begin. Try to work quickly and intuitively. Your honesty is crucial!

Thank you.

Page 2 (Instructions and list of building uses for the participants to rate):

Instructions

Please record the probability of a terrorism activity occurring in every one of the following buildings. When you estimate that probability, consider each particular facility (building) as it is located generally in United States, rather than being related to a specific town.

Insert a probability number from 0 – 100, in the brackets after each building.
A rating of 0 implies that you think there is no chance of a terrorism action in this type of building.
A rating of 100 suggests that you are certain that such a building will be hit by a terrorism action.
Naturally, the number between 0 and 100 indicate your risk assessment – the higher the number, the more risk of terrorism is associated with the building.

List

1. Railroad/subway station (______________)
2. Shopping mall (_____________)
3. Hospital (____________)
4. University dormitories (____)
5. Airport terminal (____________)
6. Restaurant (____________)
7. Stadium (_____________)
8. Courthouse (____)
9. Café (__________)
10. Municipal library (____________)
11. General office building (_____________)
12. Post office (_____________)
13. Sea port terminal (_____________)
14. Bank (____________)
15. Department store (_____________)
16. City hall (_____________)
17. Church (___________)
18. Amusement park (_____________)
19. Central bus station/terminal (_____________)
20. Movie theater (__________)

Pretest: Survey Material, Hebrew Version

Page 1 (Introduction, description of procedure, demographic information):

תאריך: ________________
מין (אנא הקף בעיגול): ז / נ
גיל: ____________________

הקדמה

כידוע לכולם, החיים טומנים בחובם הרבה אי ודאות. פעמים רבות, אי ודאות זו מוגדרת כסיכונים אותם אנו לוקחים בחיי היום-יום. ישנם סיכונים הקשורים בכוחות הטבע; ישנם סיכונים בנושאי בריאות שקשורים בהחלטות והרגלים מתוך בחירה; קיים סיכון של תקלה טכנולוגית או של ציוד בו אנו משתמשים; סיכונים של תאונות מקריות או כאלה הנובעות מטעות אנוש; והסיכון של להיות קורבן למעשה זדון של אדם אחר. סיכון זה, מתיחס למעשי פשע אלימים, או להתקפות טרור, שהם חלק מעולמנו.

במחקר זה, אנו מעוניינים ללמוד על תפישת הסיכון הקשור בטרור בהתיחס למקומות ספציפיים.

בעמודים הבאים, תוצג בפניך רשימת מקומות. את/ה מתבקש/ת לסמן את הערכתך לסבירות התקיימות התקפת טרור בכל אחד מהמקומות המצויינים.
אנא קרא/י את ההוראות בקפידה לפני תחילת העבודה. נסה/י לעבוד באופן איטואיטיבי ומהיר. כנותך חשובה והכרחית!

תודה רבה.

Page 2 (Instructions and list of building uses for the participants to rate):

הוראות

בבקשה ציין/ני את מידת הסבירות של התקפת טרור בכל אחד מהמבנים הבאים. בהערכתך של כל אחד ואחד מהמבנים, התייחס/י לסבירות בישראל באופן כללי ולאו דווקא בהקשר לישוב ספציפי.

הכנס/י ערך הסתברותי בין 0 ל 100 בסוגריים שלצד כל מבנה.
ערך 0 מבטא שאת/ה חושב/ת שאין סיכוי שהתקפת טרור תתקיים בסוג זה של מבנה.
ערך של 100 מבטא שאת/ה בטוח/ה שהתקפת טרור תתקיים בסוג זה של מבנה.
כמובן, הערכים שבין 0 ו- 100 מציינים את תפישת הסיכון שלך – ככל שהערך גבוה יותר, כך הסיכון של התקפת טרור במבנה זה גבוה יותר.

רשימה

1. תחנת רכבת (_________)
2. קניון (_________)
3. בית חולים (_________)
4. מעונות סטודנטים (_________)
5. טרמינל בשדה תעופה (_________)
6. מסעדה (_________)
7. איצטדיון (_________)
8. בית משפט (_________)
9. בית קפה (_________)
10. ספרייה עירונית (_________)
11. בניין משרדים (_________)
12. בית דואר (_________)
13. טרמינל בנמל (_________)
14. בנק (_________)
15. כלבו חנות (_________)
16. בניין עירייה (_________)
17. בית כנסת (_________)
18. פארק שעשועים (_________)
19. תחנת אוטובוסים מרכזית (_________)
20. בית קולנוע (_________)

The Three Studies: Complete Written Material, English Version

Screen 1 (Description of procedure and general instructions):

Welcome!

In the following screens you will be presented with a hypothetical scenario. Please read the description of the situation carefully and try to place yourself in it.

Upon reviewing the scenario you will be asked to respond to several questions.

Now, please remember that there are no right or wrong answers. Just try to choose the answers which seem to best describe the way you feel at the moment you are asked.

Try to work quickly and intuitively - Your honesty is crucial!

Before we begin, please take the time to answer some questions about your background. Note that your complete anonymity is assured!!!

Thank You.

Screen 2 (Collection of demographic information):

Hi there,
Below are some simple questions about your background. Please take a few minutes and answer them.
Please click on the "Next" button when you are done, in order to flip to the next page.

1. Gender:
   Please select: Male / Female

2. What is your age?
   Please select: 18-21 / 21-30 / +30

3. What is your major area of study?
   Please Select: Agriculture / Political Science / Architecture / Behavioral Sciences / Biology / Chemistry / Computer Science / Education / Engineering / Fine Arts / History / Linguistics / Literature / Physics / Other

4. What is your marital status?
   Please Select: Single / Married / Divorced / Widow/Widower

5. Do you have any children?
   Please Select: Yes / No

6. Have you ever served in the military / National Guard / police?
   Please Select Yes No

7. What is the size of the town or city in which you spent most of your life?
   Please Select: Less than 250000 residents / 250000-500000 residents / Above 500,000 residents

8. How religious do you consider yourself to be?
   Please Select: Not at all / Somewhat / Moderately / Very much so

<u>Screen 3 (Specific instructions):</u>

OK, we have some more instructions now...

We are going to ask you to consider a scenario. Please try to place yourself in the reality it describes, and answer the questions following it as intuitively as possible.

(The following text appeared only in study 1:)

Before we begin, we would like you to think of a **[insert building use variations: "city hall" / "shopping mall"]** you have been to in the last month or two.
Please fill in the FULL name of this shopping mall in the box below (for example: The Sunnyvill Mall) :

***<u>Screen 4</u>* (Description of a specific scenario: Manipulating the level of terrorism threat and defining the building use. For the Texan sample, in creation of a low level of terrorism threat, terrorism threat was not mentioned at all Each participant was exposed to only one variation):**

<u>(Scenario, Variation I)</u>

Urgent Newsbreak:
A t t e n t i o n !!!

The Secretary of Homeland Security has put the nation in the highest, most critical, RED ALERT warning, because of the recent number of acts of terror that were committed in many public buildings, all over the country (including several cases in Texas).
The terrorist bombings, reported daily in the media, have become a major concern in every state of the nation!!!

Today, you have to meet your friend at **[insert building use variation: "the city hall" / "the shopping mall" or, in the first study, the name of the facility that the participant had entered in screen 3,]**.

(The following text appeared only in studies 2 and 3:)

The following picture is of the **[insert building use variation: "the city hall" / "the shopping mall"]**. Please look at it as you answer the following questions.

<u>(Scenario, Variation II)</u>

Today, you have to meet your friend at **[insert building use variation: "the city hall" / "the shopping mall" or, in the first study the name of the facility that the participant had entered in screen 3,]**.

(The following text appeared only in in studies 2 and 3:)

The following picture is of the **[insert building use variation: "the city hall" / "the shopping mall"]**. Please look at it as you answer the following questions.

The following is the questionnaire material. The questions were presented to the participants one question per screen. In studies 2 and 3, the images which included the architectural manipulations appeared at the top of each screen, above every question.

<u>Question 1 (Appeared in all three studies):</u>

Consider that you are now walking towards **[insert building use variation: "the city hall" / "the shopping mall" or the name of the facility that the participant had entered in screen 3, in study 1]** -- as you approach the building different aspects come to mind.

Please rate how much each of the following aspects occupies your mind.

	Not at all	Very little	Somewhat	Moderately	Very much
1.1 The looks (aesthetics) of the building	1	2	3	4	5
1.2 The orientation in the building (finding your way around)	1	2	3	4	5
1.3 The security from criminal activity	1	2	3	4	5
1.4 The monumentality of the building (whether it is imposing in size and shape)	1	2	3	4	5
1.5 The security from terrorism	1	2	3	4	5

<u>Question 2 (Appeared in all three studies):</u>

Given the circumstances **(insert reminder on the level of warning, pending on manipulation of threat)**, how dangerous do you consider your visit to the **[insert building use variation: "the city hall" / "the shopping mall" or the name of the facility that the participant had entered in screen 3, in study 1]** ?

Not at all dangerous	Not dangerous	Undecided / neutral	Dangerous	Very dangerous
1	2	3	4	5

<u>Question 3 (Appeared in all three studies):</u>

How safe would you feel entering the *(Insert: building use)*?

Very unsafe	Unsafe	Undecided / neutral	Safe	Very safe
1	2	3	4	5

<u>Question 4 (Appeared only in studies 2 and 3):</u>

Do you have reservations about meeting your friend in this location?

Not at all	Not much	Undecided / neutral	Yes, to some extent	Very much so
1	2	3	4	5

Question 5 (Appeared only in studies 2 and 3):

What is the likelihood you would enter the building?

Not at all likely	Not likely	Undecided / neutral	Likely	Very likely
1	2	3	4	5

Question 6 (Appeared only in studies 2 and 3):

Would you prefer to meet your friend at a different location?

Not at all	No	Undecided / neutral	Yes	Very much
1	2	3	4	5

Question 7 (Appeared in all three studies; Based on Spielberger et al., 1970):

You are now on your way to meet your friend at **[insert building use variation: "the city hall" / "the shopping mall" or the name of the facility that the participant had entered in screen 3, , in study 1]*, (For high level of alert, insert: "while the country is under a red alert warning")**.

For each of the following statements, please select the option that best describes how you feel at this moment in time.

	Not at all	Somewhat	Moderately	Very much so
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I am regretful	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel rested	1	2	3	4
9. I feel anxious	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel "high strung"	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel over-excited and rattled	1	2	3	4
19. I feel joyful	1	2	3	4
20. I feel pleasant	1	2	3	4

Question 8 (Appeared only in studies 2 and 3):

How sophisticated is the security in this building?

Very sophisticated	Sophisticated	Undecided / neutral	Unsophisticated	Very unsophisticated
1	2	3	4	5

Question 9 (Appeared only in studies 2 and 3):

Does the design of the building trigger thoughts about threats of terrorism?

Not at all	No	Undecided / neutral	Yes	Very much
1	2	3	4	5

Question 10 (Appeared only in studies 2 and 3):

How effective is the design to deter terrorists?

Very effective	Effective	Undecided / neutral	Ineffective	Very ineffective
1	2	3	4	5

The Three Studies: Complete Written Material, Hebrew Version

Screen 1 (Description of procedure and general instructions):

ברוכים הבאים !

במסכים הבאים יוצג תרחיש מסויים באמצעות תיאור כתוב של מצב במציאות כלשהי. בבקשה קרא/י בקפידה את התאור של הסיטואציה ונסה/י לדמיין את עצמך במציאות המתוארת בתרחיש .

לאחר קריאת התרחיש תתבקש/י לענות על מספר שאלות .

בענותך על השאלות, חשוב לזכור כי אין תשובות נכונות יותר או פחות. פשוט השתדל/י לבחור בתשובות שמתארות בצורה הטובה ביותר את מה שאת/ה מרגיש/ה ברגע בו את/ נשאל/ת .

נסה/י לעבוד באופן אינטואיטיבי ומהיר. כנותך חשובה והכרחית !

לפני שנתחיל, ענה/י בבקשה על מספר שאלות לגבי הרקע שלך. דע/י שאנונימיותך מובטחת !

תודה רבה .

Screen 2 (Collection of demographic information):

שלום ,

לפניך מספר שאלות הקשורות ברקע שלך .
בסיימך לענות על השאלות, בבקשה לחץ/י על מקש ה "NEXT" על מנת לעבור לעמוד הבא .

1. מהו מינך ?
זכר / נקבה

2. מהו גילך ?
18-21 / 21-30 / 30+

3. מהו החוג בו את/ה לומד/ת ?
חקלאות / מדעי המדינה / ארכיטקטורה / מדעי ההתנהגות / ביולוגיה / כימיה / מחשבים / חינוך / הנדסה / אמנות / הסטוריה / לשון/ספרות / פיזיקה / מתמטיקה / אחר

4. מה מצבך המשפחתי ?
רווק/ה / נשוי/נשואה / גרוש/ה / אלמן/אלמנה

5. האם יש לך ילדים ?
יש / אין

6. האם שרתת בכוחות הבטחון ?
כן / לא

7. מהו הלאום שלך?
יהודי / ערבי / דרוזי / אחר

8. כמה דתי/דתיה את/ה מחשיב/ה את עצמך ?
כלל לא / במקצת / במידה בינונית / מאוד

Screen 3 (Specific instructions):

ועכשיו, עוד מספר הנחיות ...

את/ה הולך/ת לקרוא מצב במציאות מסויימת. בבקשה נסה/י למקם את עצמך במציאות המתוארת, וענה/י על השאלות שיופיעו בהמשך בצורה האינטואיטיבית ביותר שאת/ה יכול/ה .

(The following text appeared only in study 1)

לפני שנתחיל, את/ה מתבקש/ת לחשוב על *[הכנס סוג בניין: "קניון" / "עירייה"]* בו ביקרת בחודש האחרון. בבקשה ציין/י את שמו המלא של המבנה במסגרת האדומה (לדוגמא: "קניון הים האדום"):

***Screen 4* (Description of a specific scenario. There were two alternative scenarios, each defining a different level of terrorism threat. The scenarios were adapted to the Israeli cultural-political context. A direct translation of the Hebrew text was presented in the dissertation. Each participant was exposed to only one variation):**

(Scenario, Variation I)

מבזק חדשות עדכני:
לתשומת לבך!

כוחות הבטחון ובראשם שר הבטחון הכריזו על כוננות הפיגועים הגבוהה ביותר שהיתה בארץ עד כה, זאת בשל מספר הפיגועים הרב שהיה לאחרונה במבנים ציבורים ברחבי הארץ. שר הבטחון מתריע כי המדינה כולה תחת התראה בטחונית חריפה ביותר !!!
התקפות הטרור החוזרות ונישנות המסוקרות באופן יום-יומי במבזקים, בחדשות ובעתונים גורמות לחשש כבד בכל בארץ .

היום, את/ה חייב/ת להפגש עם חבר/ה ב *[הכנס סוג בניין: "קניון" / "עירייה", או עבור הניסוי הראשון את שם הבניין שהוקלד ע"י המשתתף במסך 3]*.

(The following text appeared only in studies 2 and 3)

התמונה הבאה היא של הבניין אליו את/ה הולך/ת. בבקשה הסתכל/י על התמונה בענותך על השאלות הבאות.

(Scenario, Variation II)

מבזק חדשות:
סוף לטרור!!!

בתום שנה שלמה של שלווה ורגיעה מוחלטת של פעילות הטרור בישראל, שבאה בעקבות הסכמי השלום שנחתמו בין ישראל לכל שכנותיה ויחסי המסחר והתיירות הענפים שנרקמו בין ישראל לכל מדינות האזור, הכריזו היום רשמית ראש הממשלה ושר הבטחון על ביטול איום הטרור על ישראל. בדוחות שהוגשו לוועדת החוץ והבטחון של הכנסת אישרו ראש השב"כ, המוסד והרמטכ"ל קביעה זו .

היום, את/ה חייב/ת להפגש עם חבר/ה ב *[הכנס סוג בניין: "קניון" / "עירייה", או עבור הניסוי הראשון את שם הבניין שהוקלד ע"י המשתתף במסך 3]*.

(The following text appeared only in studies 2 and 3)

התמונה הבאה היא של הבניין אליו את/ה הולך/ת. בבקשה הסתכל/י על התמונה בענותך על השאלות הבאות.

The following is the questionnaire material. The questions were presented to the participants one question per screen. In studies 2 and 3 the images which included the architectural manipulations appeared at the top of each screen, above every question.

Question 1(Appeared in all three studies):

הנח/הניחי שאת/ה הולך/ת לכיוון *[הכנס סוג בניין: "קניון" / "עירייה", או עבור הניסוי הראשון את שם הבניין שהוקלד ע"י המשתתף במסך 3]*
-- בהתקרבך לבניין נושאים שונים צצים במוחך.
עבור כל אחד מהנושאים הבאים דרג/י כמה הוא מעסיק אותך.

	מעסיק מאוד	מעסיק	מעסיק	מעסיק	כלל לא
1.1. מראה (אסטטיקת) הבניין	5	4	3	2	1
1.2. ההתמצאות בתוך המבנה	5	4	3	2	1
1.3. הביטחון מפני פשיעה	5	4	3	2	1
1.4. המונומנטליות של המבנה (האם הבניין נראה ממלכתי – בגודלו, בעיצובו ובחומריו)	5	4	3	2	1
1.5. הביטחון מפני טרור	5	4	3	2	1

Question 2 (Appeared in all three studies):

בהתחשב בנסיבות – ההתראה הבטחונית החמורה הקיימת בכל המדינה, כמה מסוכן ביקורך ב *[הכנס סוג בניין: "קניון" / "עירייה", או עבור הניסוי הראשון את שם הבניין שהוקלד ע"י המשתתף במסך 3]* לפי דעתך?

מאוד מסוכן	מסוכן	ניטרלי / לא החלטי	לא מסוכן	כלל לא מסוכן
5	4	3	2	1

Question 3(Appeared in all three studies):

כמה בטוח תרגיש/י בכניסתך ל *[הכנס סוג בניין: "קניון" / "עירייה"]* זה?

בטוח מאוד	בטוח	ניטרלי / לא החלטי	לא בטוח	מאוד לא בטוח
5	4	3	2	1

Question 4 (Appeared only in studies 2 and 3):

האם את/ה חש/ה הסתייגות מפגישת חברך/תך במקום זה ?

מאוד	במידה מסויימת	ניטרלי / לא החלטי	כמעט ולא	כלל לא
5	4	3	2	1

Question 5 (Appeared only in studies 2 and 3

מה הסבירות שתכנס/י לבניין?

מאוד סביר	סביר	ניטרלי / לא החלטי	לא סביר	כלל לא סביר
5	4	3	2	1

Question 6 (Appeared only in studies 2 and 3

האם תעדיף/י לפגוש את חברך/תך במקום אחר?

כן, מאוד	כן	ניטרלי / לא החלטי	לא	כלל לא
5	4	3	2	1

Question 7 (Appeared in all three studies; Based on: Spielberger et al., 1970, and Teichman and Melineck, 1979):

את/ה עכשיו בדרכך לפגוש את החבר/ה שעמו/ה קבעת ב *[הכנס סוג בניין: "קניון" / "עירייה", או עבור הניסוי הראשון את שם הבניין שהוקלד ע"י המשתתף במסך 3]*, *[עבור תרחיש בו סכנת פיגועים חמורה הכנס: "בזמן שהמדינה תחת כוננות פיגועים חמורה "]*.

להלן מספר משפטים שבהם משתמשים אנשים בדרך כלל כדי לתאר את עצמם. קרא/י כל משפט ובחר/י את האופציה המתאימה ביותר לתיאור הרגשתך עכשיו, כלומר, ברגע זה .

אל תתעכב/י זמן רב מידי על משפט כלשהו, אלא תן/י את התשובה הנראית לך כמתארת בצורה הטובה ביותר את רגשותייך הנוכחיים .

	מאוד	במידה בינונית	במקצת	כלל לא
1. אני מרגיש/ה שלו/ה	4	3	2	1
2. אני מרגיש/ה בטוחה	4	3	2	1
3. אני מתוח/ה	4	3	2	1
4. יש לי רגשי חרטה	4	3	2	1
5. אני מרגיש רגוע/ה	4	3	2	1
6. אני מרגיש נרגז/ת	4	3	2	1
7. אני חושש/ת כעת מאסונות שעללולים לקרות	4	3	2	1
8. אני מרגיש/ה נינוח/ה	4	3	2	1
9. אני חרד/ה	4	3	2	1
10. אני חש/ה בנוח	4	3	2	1
11. יש לי הרגשה של בטחון עצמי	4	3	2	1
12. אני מרגיש/ה עצבני/ת	4	3	2	1
13. אני נפחד/ת	4	3	2	1
14. אני מרגיש/ה מתיחות רבה	4	3	2	1
15. אני משוחחרר/ת ממתח	4	3	2	1
16. אני מרגיש/ה מרוצה	4	3	2	1
17. אני מודאג/ת	4	3	2	1
18. אני חש/ה התרגשות יתר ומבוכה	4	3	2	1
19. אני שמח/ה	4	3	2	1
20. יש לי הרגשה נעימה	4	3	2	1

Question 8 (Appeared only in studies 2 and 3)

כמה מתוחכמת האבטחה בבניין זה ?

מאוד מתוחכמת	מתוחכמת	ניטרלי / לא החלטי	לא מתוחכמת	מאוד לא מתוחכמת
1	2	3	4	5

Question 9 (Appeared only in studies 2 and 3)

האם העיצוב של הבניין מעורר מחשבות על טרור ?

כלל לא	לא	ניטרלי / לא החלטי	כן	כן, מאוד
1	2	3	4	5

Question 10 (Appeared only in studies 2 and 3)

כמה אפקטיבי העיצוב של הבניין בלהרתיע טרוריסטים ?

מאוד אפקטיבי	אפקטיבי	ניטרלי / לא החלטי	לא אפקטיבי	מאוד לא אפקטיבי
1	2	3	4	5

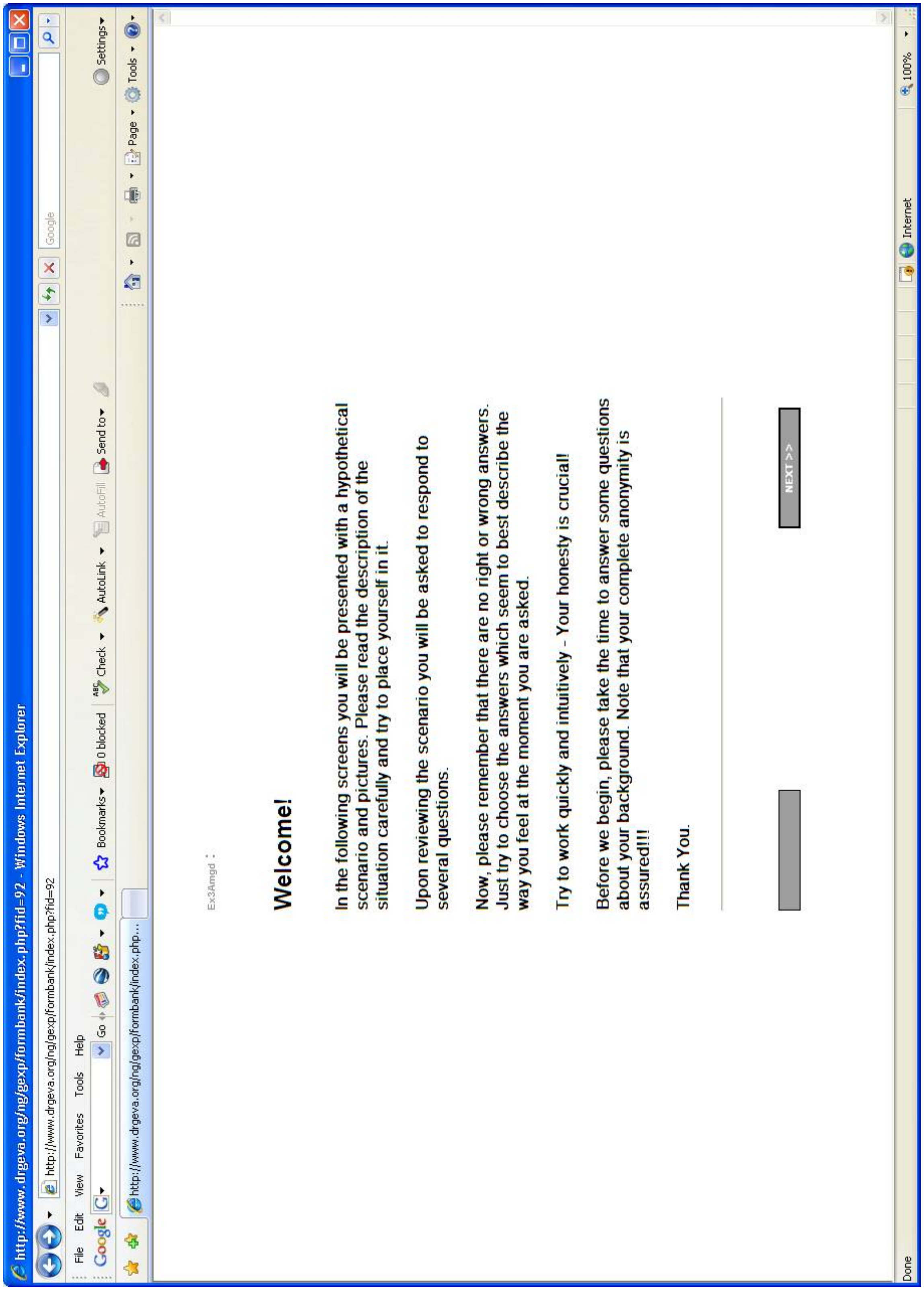
The Three Studies: Screenshots Example

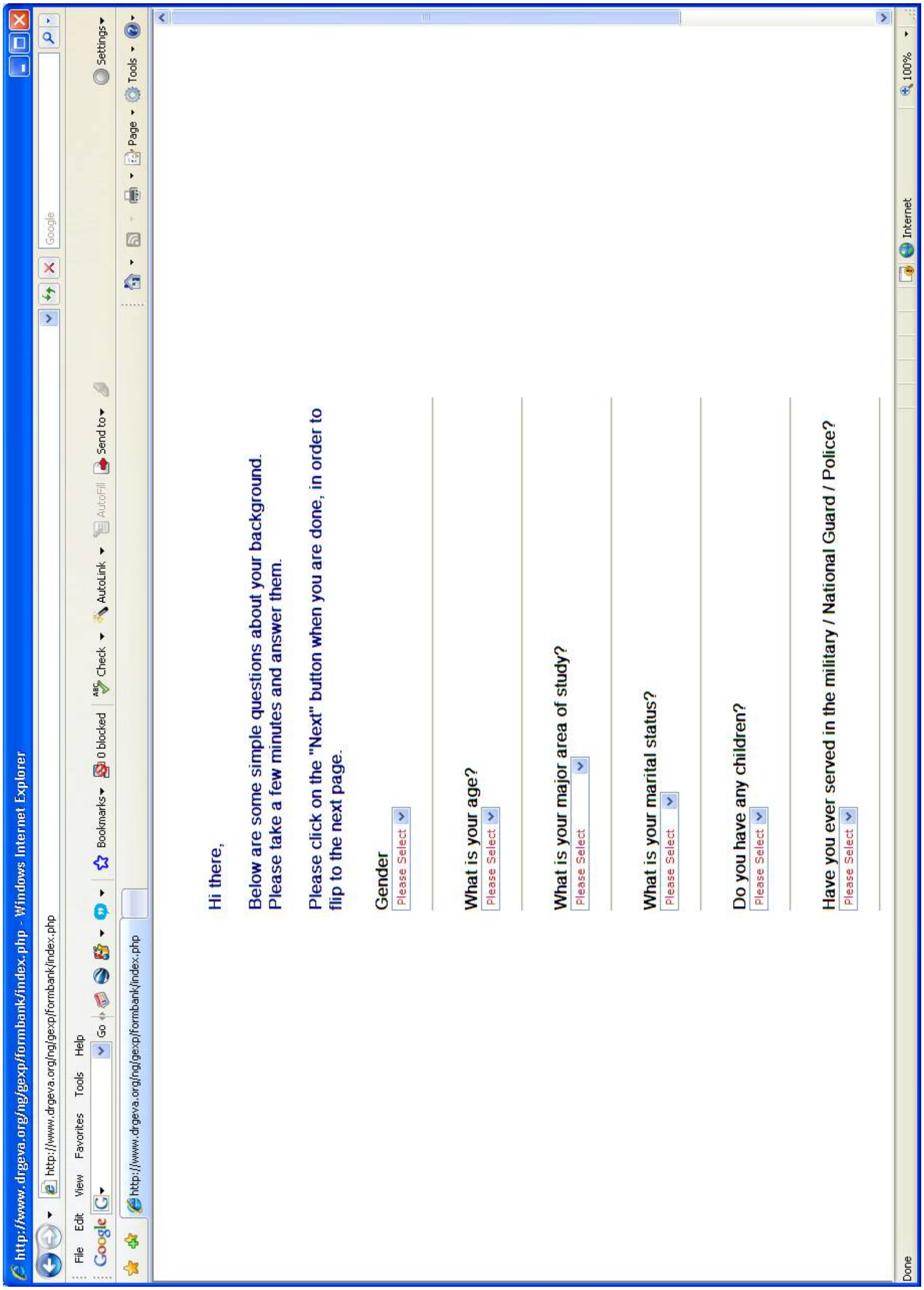
The three studies, which were administered in Texas and Israel, utilized a web-based computerized system that randomly assigned participant to the different manipulated scenarios. The basic layout was the same for all manipulated scenarios in all three studies.

The following is an example of a specific manipulated scenario as appeared on the computer screen. The screenshots have been scaled down in order to fit the dissertation's format and dimensions.

The scenario that was used for the example of screenshots is from study 3, in which the level of terrorism was set to high across all conditions. The tested independent variables in this example are:

- Building-use: Shopping mall
- Façade design: All glass facade
- Entrance design: Inconspicuous access control security measures that appear as part of the overall design of the entrance


http://www.drgeva.org/ng/gexp/formbank/index.php?fid=92 - Windows Internet Explorer
Ex3Amgd :
Welcome!
In the following screens you will be presented with a hypothetical scenario and pictures. Please read the description of the situation carefully and try to place yourself in it.
Upon reviewing the scenario you will be asked to respond to several questions.
Now, please remember that there are no right or wrong answers. Just try to choose the answers which seem to best describe the way you feel at the moment you are asked.
Try to work quickly and intuitively - Your honesty is crucial!
Before we begin, please take the time to answer some questions about your background. Note that your complete anonymity is assured!!!
Thank You.
NEXT >>
Done
Internet
100%



http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer

Hi there,

Below are some simple questions about your background.
Please take a few minutes and answer them.

Please click on the "Next" button when you are done, in order to flip to the next page.

Gender
Please Select

What is your age?
Please Select

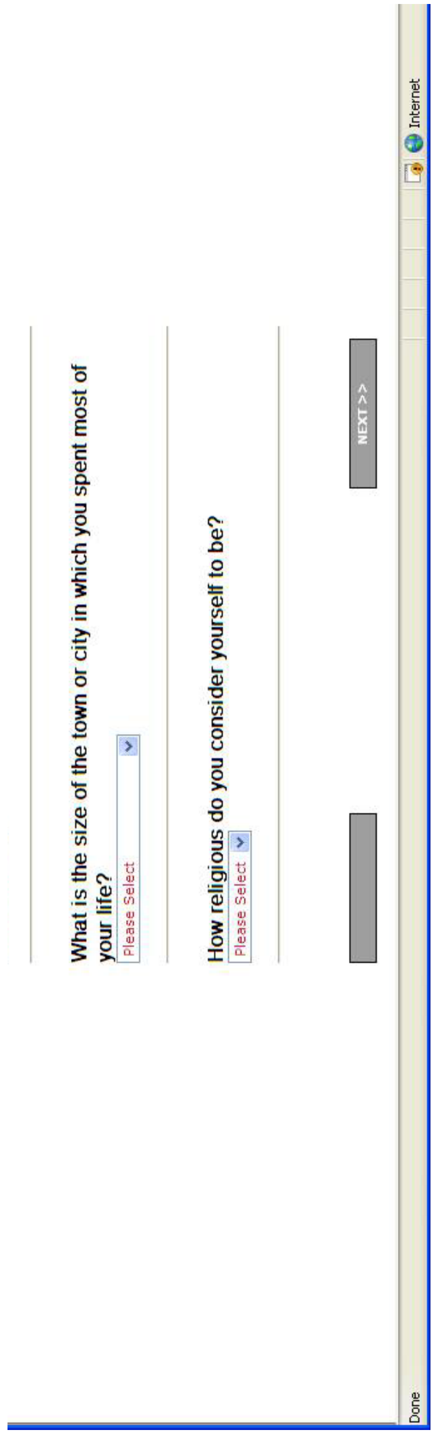
What is your major area of study?
Please Select

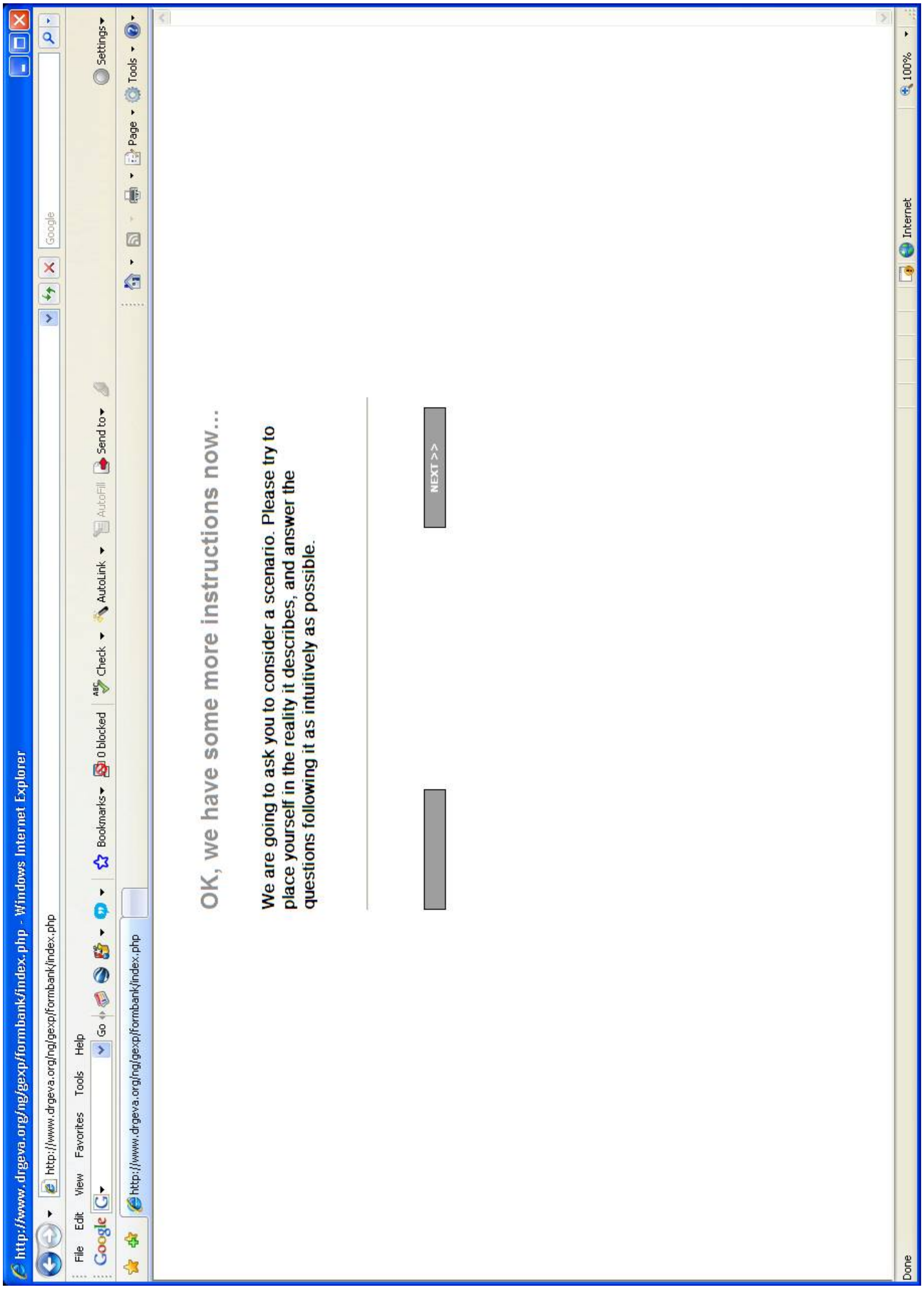
What is your marital status?
Please Select

Do you have any children?
Please Select

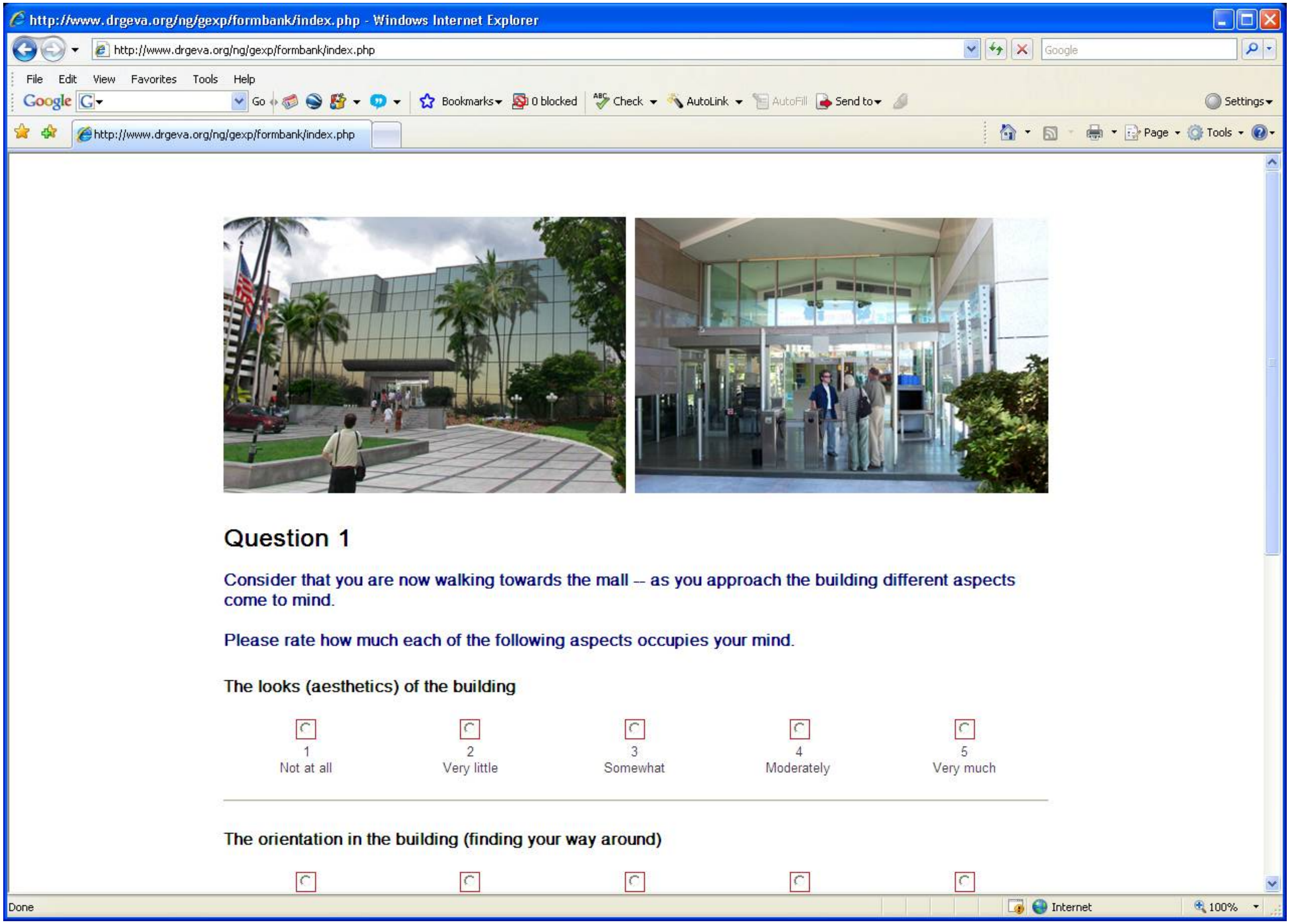
Have you ever served in the military / National Guard / Police?
Please Select

Continues from the previous page (scroll-down the screen):




http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
OK, we have some more instructions now…
We are going to ask you to consider a scenario. Please try to place yourself in the reality it describes, and answer the questions following it as intuitively as possible.
NEXT >>
Done
Internet
100%


http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
http://www.drgeva.org/ng/gexp/formbank/index.php
File Edit View Favorites Tools Help
Urgent Newsbreak:
Attention!!!
The Secretary of Homeland Security has put the nation in the highest, most critical, RED ALERT warning, because of the recent number of acts of terrorism that were committed in many public buildings, all over the country (including several cases in Texas).
The terrorist bombings, reported daily in the media, have become a major concern in every state of the nation!!!
Today, you have to meet your friend at the shopping mall. The following pictures are of the shopping mall you are going to. Please look at them as you answer the following questions.
NEXT >>
Done
Internet
100%



http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer

Question 1

Consider that you are now walking towards the mall -- as you approach the building different aspects come to mind.

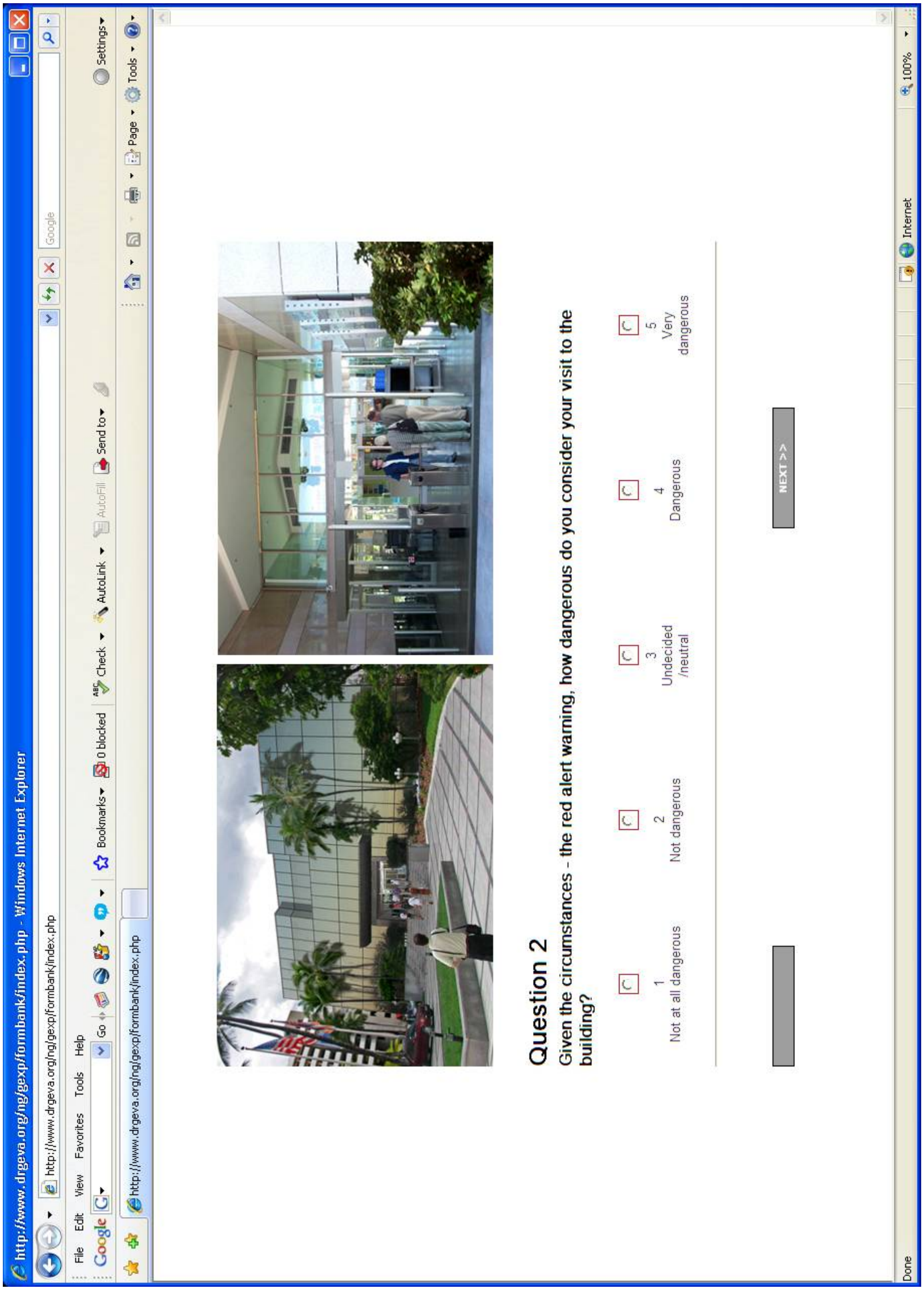
Please rate how much each of the following aspects occupies your mind.

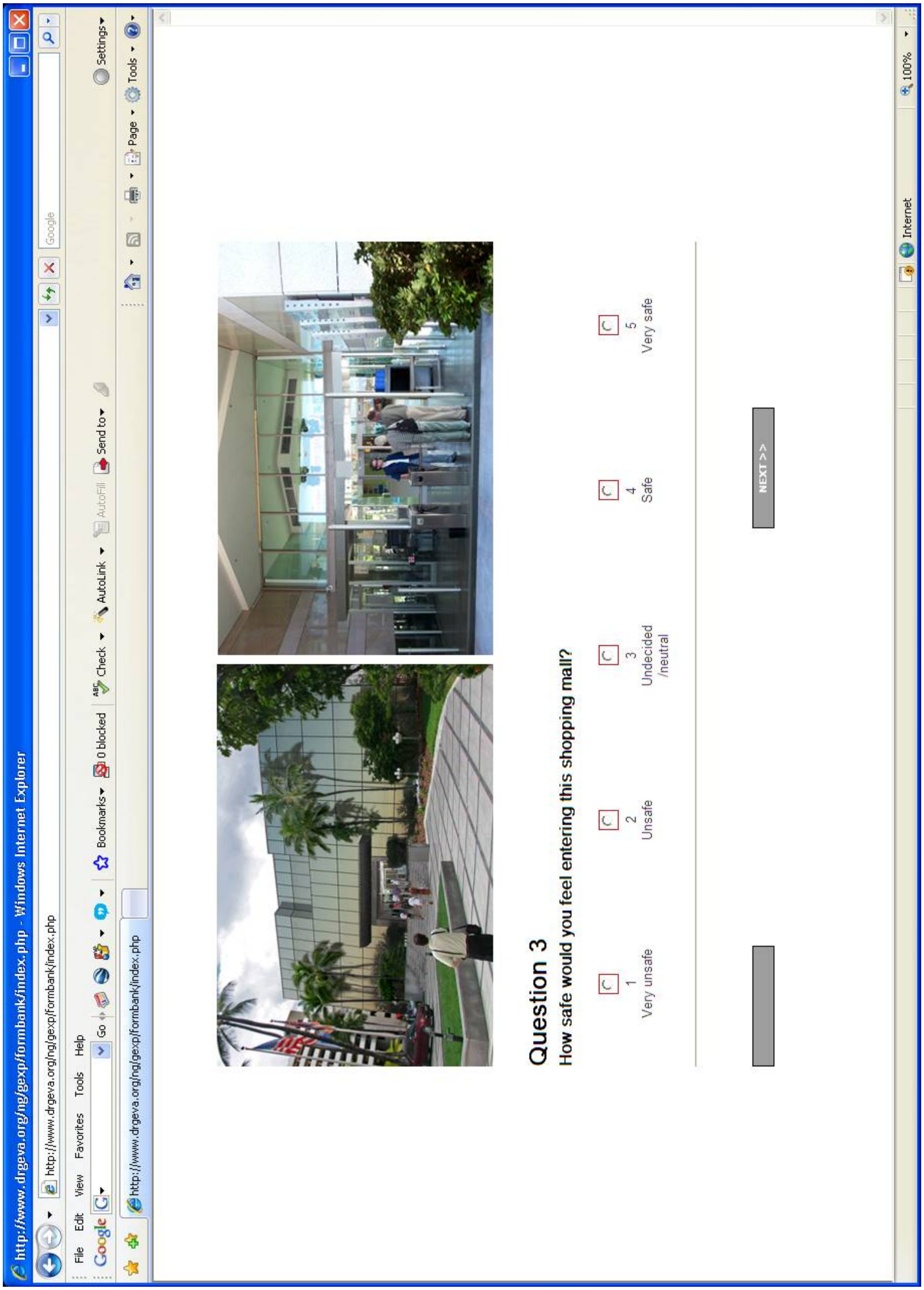
The looks (aesthetics) of the building

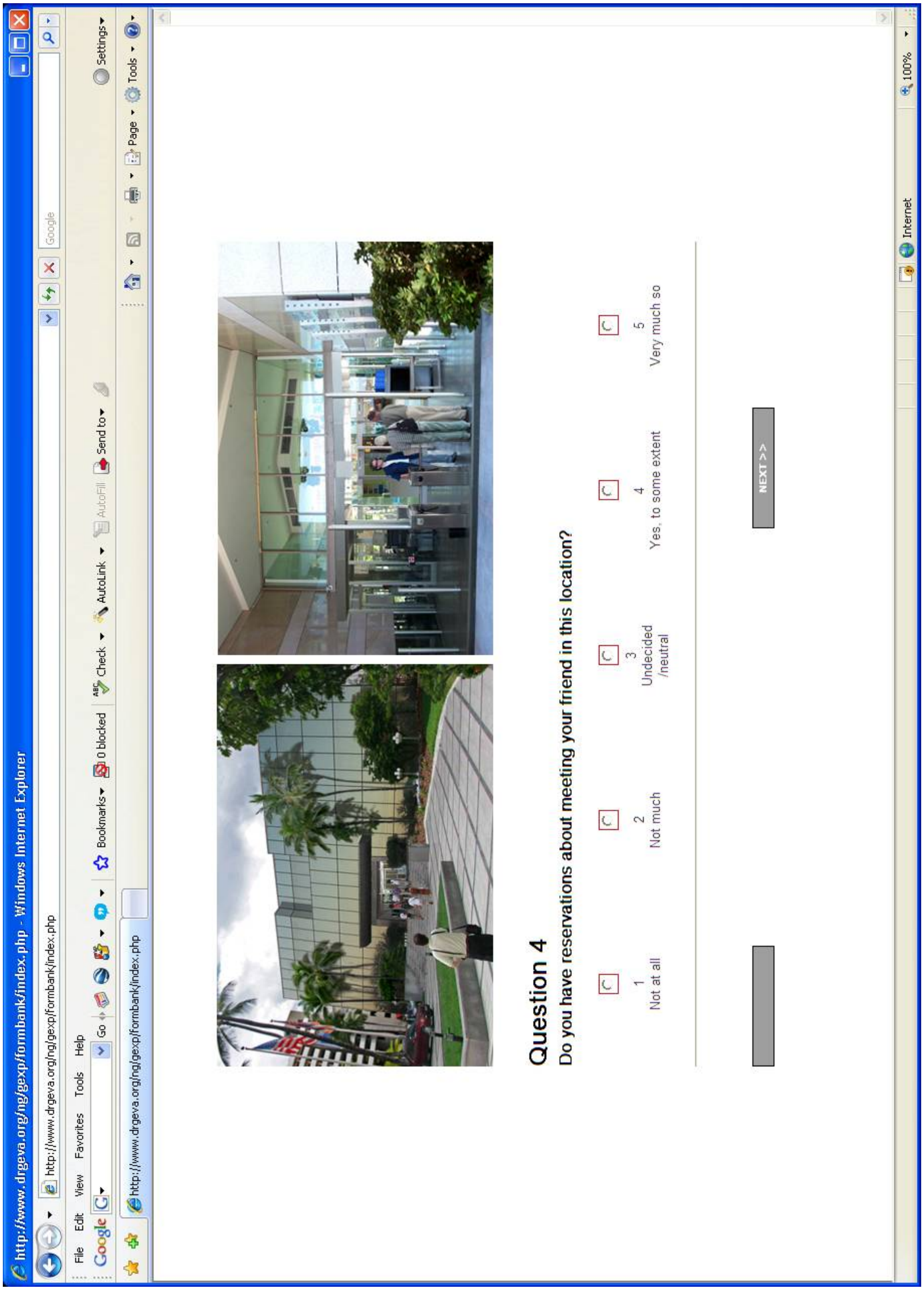
1	2	3	4	5
Not at all	Very little	Somewhat	Moderately	Very much

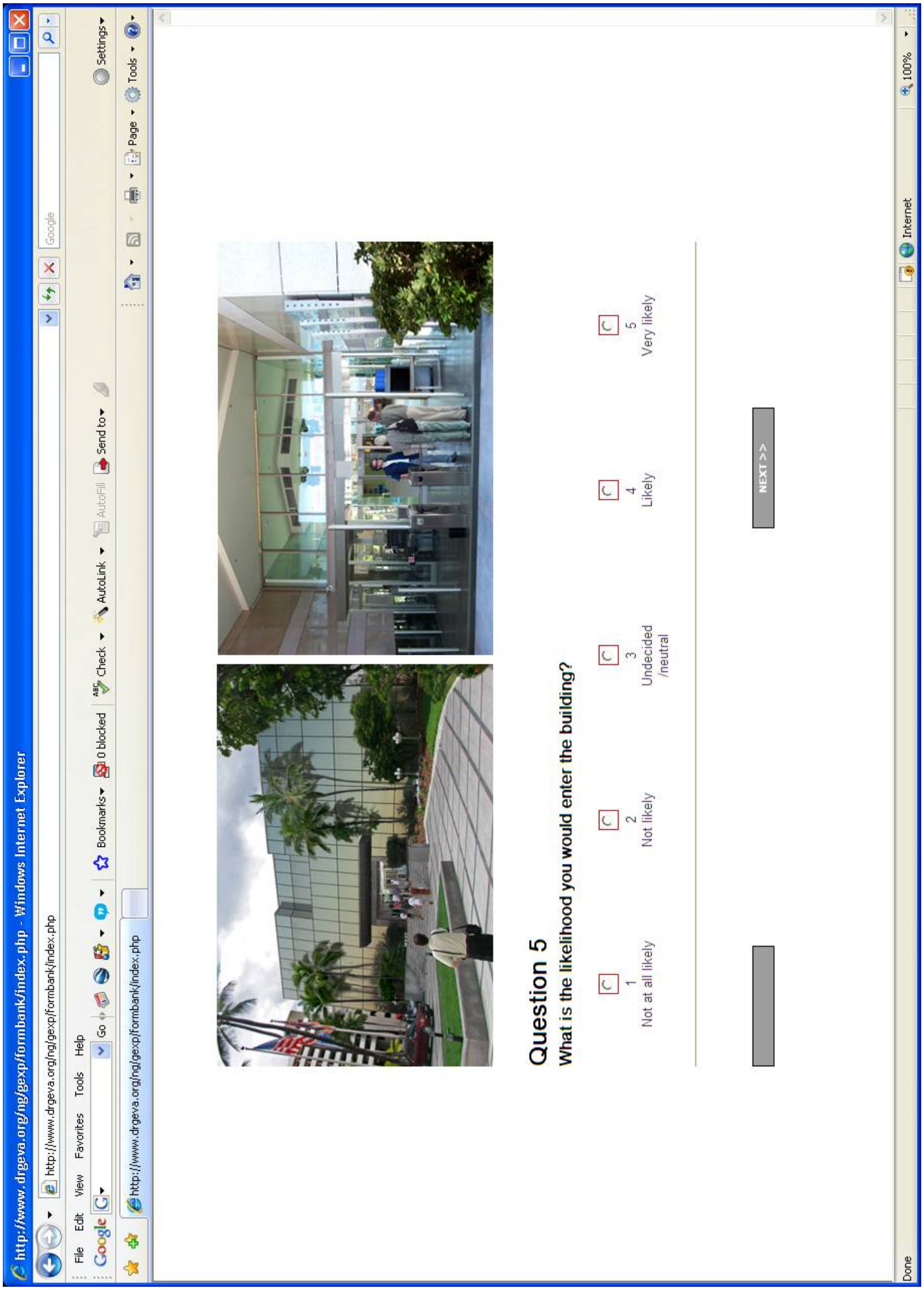
The orientation in the building (finding your way around)

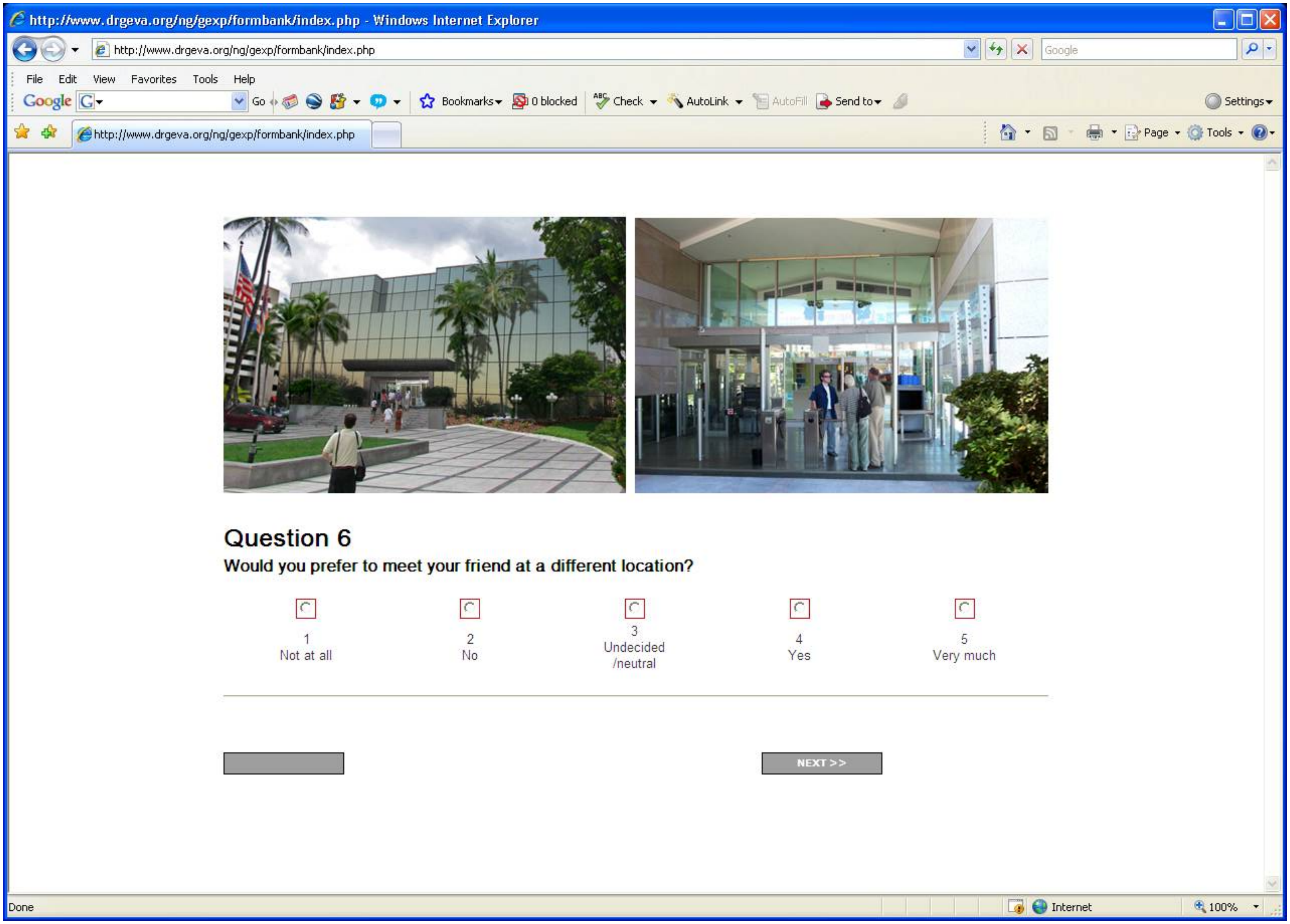
Continues from the previous page (scroll-down the screen):

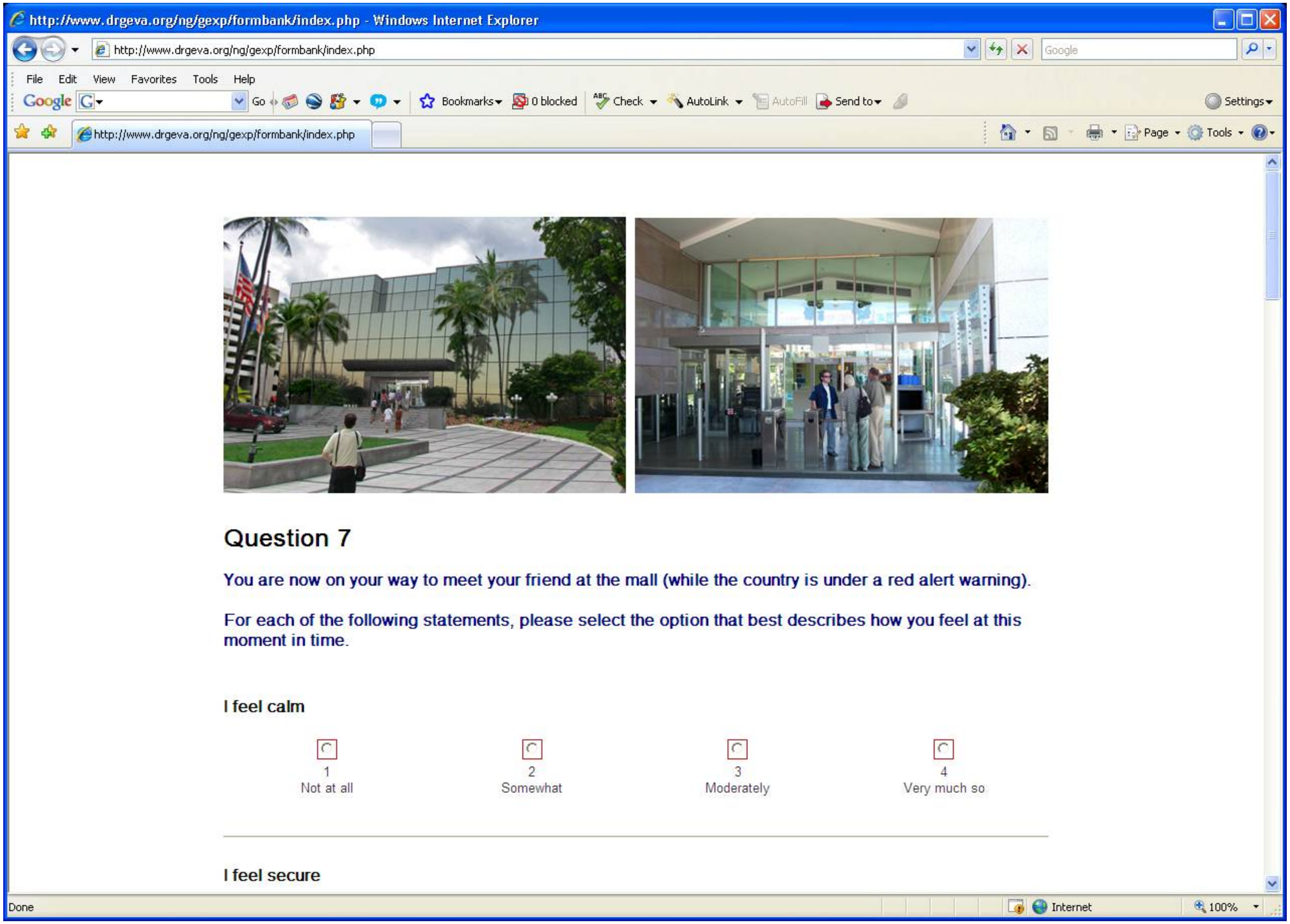

http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
http://www.drgeva.org/ng/gexp/formbank/index.php
File Edit View Favorites Tools Help
Question 2
Given the circumstances - the red alert warning, how dangerous do you consider your visit to the building?
1
Not at all dangerous
2
Not dangerous
3
Undecided /neutral
4
Dangerous
5
Very dangerous
NEXT >>
Done
Internet
100%


http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
http://www.drgeva.org/ng/gexp/formbank/index.php
File Edit View Favorites Tools Help
Question 3
How safe would you feel entering this shopping mall?
1
Very unsafe
2
Unsafe
3
Undecided /neutral
4
Safe
5
Very safe
NEXT >>
Internet
100%

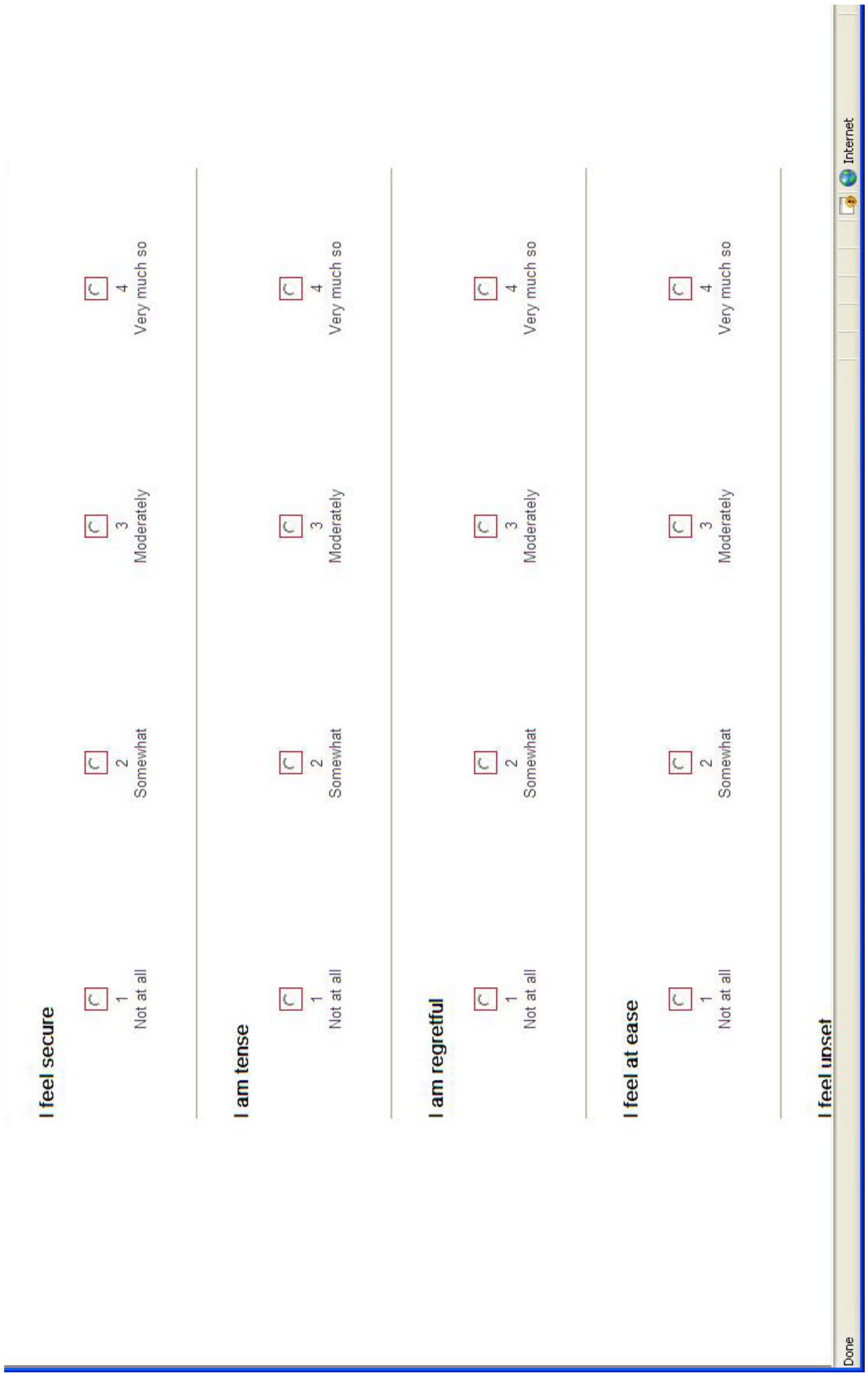

http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
Question 4
Do you have reservations about meeting your friend in this location?
1
Not at all
2
Not much
3
Undecided /neutral
4
Yes, to some extent
5
Very much so
NEXT >>


http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
Question 5
What is the likelihood you would enter the building?
1
Not at all likely
2
Not likely
3
Undecided
/neutral
4
Likely
5
Very likely
NEXT >>

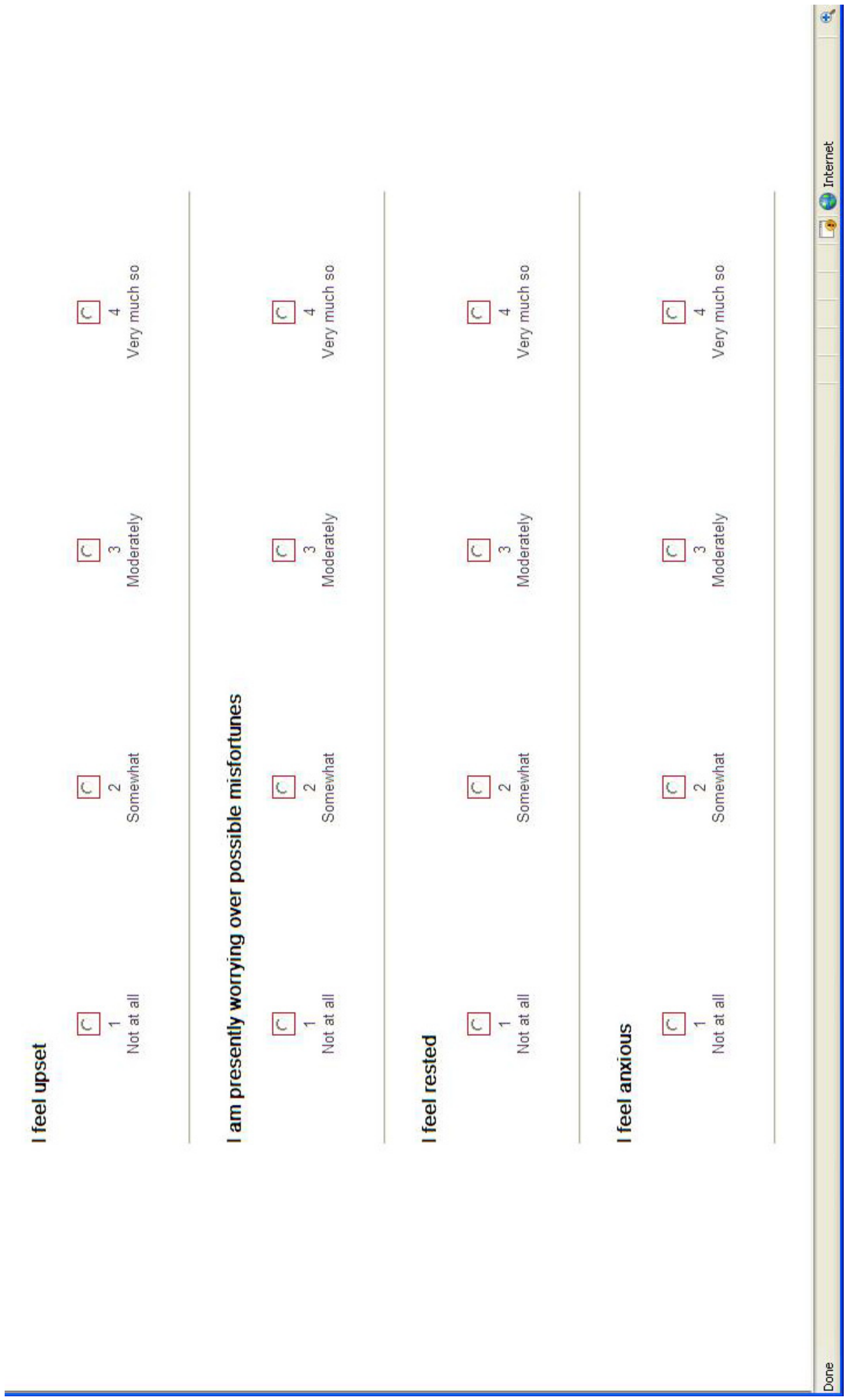

http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
http://www.drgeva.org/ng/gexp/formbank/index.php
File Edit View Favorites Tools Help
Bookmarks 0 blocked Check AutoLink AutoFill Send to Settings
Page Tools
Question 6
Would you prefer to meet your friend at a different location?
1 Not at all
2 No
3 Undecided /neutral
4 Yes
5 Very much
NEXT >>
Done
Internet
100%


http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
http://www.drgeva.org/ng/gexp/formbank/index.php
File Edit View Favorites Tools Help
Bookmarks 0 blocked Check AutoLink AutoFill Send to Settings
Page Tools
Question 7
You are now on your way to meet your friend at the mall (while the country is under a red alert warning).
For each of the following statements, please select the option that best describes how you feel at this moment in time.
I feel calm
1 Not at all
2 Somewhat
3 Moderately
4 Very much so
I feel secure
Done
Internet
100%

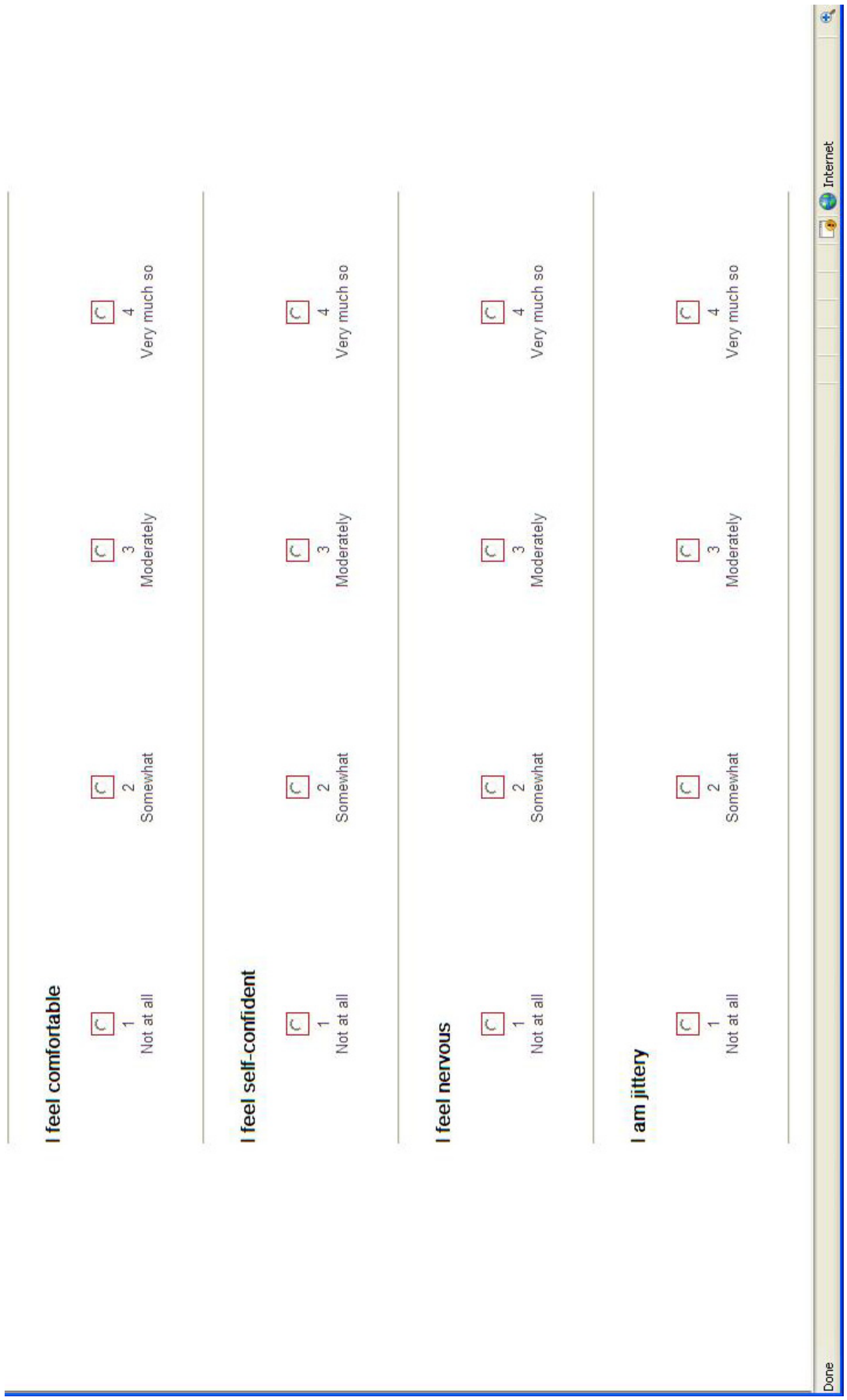
Question 7 continues from the previous page (scroll-down the screen):



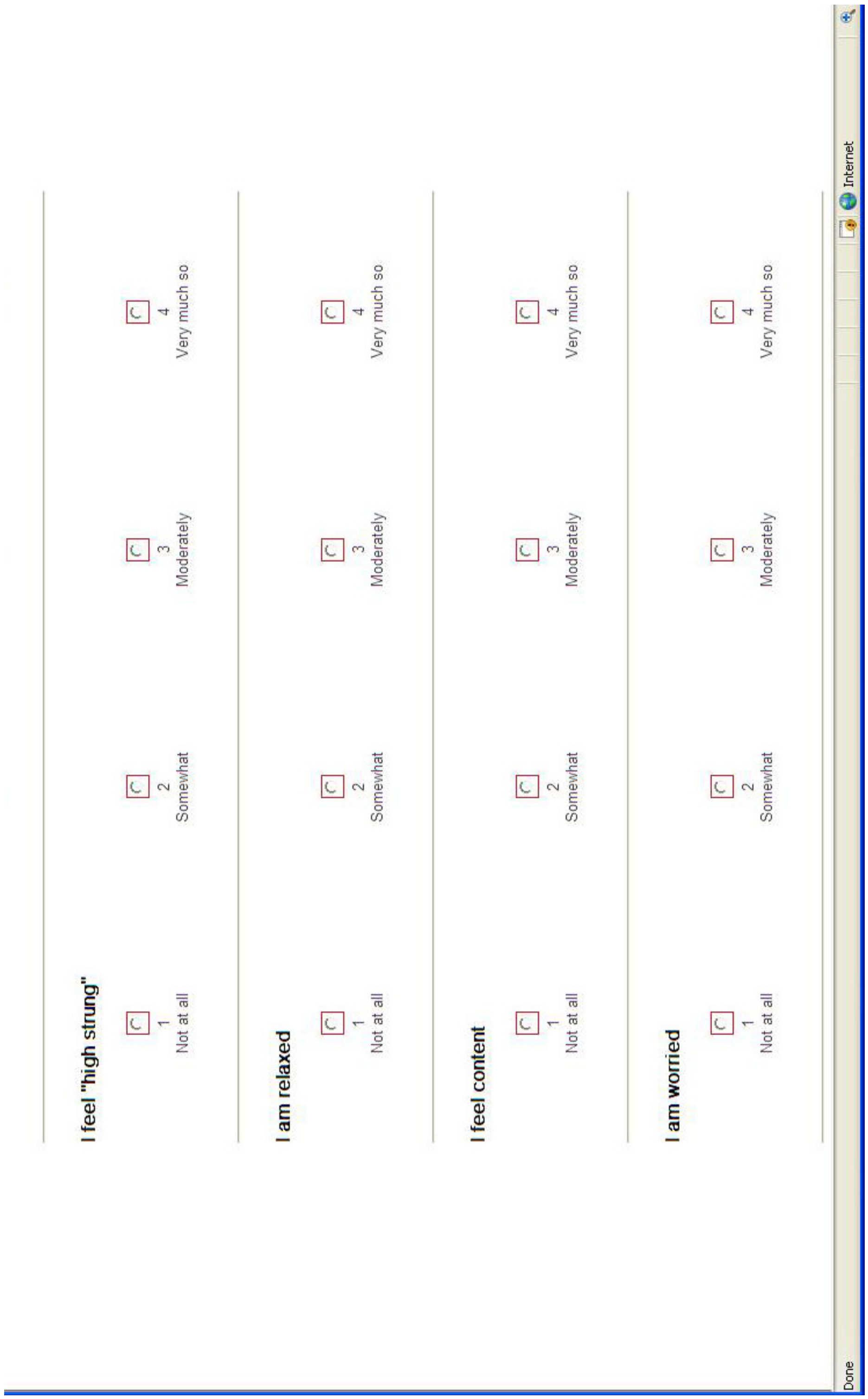
Question 7 continues from the previous page (scroll-down the screen):



Question 7 continues from the previous page (scroll-down the screen):



Question 7 continues from the previous page (scroll-down the screen):


I feel "high strung"

1 Not at all | 2 Somewhat | 3 Moderately | 4 Very much so

I am relaxed

1 Not at all | 2 Somewhat | 3 Moderately | 4 Very much so

I feel content

1 Not at all | 2 Somewhat | 3 Moderately | 4 Very much so

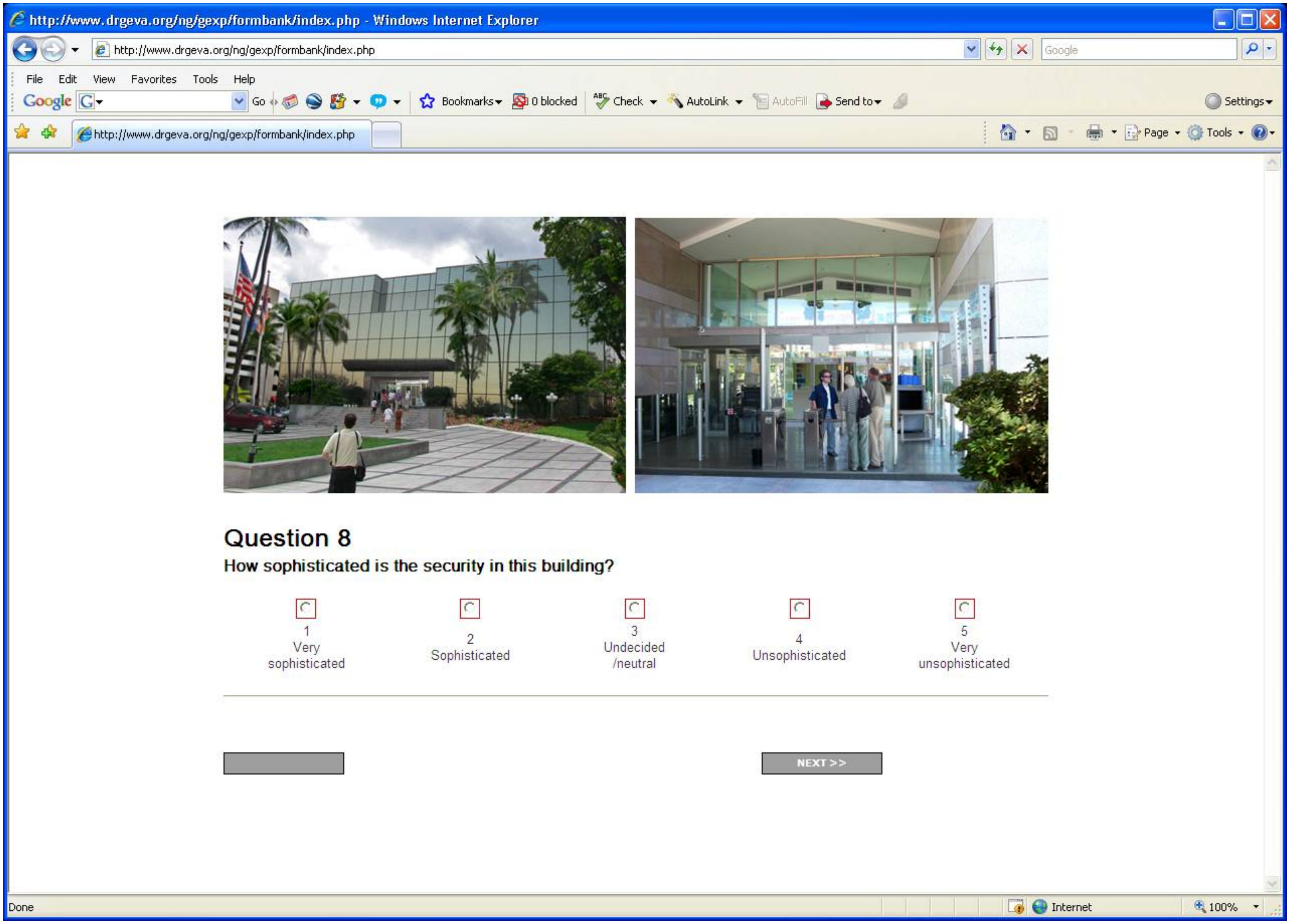
I am worried

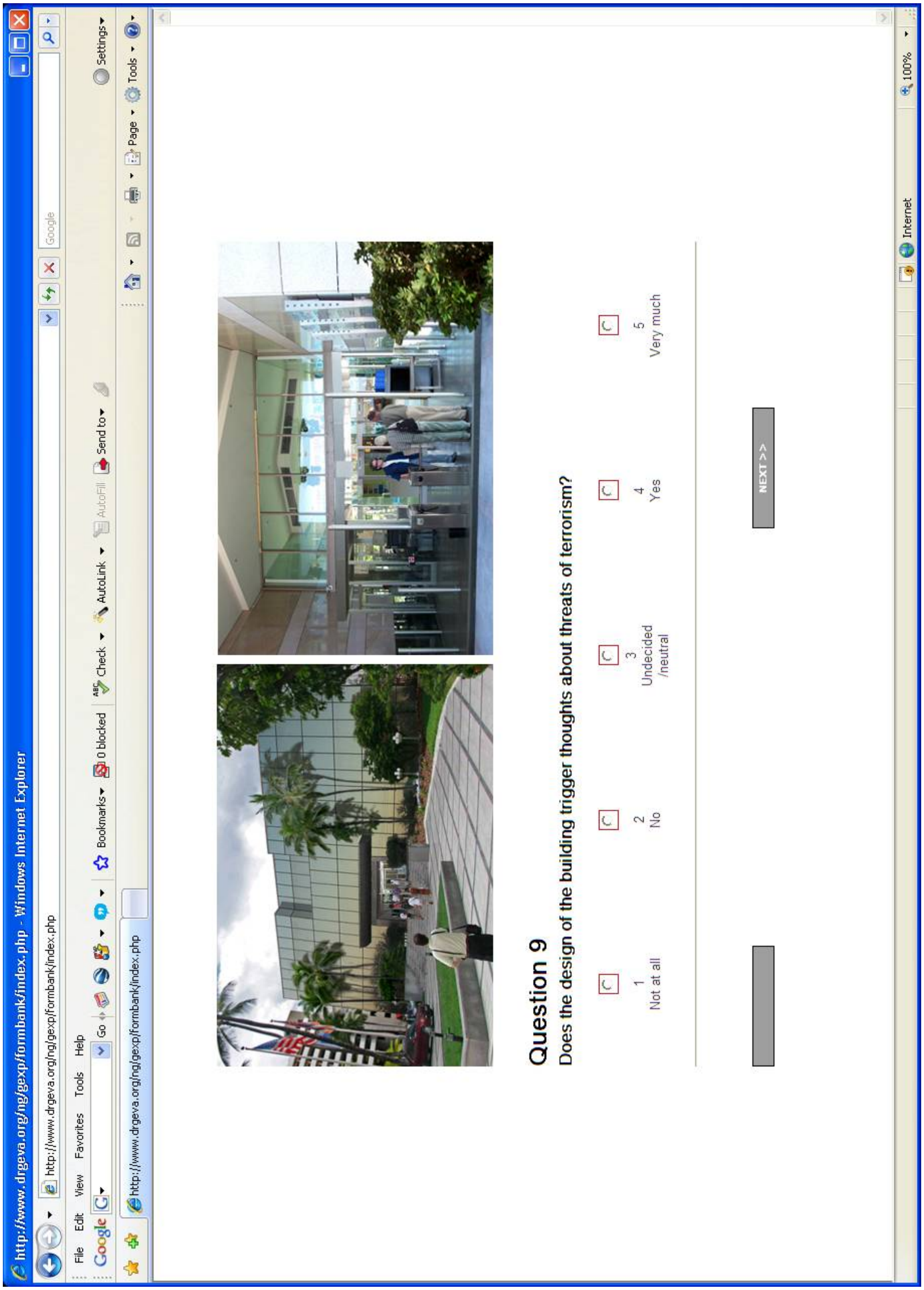
1 Not at all | 2 Somewhat | 3 Moderately | 4 Very much so

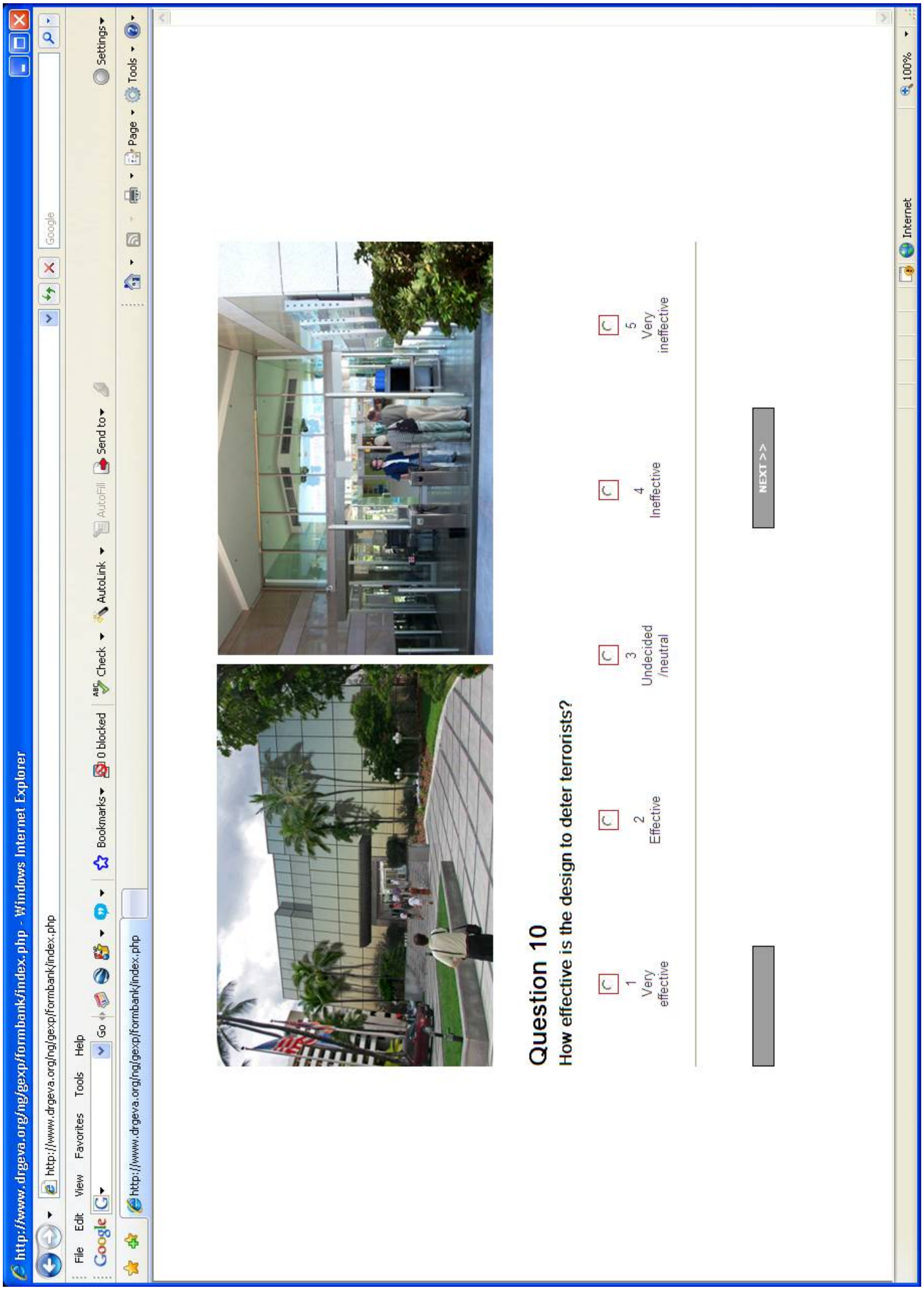
Done

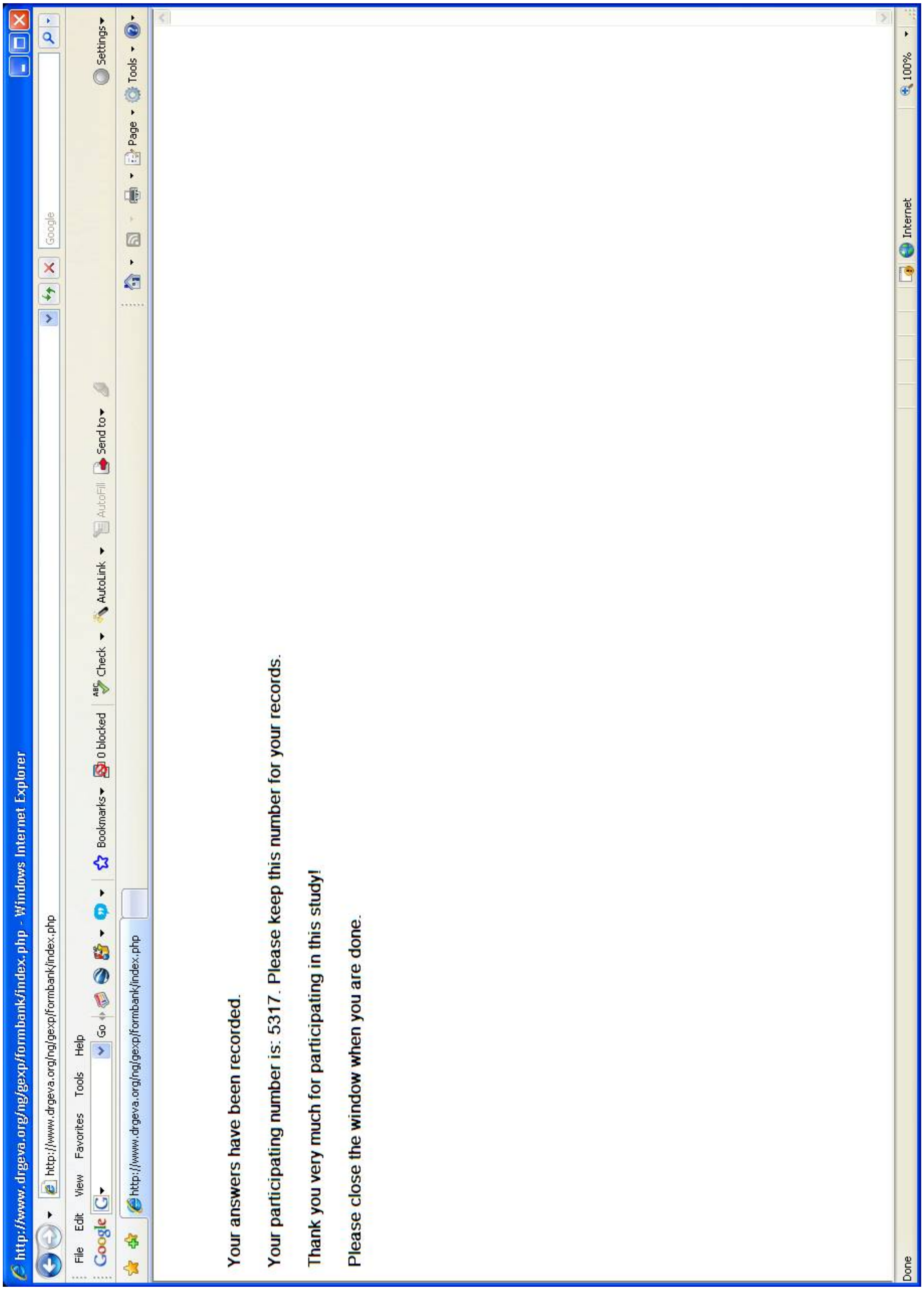
Internet

Question 7 continues from the previous page (scroll-down the screen):


http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
http://www.drgeva.org/ng/gexp/formbank/index.php
File Edit View Favorites Tools Help
Question 8
How sophisticated is the security in this building?
1 Very sophisticated
2 Sophisticated
3 Undecided /neutral
4 Unsophisticated
5 Very unsophisticated
NEXT >>
Done
Internet
100%


http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
Question 9
Does the design of the building trigger thoughts about threats of terrorism?
1
Not at all
2
No
3
Undecided
/neutral
4
Yes
5
Very much
NEXT >>


http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
Question 10
How effective is the design to deter terrorists?
1 Very effective
2 Effective
3 Undecided /neutral
4 Ineffective
5 Very ineffective
NEXT >>


http://www.drgeva.org/ng/gexp/formbank/index.php - Windows Internet Explorer
Your answers have been recorded.
Your participating number is: 5317. Please keep this number for your records.
Thank you very much for participating in this study!
Please close the window when you are done.

TEXAS A&M UNIVERSITY
VICE PRESIDENT FOR RESEARCH - OFFICE OF RESEARCH COMPLIANCE

1186 TAMU
College Station, TX 77843-1186
1500 Research Parkway, Suite B-150

979.458.1467
FAX 979.862.3176
http://researchcompliance.tamu.edu

Institutional Biosafety Committee | Institutional Animal Care and Use Committee | Institutional Review Board

DATE: 10-May-2007

MEMORANDUM

TO: ZILBERSHTEIN, GALI
TAMU-ARCHITECTURE(00010)

FROM: Office of Research Compliance
Institutional Review Board

SUBJECT: Request for Continuation

Protocol Number:	2004-0310
Title:	A Cross-Cultural Investigation of Responses to Architecture in the Era of Terror
Review Category:	Expedited
Approval Period:	09-Jun-2007 **To** 08-Jun-2008

Approval determination was based on the following Code of Federal Regulations:

45 CFR 46.110(b)(1) - Some or all of the research appearing on the list and found by the reviewer (s) to oinvolve no more than minimal risk.

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(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation or quality assurance methodologies.

(Note: Some research in this category may be exempt from the HHS regulations for the protection of human subjects. 45 CFR 46.101(b)(2) and (b) (3). This listing refers only to research that is not exempt.)

Provisions:

This research project has been approved for one (1) year. As principal investigator, you assume the following responsibilities

1. **Continuing Review:** The protocol must be renewed each year in order to continue with the research project. A Continuing Review along with required documents must be submitted 30 days before the end of the approval period. Failure to do so may result in processing delays and/or non-renewal.
2. **Completion Report:** Upon completion of the research project (including data analysis and final written papers), a Completion Report must be submitted to the IRB Office.
3. **Adverse Events:** Adverse events must be reported to the IRB Office immediately.
4. **Amendments:** Changes to the protocol must be requested by submitting an Amendment to the IRB Office for review. The Amendment must be approved by the IRB before being implemented.
5. **Informed Consent:** Information must be presented to enable persons to voluntarily decide whether or not to participate in the research project.

This electronic document provides notification of the review results by the Institutional Review Board.

APPENDIX B

DESCRIPTIVE STATISTICS

AND RESULTS OF STATISTICAL TESTS

TABLE B-1. Study 1: Means and standard deviations for how much security from terrorism occupies the mind.

Variation in the level of terrorism threat	Texas (n=89)						Israel (n=86)						Both societies (n=175)					
	City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
High	3.33	1.53	2.55	1.22	2.93	1.42	3.10	1.38	3.78	1.00	3.45	1.23	3.21	1.44	3.18	1.27	3.20	1.35
Low	2.68	1.43	2.29	1.43	2.48	1.43	2.71	1.27	3.00	1.30	2.86	1.28	2.70	1.34	2.62	1.40	2.66	1.36
Total	3.00	1.50	2.41	1.33	2.70	1.43	2.90	1.32	3.41	1.21	3.16	1.28	2.95	1.41	2.90	1.36	2.93	1.38

Note. Values are based on responses to Question 1.5 in the questionnaire (Appendix A).

TABLE B-2. Study 1: Means and standard deviations for the overall sense of insecurity.

Variation in the level of terrorism threat	Texas (n=89)						Israel (n=86)						Both societies (n=175)					
	City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
High	2.55	0.93	2.48	0.87	2.51	0.89	2.59	0.92	3.13	0.76	2.88	0.87	2.57	0.91	2.81	0.87	2.70	0.89
Low	1.89	0.84	1.75	0.78	1.82	0.81	2.43	0.84	2.57	0.83	2.50	0.83	2.15	0.88	2.13	0.89	2.14	0.88
Total	2.21	0.94	2.10	0.89	2.15	0.91	2.51	0.87	2.86	0.83	2.69	0.86	2.36	0.91	2.47	0.94	2.42	0.93

Note. The overall sense of security for each participant was calculated using the average of the response to Question 2 and the reversed value of the response to Questions 3 in the questionnaire (questions are detailed in Appendix A).

TABLE B-3. Study 1: Means and standard deviations for the overall state of anxiety.

Variation in the level of terrorism threat	Texas (n=89)						Israel (n=86)						Both societies (n=175)					
	City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
High	45.33	12.58	38.09	12.57	41.63	12.95	41.81	11.31	42.61	11.39	42.23	11.22	43.57	11.95	40.40	12.06	41.93	12.04
Low	30.86	7.54	31.17	7.57	30.50	7.48	32.81	8.47	41.71	11.99	37.26	11.20	31.81	7.97	35.56	11.37	33.73	9.98
Total	37.93	12.54	33.96	10.91	35.88	11.83	37.31	10.87	42.18	11.55	39.80	11.42	37.62	11.68	37.98	11.90	37.81	11.76

Note. The values for the overall score of anxiety state were calculated based on Spielberger, Gorsuch and Lushene's *Manual of the State-Trait Anxiety Inventory* (1970). The calculation is detailed in sub-section 4.2.3 Method.

TABLE B-4. Study 2: Means and standard deviations for how much security from terrorism occupies the mind.

Variation in the design of the facade	Variation in the level of terrorism threat	Texas (*n*=200)						Israel (*n*=162)						Both societies (*n*=362)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Glass	High	3.95	1.53	3.56	1.47	3.74	1.50	3.83	1.38	4.20	106	4.03	1.22	3.90	1.45	3.84	1.33	3.87	1.38
	Low	2.29	1.00	1.96	1.26	2.13	1.14	2.05	1.43	2.95	1.43	2.53	1.49	2.19	1.20	2.43	1.42	2.31	1.31
	Total	3.07	1.51	2.79	1.58	2.92	1.55	2.92	1.66	3.56	1.40	3.26	1.55	3.00	1.57	3.15	1.54	3.08	1.55
Solid	High	3.96	1.16	3.46	1.42	3.72	1.31	3.86	1.01	4.29	0.85	4.07	0.95	3.92	1.09	3.83	1.26	3.87	1.17
	Low	2.00	1.19	2.35	1.23	2.17	1.21	2.55	1.57	2.40	1.10	2.48	1.35	2.24	1.38	2.37	1.16	2.30	1.27
	Total	2.96	1.52	2.90	1.43	2.93	1.48	3.19	1.47	3.37	1.36	3.27	1.41	3.06	1.50	3.11	1.41	3.08	1.45
Total	High	3.96	1.32	3.51	1.43	3.73	1.39	3.85	1.18	4.24	0.94	4.05	1.08	3.91	1.25	3.84	1.29	3.87	1.27
	Low	2.13	1.10	2.16	1.25	2.15	1.17	2.32	1.51	2.68	1.29	2.50	1.41	2.22	1.29	2.40	1.29	2.31	1.29
	Total	3.01	1.51	2.85	1.50	2.93	1.51	3.06	1.55	3.46	1.37	3.27	1.47	3.03	1.53	3.13	1.47	3.08	1.50

Note. Values are based on responses to Question 1.5 in the questionnaire (Appendix A)

TABLE B-5. Study 2: Means and standard deviations for the overall sense of insecurity.

Variation in the design of the facade	Variation in the level of terrorism threat	Texas (*n*=200)						Israel (*n*=162)						Both societies (*n*=362)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Glass	High	3.33	0.84	2.76	0.94	3.02	0.93	3.19	0.75	3.55	0.81	3.38	0.79	3.27	0.79	3.11	0.96	3.18	0.88
	Low	1.92	0.58	1.93	0.55	1.93	0.56	1.69	0.57	2.05	0.74	1.88	0.68	1.82	0.58	1.99	0.64	1.91	0.62
	Total	2.58	1.01	2.36	0.87	2.47	0.94	2.44	1.01	2.78	1.08	2.62	1.05	2.52	1.00	2.56	0.99	2.54	0.99
Solid	High	2.93	0.95	2.75	0.80	2.84	0.88	2.83	0.66	3.57	0.66	3.20	0.75	2.89	0.83	3.12	0.84	3.00	0.84
	Low	1.71	0.58	1.94	0.50	1.82	0.55	2.25	0.84	2.30	0.77	2.27	0.80	1.95	0.75	2.10	0.65	2.02	0.70
	Total	2.31	0.99	2.35	0.78	2.33	0.89	2.53	0.80	2.95	0.95	2.74	0.90	2.41	0.91	2.61	0.91	2.51	0.91
Total	High	3.10	0.92	2.75	0.86	2.92	0.90	3.00	0.72	3.56	0.73	3.29	0.77	3.06	0.83	3.11	0.90	3.09	0.86
	Low	1.81	0.59	1.94	0.52	1.87	0.56	2.00	0.78	2.17	0.76	2.09	0.77	1.89	0.68	2.04	0.64	1.97	0.66
	Total	2.43	1.00	2.36	0.82	2.39	0.91	2.49	0.90	2.87	1.02	2.68	0.97	2.46	0.95	2.59	0.95	2.52	0.95

Note. The overall sense of security for each participant was calculated using the average of the response to Question 2 and the reversed value of the response to Questions 3 in the questionnaire (questions are detailed in Appendix A).

TABLE B-6. Study 2: Means and standard deviations for the state of anxiety.

Variation in the design of the facade	Variation in the level of terrorism threat	Texas (*n*=200)						Israel (*n*=162)						Both societies (*n*=362)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Glass	High	54.67	13.75	44.36	13.93	49.07	14.65	49.78	4.15	50.25	5.21	50.03	4.68	52.41	10.64	46.98	11.24	49.50	11.24
	Low	33.83	10.08	31.57	7.82	32.72	9.02	45.68	4.76	46.38	4.36	46.05	4.51	39.07	10.04	38.64	9.81	38.85	9.87
	Total	43.56	15.80	38.23	13.02	40.81	14.60	47.68	4.88	48.27	5.12	47.99	4.98	45.41	12.26	42.85	11.30	44.08	11.81
Solid	High	46.74	14.71	51.23	11.03	48.94	13.11	49.10	4.05	48.57	5.07	48.83	4.54	47.77	11.32	50.04	8.89	48.89	10.20
	Low	31.86	10.83	36.31	8.63	34.00	10.00	46.59	5.55	46.30	3.16	46.45	4.52	38.34	11.51	40.65	8.41	39.45	10.16
	Total	39.16	14.81	43.77	12.37	41.40	13.81	47.81	4.98	47.46	4.35	47.64	4.66	42.96	12.31	45.40	9.82	44.15	11.20
Total	High	50.21	14.70	47.86	12.88	49.00	13.77	49.41	4.06	49.39	5.14	49.40	4.62	49.85	11.20	48.54	10.17	49.18	10.67
	Low	32.77	10.44	34.08	8.52	33.41	9.53	46.17	5.16	46.34	3.78	46.26	4.49	38.68	10.80	39.67	9.13	39.16	10.00
	Total	41.14	15.34	41.11	12.92	41.13	14.15	47.75	4.90	47.87	4.74	47.81	4.81	44.08	12.31	44.15	10.62	44.12	11.48

Note. The values for the overall score of anxiety state were calculated based on Spielberger, Gorsuch and Lushene's *Manual of the State-Trait Anxiety Inventory* (1970). The calculation is detailed in sub-section 4.2.3 Method.

TABLE B-7. Study 2: Means and standard deviations for the overall tendency to avoid entering the building.

Variation in the design of the facade	Variation in the level of terrorism threat	Texas (*n*=200)						Israel (*n*=162)						Both societies (*n*=362)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Glass	High	3.17	0.86	2.71	0.92	2.92	0.92	2.80	0.70	3.25	1.14	3.04	0.97	3.00	0.80	2.95	1.05	2.97	0.94
	Low	2.15	0.85	1.97	0.62	2.06	0.74	2.04	0.68	1.84	0.79	1.93	0.74	2.10	0.78	1.90	0.70	2.00	0.74
	Total	2.63	0.99	2.35	0.87	2.49	0.93	2.41	0.78	2.53	1.20	2.47	1.02	2.53	0.90	2.43	1.03	2.48	0.97
Solid	High	2.64	0.91	2.58	0.91	2.61	0.91	2.33	0.71	2.87	0.80	2.60	0.79	2.51	0.84	2.71	0.87	2.61	0.85
	Low	2.14	0.82	2.10	0.71	2.12	0.76	2.00	0.77	1.92	0.79	1.96	0.77	2.08	0.79	2.02	0.75	2.05	0.77
	Total	2.39	0.90	2.34	0.84	2.36	0.87	2.16	0.75	2.41	0.92	2.28	0.84	2.29	0.84	2.37	0.88	2.33	0.86
Total	High	2.88	0.92	2.64	0.91	2.75	0.92	2.55	0.73	3.06	0.99	2.81	0.90	2.73	0.85	2.83	0.96	2.78	0.91
	Low	2.15	0.83	2.04	0.67	2.10	0.75	2.02	0.72	1.88	0.78	1.95	0.75	2.09	0.78	1.97	0.72	2.03	0.75
	Total	2.50	0.94	2.35	0.85	2.42	0.90	2.28	0.77	2.47	1.07	2.37	0.93	2.40	0.87	2.40	0.95	2.40	0.91

Note. The overall likelihood of entering the building for each participant was calculated using the average of responses to Question 4, Question 6 and the reversed value of the response to Questions 5 in the questionnaire (questions are detailed in Appendix A).

TABLE B-8. Study 2: Means and standard deviations for the question on how unsophisticated the security in the building is.

Variation in the design of the facade	Variation in the level of terrorism threat	Texas (*n*=200)						Israel (*n*=162)						Both societies (*n*=362)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Glass	High	3.05	1.11	2.68	0.80	2.85	0.97	2.56	0.92	3.20	0.83	2.89	0.92	2.82	1.05	2.91	0.85	2.87	0.94
	Low	2.58	0.88	2.43	0.73	2.51	0.80	2.84	0.83	3.14	0.85	3.00	0.85	2.70	0.86	2.77	0.86	2.74	0.86
	Total	2.80	1.01	2.56	0.77	2.68	0.90	2.70	0.88	3.17	0.83	2.95	0.88	2.76	0.95	2.84	0.85	2.80	0.90
Solid	High	2.85	0.95	2.73	0.87	2.79	0.91	2.71	0.90	3.29	1.01	3.00	0.99	2.79	0.92	2.98	0.97	2.88	0.94
	Low	2.46	0.69	2.85	0.73	2.65	0.73	2.82	0.73	2.85	0.99	2.83	0.85	2.62	0.73	2.85	0.84	2.73	0.79
	Total	2.65	0.84	2.79	0.80	2.72	0.82	2.77	0.81	3.07	1.01	2.92	0.92	2.70	0.83	2.91	0.91	2.81	0.87
Total	High	2.94	1.02	2.71	0.83	2.82	0.93	2.64	0.90	3.24	0.92	2.95	0.95	2.80	0.98	2.95	0.91	2.88	0.94
	Low	2.52	0.78	2.65	0.75	2.58	0.77	2.83	0.77	3.00	0.92	2.91	0.85	2.66	0.79	2.81	0.85	2.73	0.82
	Total	2.72	0.92	2.68	0.79	2.70	0.86	2.74	0.84	3.12	0.92	2.93	0.90	2.73	0.88	2.88	0.88	2.80	0.88s

Note. Values are based on responses to Question 8 in the questionnaire (Appendix A)

TABLE B-9. Study 2: Results of between-groups effects for the question on how unsophisticated the security in the building is.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*
Facade design	.01	1	.01	.01	.919
Level of terrorism threat	1.64	1	1.64	2.18	.141
Society	4.36	1	4.36	5.80	.017
Building-use	2.33	1	2.33	3.10	.079
Façade design * Level of terrorism threat	.02	1	.02	.03	.866
Façade design * Society	.07	1	.07	.09	.765
Level of terrorism threat * Society	1.08	1	1.08	1.43	.232
Façade design * Level of terrorism threat * Society	1.39	1	1.39	1.85	.175
Façade design * Building-use	.26	1	.26	.35	.554
Level of terrorism threat * Building-use	.04	1	.04	.05	.826
Facade design * Level of terrorism threat * Building-use	.01	1	.01	.01	.905
Society * Building-use	4.53	1	4.53	6.03	.015
Façade design * Society * Building-use	1.74	1	1.74	2.32	.129
Level of terrorism threat * Society * Building-use	3.59	1	3.59	4.77	.030
Façade design * Level of terrorism threat * Society * Building-use	.32	1	.32	.43	.514
Error	259.89	346	.75		
Total	3127.00	362			

a R Squared = .075 (Adjusted R Squared = .035)

TABLE B-10. Study 2: Means and standard deviations for the questions on whether the design of the building triggers thoughts about threats of terrorism.

Variation in the design of the facade	Variation in the level of terrorism threat	Texas (*n*=200)						Israel (*n*=162)						Both societies (*n*=362)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Glass	High	2.90	1.30	2.84	1.18	2.87	1.22	2.44	1.15	2.25	1.21	2.34	1.17	2.69	1.24	2.58	1.22	2.63	1.22
	Low	2.21	1.02	1.91	0.95	2.06	0.99	1.89	0.74	1.81	0.60	1.85	0.66	2.07	0.91	1.86	0.80	1.97	0.86
	Total	2.53	1.20	2.40	1.16	2.46	1.18	2.16	0.99	2.02	0.96	2.09	0.97	2.37	1.12	2.22	1.09	2.29	1.10
Solid	High	2.63	0.97	2.85	1.16	2.74	1.06	2.67	1.11	2.14	0.91	2.40	1.04	2.65	1.02	2.53	1.10	2.59	1.06
	Low	1.96	1.04	2.04	1.18	2.00	1.10	2.32	1.17	2.30	1.13	2.31	1.14	2.12	1.10	2.15	1.15	2.14	1.12
	Total	2.29	1.05	2.44	1.23	2.36	1.14	2.49	1.14	2.22	1.01	2.36	1.08	2.38	1.09	2.34	1.14	2.36	1.11
Total	High	2.75	1.12	2.84	1.16	2.80	1.13	2.56	1.12	2.20	1.05	2.37	1.10	2.67	1.12	2.55	1.15	2.61	1.13
	Low	2.08	1.03	1.98	1.07	2.03	1.04	2.12	1.01	2.05	0.92	2.09	0.96	2.10	1.01	2.01	1.00	2.05	1.00
	Total	2.40	1.12	2.42	1.19	2.41	1.15	2.34	1.08	2.12	0.99	2.23	1.04	2.37	1.10	2.29	1.11	2.33	1.10

Note. Values are based on responses to Question 9 in the questionnaire (Appendix A)

TABLE B-11. Study 2: Results of between-groups effects for the question on whether the design triggers thoughts about threats of terrorism.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*
Facade design	.57	1	.57	.50	.479
Level of terrorism threat	25.46	1	25.46	22.36	.000
Society	3.21	1	3.21	2.82	.094
Building-use	1.10	1	1.10	0.97	.325
Façade design * Level of terrorism threat	1.25	1	1.25	1.10	.295
Façade design * Society	2.79	1	2.79	2.45	.118
Level of terrorism threat * Society	5.10	1	5.10	4.48	.035
Façade design * Level of terrorism threat * Society	.59	1	.59	.51	.474
Façade design * Building-use	.21	1	.21	.18	.668
Level of terrorism threat * Building-use	.08	1	.08	.07	.789
Facade design * Level of terrorism threat * Building-use	.33	1	.33	.29	.593
Society * Building-use	.79	1	.79	.69	.406
Façade design * Society * Building-use	1.16	1	1.16	1.02	.314
Level of terrorism threat * Society * Building-use	1.36	1	1.36	1.19	.276
Façade design * Level of terrorism threat * Society * Building-use	.13	1	.13	.12	.734
Error	393.99	346			
Total	2403.00	362			

a R Squared = .104 (Adjusted R Squared = ..065)

TABLE B-12. Study 2: Means and standard deviations for the questions on how the ineffectiveness of the design in deterring terrorists.

Variation in the design of the facade	Variation in the level of terrorism threat	Texas (*n*=200)						Israel (*n*=162)						Both societies (*n*=362)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Glass	High	3.57	0.93	3.28	0.94	3.41	0.93	3.61	0.92	3.80	0.89	3.71	0.90	3.59	0.91	3.51	0.94	3.55	0.92
	Low	3.04	0.62	3.00	0.94	3.02	0.68	3.47	0.91	3.48	0.87	3.48	0.88	3.23	0.78	3.23	0.83	3.23	0.80
	Total	3.29	0.82	3.15	0.85	3.22	0.83	3.54	0.90	3.63	0.89	3.59	0.89	3.40	0.86	3.37	0.90	3.39	0.88
Solid	High	3.07	0.68	2.88	0.82	2.98	0.75	3.00	0.95	3.19	0.98	3.10	0.96	3.04	0.80	3.02	0.90	3.03	0.84
	Low	2.86	0.65	3.04	0.72	2.94	0.69	2.91	1.15	2.75	0.91	2.83	1.03	2.88	0.90	2.91	0.81	2.90	0.85
	Total	2.96	0.67	2.96	0.77	2.96	0.71	2.95	1.05	2.98	0.96	2.96	1.00	2.96	0.85	2.97	0.85	2.96	0.85
Total	High	3.29	0.83	3.08	0.89	3.18	0.86	3.28	0.97	3.49	0.98	3.39	0.97	3.29	0.89	3.26	0.95	3.27	0.92
	Low	2.94	0.64	3.02	0.72	2.98	0.68	3.17	1.07	3.12	0.95	3.15	1.01	3.04	0.86	3.07	0.83	3.05	0.84
	Total	3.11	0.72	3.05	0.81	3.08	0.78	3.23	1.02	3.30	0.98	3.27	0.97	3.16	0.88	3.16	0.90	3.16	0.89

Note. Values are based on responses to Question 10 in the questionnaire (Appendix A)

TABLE B-13. Study 2: Results of between-groups effects for the question on the ineffectiveness of the design in deterring terrorists.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*
Facade design	17.53	1	17.53	24.04	.000
Level of terrorism threat	4.84	1	4.84	6.64	.010
Society	2.98	1	2.98	4.08	.044
Building-use	.02	1	.02	.03	.870
Façade design * Level of terrorism threat	.64	1	.64	.87	.351
Façade design * Society	3.02	1	3.02	4.14	.043
Level of terrorism threat * Society	.02	1	.02	.03	.869
Façade design * Level of terrorism threat * Society	.93	1	.93	1.27	.260
Façade design * Building-use	.04	1	.04	.05	.820
Level of terrorism threat * Building-use	.01	1	.01	.01	.907
Facade design * Level of terrorism threat * Building-use	.00	1	.00	.00	.954
Society * Building-use	.44	1	.44	.61	.437
Façade design * Society * Building-use	.33	1	.33	.45	.503
Level of terrorism threat * Society * Building-use	1.86	1	1.86	2.55	.111
Façade design * Level of terrorism threat * Society * Building-use	.11	1	.11	.15	.695
Error	252.30	346	.73		
Total	3905.00	362			

a R Squared = .110 (Adjusted R Squared = .071)

TABLE B-14. Study 3: Means and standard deviations for how much security from terrorism occupies the mind.

Variation in the access control security measures	Variation in the design of the facade	Texas (*n*=228)						Israel (*n*=171)						Both societies (*n*=399)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Designed	Glass	3.16	1.41	2.48	1.38	2.83	1.42	3.65	1.14	3.91	1.28	3.79	1.21	3.38	1.30	3.20	1.50	3.29	1.40
	Solid	3.19	1.39	3.23	1.26	3.21	1.30	3.74	1.24	3.63	1.46	3.68	1.34	3.41	1.33	3.38	1.34	3.40	1.33
	Total	3.17	1.37	2.91	1.35	3.04	1.36	3.69	1.17	3.79	1.35	3.74	1.26	3.40	1.31	3.29	1.41	3.34	1.36
Temporary	Glass	3.63	1.38	3.38	1.42	3.50	1.39	2.80	1.32	3.67	1.44	3.27	1.44	3.30	1.40	3.50	1.42	3.41	1.41
	Solid	3.70	1.15	3.54	1.12	3.60	1.12	3.58	1.21	3.65	1.04	3.61	1.13	3.63	1.17	3.58	1.08	3.61	1.12
	Total	3.66	1.27	3.46	1.27	3.55	1.27	3.24	1.30	3.66	1.26	3.44	1.29	3.46	1.30	3.54	1.26	3.50	1.28
Total	Glass	3.42	1.40	3.02	1.46	3.21	1.44	3.22	1.29	3.79	1.35	3.53	1.35	3.34	1.35	3.37	1.46	3.35	1.40
	Solid	3.42	1.28	3.39	1.19	3.41	1.22	3.64	1.21	3.64	1.25	3.64	1.22	3.53	1.25	3.49	1.21	3.50	1.22
	Total	3.42	1.34	3.22	1.33	3.31	1.33	3.45	1.26	3.72	1.30	3.58	1.28	3.43	1.30	3.43	1.34	3.43	1.32

Note. Values are based on responses to Question 1.5 in the questionnaire (Appendix A)

TABLE B-15. Study 3: Means and standard deviations for the overall sense of insecurity.

Variation in the access control security measures	Variation in the design of the facade	Texas (*n*=228)						Israel (*n*=171)						Both societies (*n*=399)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Designed	Glass	3.02	1.02	2.78	0.90	2.91	0.96	2.93	0.69	3.02	0.68	2.98	0.68	2.98	0.88	2.90	0.80	2.94	0.84
	Solid	2.76	0.79	2.73	0.94	2.74	0.86	2.97	0.79	3.29	0.82	3.13	0.81	2.85	0.79	2.94	0.93	2.90	0.86
	Total	2.88	0.91	2.75	0.92	2.82	0.91	2.95	0.73	3.14	0.75	3.05	0.74	2.91	0.83	2.92	0.87	2.92	0.85
Temporary	Glass	2.67	0.80	2.74	0.99	2.70	0.90	2.43	0.69	3.19	0.67	2.84	0.78	2.57	0.76	2.92	0.90	2.76	0.85
	Solid	2.78	0.86	3.03	0.92	2.93	0.90	2.90	0.92	3.18	0.88	3.02	0.90	2.85	0.89	3.08	0.90	2.97	0.90
	Total	2.72	0.82	2.88	0.96	2.81	0.91	2.70	0.85	3.18	0.76	2.93	0.84	2.71	0.83	3.00	0.90	2.86	0.88
Total	Glass	2.83	0.91	2.75	0.95	2.79	0.93	2.68	0.73	3.11	0.68	2.91	0.73	2.76	0.84	2.91	0.85	2.84	0.85
	Solid	2.77	0.82	2.89	0.94	2.84	0.88	2.93	0.86	3.23	0.84	3.07	0.86	2.85	0.83	3.01	0.91	2.94	0.88
	Total	2.80	0.86	2.83	0.94	2.81	0.90	2.81	0.81	3.16	0.75	2.99	0.80	2.81	0.84	2.96	0.88	2.89	0.86

Note. The overall sense of security for each participant was calculated using the average of the response to Question 2 and the reversed value of the response to Questions 3 in the questionnaire (questions are detailed in Appendix A).

TABLE B-16. Study 3: Means and standard deviations for the state of anxiety.

Variation in the access control security measures	Variation in the design of the facade	Texas (*n*=228)						Israel (*n*=171)						Both societies (*n*=399)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Designed	Glass	47.68	18.10	46.74	14.85	47.23	16.46	48.40	4.47	48.09	5.91	48.23	5.23	48.00	13.70	47.41	11.19	47.70	12.43
	Solid	44.07	12.23	50.03	13.21	47.26	13.44	47.79	4.49	48.79	4.61	48.29	4.52	45.61	10.61	49.56	10.72	47.67	10.80
	Total	45.81	15.71	48.63	13.90	47.25	14.81	48.10	4.43	48.40	5.31	48.26	4.88	46.79	12.23	48.53	10.95	47.68	11.59
Temporary	Glass	49.07	11.35	43.29	12.84	46.00	12.42	47.05	5.33	48.38	4.81	47.77	5.03	48.26	9.39	45.40	10.55	46.72	10.09
	Solid	48.83	15.31	49.71	12.83	49.36	13.74	48.38	5.24	48.65	5.01	48.50	5.09	48.59	11.03	49.33	10.62	48.98	10.77
	Total	48.96	13.08	46.55	13.14	47.60	13.12	47.80	5.26	48.50	4.84	48.14	5.05	48.42	10.19	47.31	10.72	47.83	10.46
Total	Glass	48.44	14.68	44.68	13.66	46.53	14.23	47.73	4.90	48.23	5.32	48.00	5.11	48.14	11.57	46.29	10.83	47.17	11.20
	Solid	46.26	14.28	49.86	12.91	48.31	13.57	48.13	4.89	48.72	4.76	48.40	4.81	47.15	10.88	49.44	10.62	48.35	10.78
	Total	47.40	14.46	47.46	13.46	47.43	13.90	47.94	4.87	48.45	5.05	48.20	4.95	47.64	11.21	47.87	10.81	47.76	10.99

Note. The values for the overall score of anxiety state were calculated based on Spielberger, Gorsuch and Lushene's *Manual of the State-Trait Anxiety Inventory* (1970). The calculation is detailed in sub-section 4.2.3 Method.

TABLE B-17. Study 3: Means and standard deviations for the overall tendency to avoid entering the building.

Variation in the access control security measures	Variation in the design of the facade	Texas (*n*=228)						Israel (*n*=171)						Both societies (*n*=399)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Designed	Glass	276	1.02	2.68	0.84	2.72	0.93	2.37	0.72	2.80	0.84	2.60	0.81	2.59	0.91	2.74	0.83	2.66	0.87
	Solid	2.69	0.84	2.73	0.85	2.71	0.84	2.40	0.86	3.19	0.80	2.80	0.91	2.57	0.85	2.91	0.85	2.75	0.86
	Total	2.72	0.92	2.71	0.84	2.72	0.88	2.38	0.79	2.98	0.83	2.69	0.86	2.58	0.88	2.83	0.84	2.71	0.87
Temporary	Glass	2.60	0.69	2.50	0.78	2.55	0.74	2.00	0.5	2.63	0.82	2.34	0.80	2.36	0.73	2.55	0.79	2.46	0.77
	Solid	2.78	0.80	2.99	0.81	2.91	0.80	2.54	0.86	2.65	0.93	2.59	0.88	2.65	0.84	2.87	0.86	2.77	0.85
	Total	2.68	0.74	2.75	0.83	2.72	0.79	2.30	0.82	2.64	0.86	2.47	0.85	2.51	0.79	2.71	0.84	2.61	0.82
Total	Glass	2.67	0.85	2.57	0.81	2.62	0.83	2.18	0.70	2.71	0.82	2.47	0.81	2.47	0.82	2.63	0.81	2.55	0.82
	Solid	2.73	0.81	2.87	0.83	2.81	0.82	2.48	0.86	2.91	0.90	2.68	0.90	2.61	0.84	2.89	0.85	2.76	0.86
	Total	2.70	0.83	2.73	0.83	2.72	0.83	2.34	0.80	2.80	0.86	2.57	0.86	2.54	0.83	2.76	0.84	2.66	0.84

Note. The overall likelihood of entering the building for each participant was calculated using the average of responses to Question 4, Question 6 and the reversed value of the response to Questions 5 in the questionnaire (questions are detailed in Appendix A).

TABLE B-18. Study 3: Means and standard deviations for the question on how unsophisticated the security in the building is.

Variation in the access control security measures	Variation in the design of the facade	Texas (*n*=228)						Israel (*n*=171)						Both societies (*n*=399)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Designed	Glass	2.76	0.78	2.70	0.82	2.73	0.79	3.00	1.03	2.83	1.03	2.91	1.02	2.87	0.89	2.76	0.92	2.81	0.91
	Solid	2.89	1.31	2.87	0.81	2.88	1.06	3.26	1.15	2.58	0.90	2.92	1.08	3.04	1.25	2.76	0.85	2.90	1.06
	Total	2.83	1.08	2.80	0.81	2.81	0.95	3.13	1.08	2.71	0.97	2.91	1.04	2.96	1.08	2.76	0.88	2.86	0.99
Temporary	Glass	2.43	0.77	2.94	1.10	2.70	0.99	2.85	0.93	3.25	1.07	3.07	1.02	2.60	0.86	3.07	1.09	2.85	1.01
	Solid	3.13	1.22	2.91	1.01	3.00	1.09	3.12	0.99	3.10	0.97	3.11	0.97	3.12	1.09	2.98	0.99	3.05	1.04
	Total	2.74	1.04	2.93	1.05	2.84	1.05	3.00	0.97	3.18	1.02	3.09	0.99	2.86	1.01	3.03	1.04	2.95	1.03
Total	Glass	2.58	0.79	2.84	1.00	2.71	0.91	2.93	0.97	3.04	1.06	2.99	1.02	2.73	0.88	2.93	1.03	2.83	0.96
	Solid	3.00	1.26	2.89	0.91	2.94	1.07	3.18	1.05	2.85	0.96	3.02	1.02	3.08	1.16	2.88	0.93	2.98	1.05
	Total	2.78	1.06	2.87	0.95	2.83	1.00	3.06	1.02	2.95	1.02	3.01	1.02	2.91	1.05	2.90	0.98	2.90	1.01

Note. Values are based on responses to Question 8 in the questionnaire (Appendix A).

TABLE B-19. Study 3: Results of between-groups effects for the question on how unsophisticated the security in the building is.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*
Entrance design	1.09	1	1.09	1.08	.299
Facade design	1.84	1	1.84	1.82	.178
Society	2.73	1	2.73	2.71	.100
Building-use	.11	1	.11	.10	.747
Entrance design * Façade design	.33	1	.33	.32	.570
Entrance design * Society	.30	1	.30	.29	.588
Facade design * Society	1.07	1	1.07	1.06	.304
Entrance design * Façade design * Society	.11	1	.11	.11	.745
Entrance design * Building-use	3.92	1	3.92	3.90	.049
Façade design * Building-use	3.86	1	3.86	3.83	.051
Entrance design * Façade design * Building-use	.69	1	.69	.68	.410
Society * Building-use	.70	1	.70	.70	.405
Entrance design * Society * Building-use	1.13	1	1.13	1.13	.289
Façade design * Society * Building-use	.09	1	.09	.09	.762
Entrance design * Façade design * Society * Building-use	1.12	1	1.12	1.12	.291
Error	385.31	383	1.01		
Total	3771.00	399			

a R Squared = .047 (Adjusted R Squared = .010)

TABLE B-20. Study 3: Means and standard deviations for the questions on whether the design triggers thoughts about threats of terrorism.

Variation in the access control security measures	Variation in the design of the facade	Texas (*n*=228)						Israel (*n*=171)						Both societies (*n*=399)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Designed	Glass	2.56	1.12	2.57	0.99	2.56	1.05	2.60	1.05	1.96	0.98	2.26	1.05	2.58	1.08	2.26	1.02	2.42	1.06
	Solid	2.33	0.88	2.90	1.01	2.64	0.99	2.26	0.93	2.11	1.10	2.18	1.01	2.30	0.89	2.60	1.11	2.46	1.02
	Total	2.44	1.00	2.76	1.01	2.60	1.01	2.44	1.00	2.02	1.02	2.22	1.03	2.44	0.99	2.44	1.07	2.44	1.03
Temporary	Glass	2.87	0.90	2.85	1.28	2.86	1.11	2.15	0.88	1.96	0.99	2.05	0.94	2.58	0.95	2.48	1.25	2.53	1.12
	Solid	2.35	0.98	2.77	1.09	2.60	1.06	2.00	0.85	2.30	0.98	2.13	0.91	2.16	0.92	2.60	1.07	2.39	1.02
	Total	2.64	0.96	2.81	1.18	2.74	1.09	2.07	0.85	2.11	0.99	2.09	0.92	2.37	0.95	2.54	1.16	2.46	1.07
Total	Glass	2.73	1.01	2.74	1.17	2.73	1.09	2.38	0.98	1.96	0.98	2.15	1.00	2.58	1.01	2.38	1.15	2.48	1.09
	Solid	2.34	0.92	2.83	1.05	2.62	1.02	2.11	0.89	2.21	1.03	2.15	0.95	2.23	0.91	2.60	1.08	2.43	1.02
	Total	2.54	0.98	2.79	1.10	2.68	1.05	2.24	0.93	2.07	1.00	2.15	0.97	2.41	0.97	2.49	1.12	2.45	1.05

Note. Values are based on responses to Question 9 in the questionnaire (Appendix A).

TABLE B-21. Study 3: Results of between-groups effects for the question on whether the design triggers thoughts about threats of terrorism.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*
Entrance design	.00	1	.00	.00	.962
Facade design	.35	1	.35	.34	.558
Society	22.44	1	22.44	21.78	.000
Building-use	.13	1	.13	.12	.725
Entrance design * Façade design	.17	1	.17	.16	.689
Entrance design * Society	1.48	1	1.48	1.44	.231
Facade design * Society	.36	1	.36	.35	.553
Entrance design * Façade design * Society	1.79	1	1.79	1.74	.189
Entrance design * Building-use	.83	1	.83	.81	.370
Façade design * Building-use	5.88	1	5.88	5.71	.017
Entrance design * Façade design * Building-use	.02	1	.02	.02	.884
Society * Building-use	4.23	1	4.23	4.10	.044
Entrance design * Society * Building-use	1.73	1	1.73	1.68	.195
Façade design * Society * Building-use	.00	1	.00	.00	.976
Entrance design * Façade design * Society * Building-use	.03	1	.03	.03	.872
Error	394.58	383			
Total	2836.00	399			

a R Squared = .101 (Adjusted R Squared = .066)

TABLE B-22. Study 3: Means and standard deviations for the questions on the ineffectiveness of the design in deterring terrorists.

Variation in the access control security measures	Variation in the design of the facade	Texas (*n*=228)						Israel (*n*=171)						Both societies (*n*=399)					
		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses		City hall		Shopping mall		Both bldg. uses	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Designed	Glass	3.48	0.92	3.30	0.82	3.40	0.87	3.40	0.94	3.57	0.99	3.49	0.96	3.44	0.92	3.43	0.91	3.44	0.91
	Solid	3.26	0.76	2.97	0.84	3.10	0.81	3.42	0.90	3.00	1.05	3.21	0.99	3.33	0.82	2.98	0.92	3.15	0.88
	Total	3.37	0.84	3.11	0.84	3.24	0.85	3.41	0.91	3.31	1.05	3.36	0.98	3.38	0.87	3.20	0.94	3.29	0.91
Temporary	Glass	3.13	0.90	3.00	0.95	3.06	0.92	3.35	0.93	3.58	1.14	3.48	1.05	3.22	0.91	3.24	1.07	3.23	0.99
	Solid	2.96	0.64	3.20	0.87	3.10	0.79	2.77	0.86	3.35	0.88	3.02	0.91	2.86	0.76	3.25	0.87	3.07	0.84
	Total	3.06	0.80	3.10	0.91	3.08	0.86	3.02	0.93	3.48	1.02	3.24	1.00	3.04	0.86	3.25	0.97	3.15	0.92
Total	Glass	3.29	0.92	3.12	0.91	3.21	0.91	3.38	0.93	3.57	1.06	3.48	1.00	3.33	0.92	3.33	1.00	3.33	0.96
	Solid	3.12	0.72	3.09	0.85	3.10	0.80	3.04	0.93	3.18	0.97	3.11	0.94	3.08	0.82	3.12	0.90	3.11	0.86
	Total	3.21	0.83	3.11	0.88	3.33	0.92	3.20	0.94	3.40	1.03	3.30	0.99	3.21	0.88	3.22	0.95	3.22	0.92

Note. Values are based on responses to Question 10 in the questionnaire (Appendix A).

TABLE B-23. Study 3: Results of between-groups effects for the question on the ineffectiveness of the design in deterring terrorists.

Independent Variables	Type III Sum of Squares	df	Mean Square	*F*	*Sig.*
Entrance design	1.67	1	1.67	2.05	.153
Facade design	5.37	1	5.37	6.60	.011
Society	1.94	1	1.94	2.39	.123
Building-use	.06	1	.06	.08	.785
Entrance design * Façade design	.15	1	.15	.18	.674
Entrance design * Society	.23	1	.23	.28	.599
Facade design * Society	1.02	1	1.02	1.25	.264
Entrance design * Façade design * Society	1.09	1	1.09	1.33	.249
Entrance design * Building-use	4.07	1	4.07	5.00	.026
Façade design * Building-use	.00	1	.00	.00	.976
Entrance design * Façade design * Building-use	3.05	1	3.05	3.75	.054
Society * Building-use	1.26	1	1.26	1.54	.215
Entrance design * Society * Building-use	.36	1	.36	.45	.504
Façade design * Society * Building-use	.38	1	.38	.46	.458
Entrance design * Façade design * Society * Building-use	.29	1	.29	.36	.550
Error	311.92	383	.81		
Total	4459.00	399			

a R Squared = .065 (Adjusted R Squared = .028)

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