Assessing the Contribution of Gambling Venue Design Elements to Problem Gambling Behaviour

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Tale of Contents

Abstract

Structural characteristics of a gambling venue may moderate gambling behaviour (Griffiths & Parke, 2003). The goal of this project was to explore patterns of problem gambling that emerge from the interaction of variation in individual temperament (chronic emotion of individuals across a variety of settings) and variation in emotional reaction engendered by different types of gambling settings themselves. The second goal of this project was to test directly the hypothesis that casino design acts to moderate psychological determinants of gambling behaviour in different sectors of gamblers. Participants were categorized according to the Canadian Problem Gambling Index (CPGI; Ferris & Wynne, 2001), and measured along dimensions hypothesized to predict gambling (e.g., temperament; Mehrabian, 1996). The main theoretical framework guiding the identification of the critical environmental variables assumes that environments differ in the extent to which they elicit pleasure, arousal, and dominance (Mehrabian & Russell, 1974a), as well as in their information rate and restorative quality (Korpela & Hartig, 1996). In a set of preliminary studies (Finlay, Kanetkar, Londerville, & Marmurek, 2006), we have documented a contrast between two gambling environment designs: the playground design (Kranes, 1995) and the gaming design (Friedman, 2000). Playground designs afford higher levels of pleasure and restoration than do gaming designs, but they induce a higher intention to gamble irresponsibly. Results of the current research corroborate these findings. Overall, gambling intention for a playground design was predicted by restoration, CPGI scores, and whether the pleasure in the setting matched an individual's pleasure temperament. For a gaming design, only restoration and CPGI predicted irresponsible gambling intention. Five different décor variations within each of the playground and gaming designs were rendered into video simulations that were viewed by 484 gamblers and rated according to the emotions and behaviour intentions that the environments induced. Flashing lighting increased irresponsible gambling intentions regardless of a casino's macro design. Gamblers estimate that they are more likely to gamble beyond planned levels in a crowded casino. The use of a monotone colour scheme reduced the restorative quality of a gaming casino and increased gambling intention. Colour variations had no association with gambling intention in a playground casino. The grouping of slot machines with similar themes decreased psychological well-being for a playground design and increased gambling intention for a gaming design. Restoration increased with a symmetrical layout, but only for the gaming design. Implications for the design of casinos and the treatment of problem gambling are discussed.

Introduction

The goal of the current research was to examine how specific design elements of gambling environments may, for individuals with specific temperaments and gambling tendencies, influence emotions engendered within a gaming setting and consequently, problem gambling behaviour. Across two studies, the effects of six specific design elements were examined: rock music instead of ambient casino sounds; flashing versus static lighting as a décor feature; use of a monotone versus a bright and varied colour scheme; effects of a crowded casino compared to when fewer gamblers are present; clustering or grouping of machines with similar features and themes versus a random presentation of machines; and a design layout that is symmetrically rather than asymmetrically configured. Gambling tendencies were further examined depending on whether the emotions invoked by a specific situation matched or mismatched emotions chronically preferred by individual gamblers.

Environmental Effects

Studies of vulnerability to develop problem gambling behaviour have tended to focus on biological, social and emotional, cognitive, and gambling device factors, while neglecting the role of environmental variables. Yet environmental features may combine to "trigger" the cognitive and behavioural consequences underlying problem gambling (Sharpe & Tarrier, 1993). Impressionistic publications have pointed out that macro-environmental variables influence gaming behaviour (e.g., Earley, 2000), and the research community has begun to recognize the potential role of the environment as a moderator of problem gambling. Consider the following hypothesis embedded in the draft report of the Productivity Commission Inquiry into Australian Gambling Industries: "We are referring to environmentally induced conditions which contribute to disassociating the person from the reality of the time and money spent, altering the states of mood or level of arousal and facilitating the opportunity to chase losses" (Australian Bureau of Statistics, 1999, 15.47). However, there is scant empirical work addressing this hypothesis. For example, the effect of lighting on mood is well established (e.g., Knez, 1995), but there have been no comprehensive studies of lighting on gambling behaviour. Music (French vs. German) has been shown to influence the tendency for consumers to purchase French and German wine (North, Hargreaves, & McKendrick, 1999), yet the influence of music in casinos on gambling has not been studied systematically. Moon (2002) demonstrated that the effectiveness of an advertising message depends on whether the style of the content matches the personality of the recipient. The impact of a casino's design on gambling behaviour may similarly be related to whether it is tailored to the personality of the gambler.

The systematic empirical investigation of environmental effects on gambling has emerged as an important goal for understanding the conditions that contribute to sustained problem gambling (Griffiths & Parke, 2003). Caro (2003) has traced the history of Las Vegas gaming architecture as it transformed from functionality to focus on symbolism (Venturi, Brown, & Izenour, 1972). Also important for Caro was the interior structure. In early incarnations, the gaming venues provided "an intricate maze under the low ceiling," leading to the "separation of the occupant from temporal and spatial markers….space and time are defined by the game itself" (Caro, 2003, p. 3). More modern designs tend to integrate interior and exterior spaces as gaming institutions shift their "focus to the needs of the people that use and inhabit the buildings" (Caro, 2003, p. 4). Clearly, designers of gaming venues appreciate the influence of structural characteristics, but there is an absence of knowledge in the research community as to how the types of venues may impact differentially on the gambling behaviour of sub-types of gamblers.

Griffiths and Parke (2003) proposed that research frameworks should address the situational characteristics (e.g., sound effects, music, lighting and colour) that initiate and sustain gambling behaviour. They conjecture that that these physical environmental characteristics merit exploration because "excessive gambling can occur regardless of the gambler's biological and/or psychological constitution." The current study aimed to fill this gap by developing a systematic set of discriminating physical and environmental variables that may elicit emotions that differentially influence problem gambling behaviour. Some recent laboratory studies have begun to examine how structural features of the games themselves may be related to reported levels of enjoyment, excitement, tension-reduction, and desire to play again (Loba, Stewart, Klein, & Blackburn, 2002). Generally, Loba et al. (2002) found that sensory features of video lottery terminals (VLTs) had different effects on pathological (measured by the South Oaks Gambling Screen; SOGS) and non-pathological gamblers. For example, increasing the speed of play and using sounds increased excitement and enjoyment for pathological gamblers relative to non-pathological gamblers. Those conditions also promoted a greater desire to play again in the pathological gamblers.

The main theoretical framework guiding the identification of the critical environmental variables in the current research assumes that environments differ in the extent to which they elicit pleasure, arousal, and dominance (Mehrabian & Russell, 1974a), as well as in their information rate (Mehrabian & Russell, 1974b) and restorative quality (Korpela & Hartig, 1996; McKechnie, 1977).

A guiding hypothesis for the current project was that sub-types of gamblers (i.e., no risk, low risk, moderate risk, problem) vary in their preferences across different constellations of environmental variables. The matching of gambler sub-types and particular gambling scenarios will determine whether there will be a consequent over-engagement in gambling behaviour. For example, if gambling is a means to reduce stress (Coman, Burrows, & Evans, 1997), a mismatch between the preferred environment and the extant environment may induce stress that is relieved by excessive gambling for some gamblers and by avoidance in others. The documentation of such complex interactions may provide a framework for research and intervention.

Personality Effects

The centrality of the pleasure-arousal-dominance (PAD) dimensions to our research stems from the finding of Mehrabian (1996) that individuals have natural predispositions or temperaments to react to environments. Temperament is quantified in terms of pleasure, arousal, and dominance. Guided by the PAD framework, Mehrabian and his colleagues have shown that video game preferences (for males) are directly related to ratings of pleasure, arousal, and dominance (Mehrabian & Wixen, 1986). In particular, colours and sounds influenced pleasure, information rate influenced arousal, and player control options influenced dominance. Mehrabian and Wixen (1986) concluded "designs which enhance user arousal and dominance could help increase attractiveness" (p. 14). Temperament mediates emotional ratings of the environment (Mehrabian, 1995). For example, whereas there is a direct relation between ratings of experienced pleasure and ratings of situational arousal for high arousal seekers, the relation is negative for low arousal seekers.

Environment x Personality Interaction

Our goal is to identify how personality variables moderate the impact of macro environmental variables on gambling behaviour (Griffiths & Parke, 2003). In our preliminary studies (Finlay, Kanetkar, Londerville & Marmurek, 2006) we developed a macro environment classification scheme in consultation with architects that design gambling venues. We assessed the validity of that scheme with ratings of the venues *in situ* and ratings of video representations of the venues. We identified two competing approaches to effective casino design. Although well-known in the commercial gambling community, no empirical testing had been conducted on either of the two designs.

Playground Design. The first design type follows from Kranes (1995) who conceptualizes casinos as playgrounds; places where the activity (playing) should be conducted in an environment that is inviting and energizing, and that stimulates curiosity and exploration. Kranes (1995) proposes that appealing casinos are related to design elements that are pleasurably "legible" (instantly intelligible), inducing senses of order, freedom, and vitality. He argues that humans seek spaces where they feel centered and at home; spaces that empower and feel more rewarding, secure, natural, and intimate. Humans feel vital in an identifiable environment, thriving on sunlight, warm colours, the presence of accessible green space, and moving water (Kranes, 1995). It should be apparent that the "playground design" is compatible with the recent trends in Las Vegas (Caro, 2003). According to Kranes (personal conversations, June 8, 2003 and August 25, 2005), such casinos are located in the Bellagio, Mirage, Mandalay Bay, Flamingo, Rio, Venetian, and Wynn resorts.

Gaming Design. Friedman (2000) proposes that the design of a casino is related to functionality, and summarizes his perspective in "The Thirteen Winning Design Principles". These principles include, but are not limited to, the following: gambling equipment should be the dominant decorative feature in a casino, and décor should be used only to highlight and enhance the equipment layout; interior décor that is impressive, imposing, or memorable distracts from the gambling equipment; a maze layout of slot machines is better than long, wide, straight passageways and aisles because mazes produce secluded, intimate gambling areas; and low ceilings which leave little space between the tops of the gambling equipment and the ceiling create a sense of intimacy and a focus on gambling (Friedman, 2000). These principles are consistent with the traditional Las Vegas casino design (Caro, 2003). According to Friedman (2000), many casinos in downtown Las Vegas manifest this design, as do some Las Vegas Boulevard ("the strip") casinos, including Imperial Palace, the Riviera, and Circus Circus.

The present research tested the hypothesis that the effects of macro casino design (playground vs. gaming) on gambling intention may depend on variations along six specific décor dimensions, and on the emotional temperament of gamblers. Study 1 varied sounds in the casino: rock music versus ambient casino sounds. Study 2 tested five casino design variations: (1) lighting - flashing versus static lighting; (2) colour - monotone versus bright and varied colour scheme; (3) crowding - crowded casino compared to the presence of few gamblers; (4) machine clustering - physical grouping of machines with similar features and themes versus a random arrangement of machines; (5) symmetry - design layout that is symmetrically configured versus asymmetrically configured. The analysis of perceived gambling tendencies tested whether the emotions invoked by a specific situation matched or mismatched the emotions chronically preferred by individual gamblers.

We focused on two outcome variables: (1) restoration (extent to which a setting psychologically refreshes an individual facing a high level of environmental stress); and (2) intent to gamble irresponsibly (i.e., beyond planned or controllable levels). Restoration was assessed with the McKechnie (1977) measure of the extent to which a venue reduces anxiety. The second critical dependent measure, rated intent to gamble irresponsibly, was developed by the current researchers (Finlay et al., 2006). Our research has consistently demonstrated that, in the absence of any specific design variation, the playground design yields higher scores than the gaming design on environmental pleasure, restoration, and perceived likelihood of gambling irresponsibly.

Study 1: Research Design and Methodology

Research in multiple domains has established that simulations are valid representations of real situations and significantly predict performance in those domains (Bernhard & Preston, 2004; O'Connell, Hattrup, Doverspike, & Cober, 2002; Stamps, 1990). Four video simulations produced for a previous gambling study (Marmurek, Finlay, Kanetkar, & Londerville, 2005) were used to examine the effects of replacing ambient casino sounds with a rock music soundtrack. The four video simulations were defined by the factorial combination of casino design (playground vs. gaming) and sounds (ambient casino sounds vs. rock music). A sample of 104 gamblers (53% males) was recruited by posting signs in shopping malls, bars, and restaurants in a southern Ontario city located within easy access to five slot facilities. The signs invited individuals who liked to gamble to contact the researchers to arrange participation in a study of gambling. Participants received $30 for their participation. The mean age was 43 years and the median household income was $46,000 (the range was $6,000 to $120,000).

Participants were tested in groups of one to four individuals assigned randomly to view either two playground videos or two gaming videos. For both sets of playground and gaming videos, one featured natural gambling sounds and the other featured the music track. The order of the two types of sound videos (ambient or music) was counterbalanced. Following the viewing of each videotape, each participant completed the At-risk Gambling Intention Scale developed by the researchers (Finlay et al., 2006), the Restoration Scale (McKechnie, 1977), the PAD Environment Scale (Mehrabian & Russell, 1974a; Mehrabian, 1996), the Information Rate Scale (Mehrabian & Russell, 1974b), and the PAD Scale measuring the temperament dimensions of pleasure, arousal, and dominance (Mehrabian, 1996). The participants then completed The South Oaks Gambling Screen-Revised (SOGS-R)(Lesieur & Blume, 1993), and the Canadian Problem Gambling Index (CPGI)(Ferris & Wynne, 2001).

The Information Rate Scale is comprised of eight bipolar adjectives, including items such as varied-redundant, simple-complex, and patterned-random. Scores for each item range from - 4 to + 4. The Restoration Scale consists of eight items (for example, "spending time here gives me a break from my day-to-day routine") that are each rated for level of agreement on a 7-point scale. The Gambling Intention Scale consists of five statements, including: (1) "I would probably bet or play more than I wanted to at this place"; (2) "I would get drawn into other types of games I did not intend to play at this place"; (3) "I would have an uncontrollable urge to bet a lot of money at this place"; (4) "I would have trouble quitting without placing one more bet at this place"; and (5) "I would probably regret betting money at this place when I think about it later". Participants were required to indicate their level of agreement on a 7-point scale. The Cronbach's alpha coefficients for the information rate scale, restoration scale, and intention to gamble irresponsibly scale were .81, .87, and .91, respectively (see Appendix 1A).

For the PAD Environment Scale, participants were required to judge their feelings along a semantic differential scale, ranging from - 3 to +3. Participants were asked to try to get into the mood of the gambling simulation they had just viewed and rate the feelings that they might have experienced inside the venue. Sample adjective pairs for the three dimensions included: for pleasure, "annoyed-pleased" and "melancholic-contented"; for arousal, "relaxed-stimulated" and "sluggish-frenzied"; and for dominance, "submissive-dominant" and "controlled-controlling." Scale reliability coefficients for these three dimensions were .90, .82, and .31, respectively. As in our prior research, internal consistency was low for the dominance dimension.

The Pleasure Temperament Scale contained 22 bipolar adjective pairs. The adjectives were aligned with extreme values from - 4 to + 4. Participants indicated the degree to which their temperament corresponded with the adjective pairs by designating a number on the 9-point scale. Sample items assessing pleasure included, "angry….interested"; "scornful….happy"; "cruel….happy"; and "hateful….interested." Arousal and dominance were also measured on a 9-point scale anchored by - 4 and + 4. For these dimensions, the ratings indicated strength of agreement (i.e., - 4 is very weak agreement; +4 is very strong agreement) with the statements. Arousal statements included: "When I get stirred up, my heart beats fast and keeps on beating for a while"; and "I tend to relive exciting emotional episodes over and over again." The dominance statements included: "In general, across a variety of life situations, I am more likely to feel DOMINEERING than to feel TIMID"; and "I control others more than they control me." The coefficient alpha scores for pleasure, arousal, and dominance temperament were .95, .75, and .89, respectively (see Appendix 1A).

The CPGI (Ferris & Wynne, 2001) consists of nine items (Cronbach's alpha = .83) that identify four categories of participants: no problem; low risk; moderate risk; and problem. In the current sample, the frequency of participants per increasingly problematic category was 22, 24, 38, and 20, respectively. This distribution reflects the effectiveness of the recruitment technique in attracting people with gambling histories. Moreover, the distribution across high and low gambling categories did not differ across the experimental conditions, $X^2(3) = 3.84$, $p = .29$.

Study 1: Results

Appendix 1B presents the correlations among the dependent measures across all videos. The pattern of significant correlations confirms our previous findings (Finlay et al., 2006) that gambling intention is positively correlated with restoration, pleasure, and arousal. Information rate is negatively correlated with restoration and pleasure. Appendix 1B shows that pleasure temperament and gambling intention were positively correlated with CPGI scores.

Separate analyses of variance were conducted to test the effects of casino design and the sound manipulation on the dependent measures of emotion and gambling intention. Appendix 1C presents the means for these measures for each video and summarizes the statistical analyses. Mirroring our previous findings (Finlay et al., 2006, Marmurek et al., 2005), the main effects of design showed that the playground design yielded significantly higher scores than the gaming design on the following measures: restoration, $F(1, 200) = 10.96$, $p < .001$; pleasure, $F(1, 200) = 41.49$, $p < .001$; and information rate, $F(1, 200) = 65.70$, $p < .001$. The mean likelihood of gambling beyond planned levels was higher for the playground design than for the gaming design, but the difference was not statistically significant, $F(1, 200) = 1.92$, $p = .17$.

Replacing ambient casino sounds with rock music yielded a marginally significant main effect with higher ratings on perceived pleasure for rock music, $F(1, 197) = 3.49$, $p = .06$. The restoration scores were also higher for the rock music video, but the difference was not statistically significant, $F(1, 200) = 1.85$, $p = .18$. For information rate, there was a marginally significant two-way interaction between design and music, $F(1, 199) = 3.05$, $p = .08$. Perceived information rate decreased with music for the gaming design but increased for the playground design.

Study 1: Summary

Rock music (as opposed to ambient casino sounds) increases pleasure and restoration for both the playground and gaming designs. Overall, pleasure and restoration are positively related to irresponsible gambling intention. The relation between pleasure and irresponsible gambling is consistent with the positive correlation between those measures and the CPGI. Study 1 found that gambling intention was directionally higher for the rock music video, although the effect was not statistically significant. One implication of these results is that it is possible to increase pleasure and restoration with a concomitant strong negative impact on gambling behaviour.

Study 2: Research Design and Methodology

The production of video simulations in previous research was based on footage of Las Vegas casinos taped by the researchers and edited into playground and gaming scenarios by videographers at CtoC Productions in Kitchener, Ontario. For the current research, however, our methodology involved the scouting of sites and trial videotaping by the research team in Las Vegas prior to the arrival of CtoC Productions who shot all final footage. Over 4 days in June 2004, members of the research team accompanied CtoC Productions photographers during the casino videotaping. These pairings facilitated the identification of the best strategic choices of scenes within casinos that were representative of the desired manipulations. Footage was reviewed each day by the group and priorities were set for the next day of videotaping.

Seven variables were manipulated, yielding 28 video simulations (two levels of each of the seven variables in each of the two casino designs). The research team examined all 28 videos. Two series of edits were made before the team reached consensus on the five videos that successfully reflected their intended manipulations. Thus, there were 20 videos in the final set of experimental stimuli (two levels of five variables in each of the two casino designs; 2 x 5 x 2 design) that captured the following five manipulations:

1) flashing versus stationary lighting;
2) clustering versus random slot machine positioning;
3) symmetric versus asymmetric design features (horizontally or vertically symmetric layout; i.e., same pattern on top and bottom, or same pattern on each side);
4) crowded versus not crowded venue;
5) monotone versus complementary colour scheme (variety of colours).

Since videos were designed in the playground and gaming formats to include some common footage in order to establish the macro design of the venue (i.e., approximately 30% of the footage for each macro design), we sought to execute and verify the presence of the manipulation in the remaining 70% of each video within the two macro designs.

Ballot and Votestream Pre-Testing of Design Variables

The research team used Resolver wireless response units and associated technology to collect data in Study 2. Resolver offers two software programs: Ballot and Votestream. Ballot collects questionnaire data by presenting questions on a screen to groups of 3 to 10 respondents at a time. When instructed, individuals responded by pressing a number on wireless, hand-held units that corresponded to their answer for each question. Interval-scaled, multiple choice, and semantic differential questions were all posed using the technology. The second software program, Votestream, allowed participants to view our video simulations on a large screen while simultaneously punching a "1" or "3" button on their hand-held unit. These two buttons appear on the same horizontal line of the keypads, one on the left side and one on the right. Individuals provided a manipulation check for the casino videos by pressing "3" on the right side of the unit if they felt, for example, that the venue was "crowded with people", or conversely "1" on the left side of the unit when they considered the venue not to be "crowded with people." The output of this process is a new video of the casino simulation, superimposed with a moving line graph of the average responses over the three-minute duration of the video. The process was repeated for all 20 videos. This technology identified the segments of videos in which consumers perceived differences in each manipulation (e.g., non-flashing vs. flashing lights, crowded vs. not crowded).

Recruitment for the manipulation pre-testing followed the same procedure as described in Study 1. Respondents viewed the first video and provided interval-scaled responses using hand-held units and Ballot software to the three variables (irresponsible gambling intention, restoration, and pleasure) that served to distinguish the two macro designs in previous research. This procedure was repeated for a second video. Finally, respondents were shown two more videos and asked to simultaneously rate each on a moment-to-moment basis by pressing "3" or "1" to indicate whether the relevant manipulation was present or absent (e.g., flashing vs. static lights) as they watched the video.

Each of the videos was manipulation checked for its macro design (playground or gaming) using the interval-scaled data. Specifically, each video was checked on a moment-to-moment basis for its delivery of the relevant décor variation. CtoC Productions re-edited the videos based on the Votestream data, replacing any weaknesses in delivery of the décor variations to produce the strongest manipulations possible.

For the final study, separate groups were tested for each of the five décor variations (flashing vs. stationary lighting; clustering vs. random slot machine positioning; symmetric vs. asymmetric design features/layout; crowded vs. not crowded venue; and monotone vs. complementary colour scheme). Each participant viewed videos for only one of the five décor variations. Within each of these groups, there were two subgroups defined by level of décor variation (e.g., flashing lights vs. static lights). Participants (tested in groups of 3 to10) viewed two videotapes in each subgroup; one for the playground design and one for the gaming design. The order of the two design videos was counterbalanced. Thus, for each manipulation, the dependent measures were analyzed with a 2 (level of décor variation) x 2 (design: playground or gaming) mixed-factor ANOVA with design as the repeated-measures factor.

The participants were 484 gamblers and each received $30 as compensation. A sample of 364 individuals was recruited by posting signs near casinos, in malls, and at bars and restaurants in areas around the vicinity of Guelph, Ontario. The signs encouraged individuals that like to gamble to contact the researcher. These participants were tested in small groups (3-10 participants per group) in a mini theatre-style setting at the University of Guelph. An additional 85 respondents were recruited through a combination of community posters and newspaper advertisements in Niagara Falls, Ontario to attend a research session held at a meeting room (6-10 participants per session) in a Niagara Falls hotel. Finally, 36 respondents were approached (with permission from Niagara Fallsview Casino management and the Ontario Lottery and Gaming Corporation) to attend a research session (5-10 participants per session) held in a conference room at the Fallsview Casino's retail management office. Differences in the number of participants tested at a time were a function of the number of individuals that contacted us to participate in each session. Up to maximum of 10 participants attended each session to ensure satisfactory control. The percentages of gamblers in each of the four categories of gambler types are shown in Table 1 for each of the three recruitment methods.

Table 1. Percentage of Gambler Type by Recruitment Method

Gambler Type *	**Guelph vicinity-newspaper and poster advertisements *n* = 364**	**Niagara-recruitment-newspaper and poster ads *n* = 85**	**Niagara-participant exit solicitation at Fallsview Casino *n* = 36**	**Overall**
Non-problem	24	17	22	23
Low Risk	25	23	34	26
Moderate Risk	36	39	37	37
Problem	14	20	7	14

* categorized using the CPGI (Ferris &Wynne, 2001)

The instructions that were given to participants indicated that they were about to view a video of a casino. Participants were instructed to imagine themselves in the depicted casino setting, as they would later be asked how they would feel in such a setting. Following each video, participants completed the measures that were outlined in Study 1 (Gambling Intention Scale, Restoration Scale, PAD Environment Scale, and Information Rate Scale). For consistency in use with the Ballot software, the PAD environment scales were converted to + 1 to + 7 rather than the – 4 to + 4 scales used in Study 1. Additional measures that were used in Study 2 included an overall evaluation or liking of the casino simulation (e.g., "Please indicate how much you liked the gambling venue overall" and "Please indicate how interesting you find this gambling venue to be overall") and approach/avoidance reactions (e.g., "How much would you like to explore this place?" and "Would you try to avoid having to return to this place?"). The four component measures of restoration were also taken. To assess legibility, coherence, complexity, and mystery, participants were asked to indicate their agreement with the following statements on scales ranging from + 1 to + 7:

- legibility - “It was easy to find my way around the place” and “It was easy to find my way back to the entrance at any given point;”
- coherence - “The parts of this place seem well integrated;”
- complexity - “There is a lot going on in this place” and “There is a lot to look at in this place;”
- mystery - “This place promises more to be seen if you walk deeper in it” and ‘The place hides either positive or negative encounters that might lie ahead” (Kaplan & Kaplan, 1989).

After viewing and similarly indicating responses to a second video, participants completed the PAD temperament scale, CPGI, and other demographic indicators. Inter-item consistencies for all scales in Study 2 are provided in Appendix 2A.

Study 2: Results

Demographic details are summarized in Appendix 2B. The sample was evenly split by gender. Sixty percent of respondents were 19-45 years of age, 30% were 46-65 years of age, and almost 10% were 66 years of age or older. Education and income breakouts were reasonably distributed across the categories provided. In particular, 13% of the sample earned less that $15,000 per year (lowest category) and another 13% earned $95,000 or more per year (highest category).

Ratings of the neutral videos (static lighting, asymmetrical layout, low crowding, random machine arrangement, and monotone colour) corroborated our previous findings (Finlay et al., 2006; Marmurek et al., 2005) and those in Study 1 for main effects of casino design. As shown in Table 2, the means for gambling intention, restoration, and pleasure were all higher for the playground model than they were for the gaming model.

Table 2. Means (*SD*) for each Model shown in its Neutral Form

Factors	Playground Model	Gaming Model	*F*-test
Gambling Intention	3.74 (1.86)	3.37 (1.77)	$F(1,230) = 13.98, p < .01$
Restoration	4.67 (1.22)	3.96 (1.26)	$F(1,235) = 64.43, p < .01$
Environmental Pleasure	4.76 (1.20)	4.17 (1.27)	$F(1,235) = 46.36, p < .01$

Analyses by Décor Variation

Separate 2 (level of décor) x 2 (design) mixed ANOVAs, with design as the repeated measures variable, were run for each décor variation on each of the 12 dependent measures. The means and summaries of the analyses are presented in Appendix 2C.

Flashing Lights versus Stationary Lights

Flashing lights marginally increased gambling intention, $F(1, 90) = 2.87$, $p = .09$. Arousal increased with flashing lights, $F(1, 94) = 6.75$, $p = .01$, and the effect was marginally larger for the gaming design, $F(1, 94) = 3.62$, $p = .06$. Flashing lights also increased the sense of feeling dominated by the environment, $F(1, 94) = 14.14$, $p < .01$. This effect was also marginally larger for the gaming design, $F(1, 94) = 2.63$, $p = .11$.

Monotone versus Complementary Colour Scheme

Monotone colours led to higher gambling intentions than did complementary colours in the gaming design, but had no effect in the playground design, $F(1, 89) = 7.08$, $p < .01$. Monotone colours yielded higher liking scores across both designs, $F(1, 89) = 4.93$, $p =. 03$. However, monotone colouring increased approach scores for the gaming design, but decreased them for the playground design, $F(1, 89) = 7.18$, $p < .01$. Ratings of complexity and information rate were significantly higher for the monotone colour scheme than for the complementary colour scheme in the gaming design, but the reverse occurred in the playground design: for complexity, $F(1, 89) = 6.51$, $p < .01$, and for information rate, $F(1, 89) = 8.87$, $p < .01$.

Crowding

The main effect of crowding showed that gambling intention was higher for the crowded than the not crowded casino, $F(1, 110) = 4.51$, $p = .04$. Restoration also increased directionally with the crowding manipulation, $F(1, 110) = 2.60$, $p < .11$. Approach scores increased with crowding in the gaming design, but were not affected by crowding in the playground design, $F(1, 110) = 5.33$, $p = .02$. Information rate, on the other hand, decreased with crowding for the playground design and increased with crowding for the gaming design, $F(1, 110) = 4.42$, $p = .04$.

Symmetrical Layout

There were no significant main effects of symmetrical layout. There were four significant design x symmetry interactions. Symmetry decreased restoration for the playground design, but increased restoration for the gaming design, $F(1, 79) = 8.25$, $p < .01$). Similar patterns occurred for liking, $F(1, 79) = 5.71$, $p = .02$), pleasure, $F(1, 79) = 14.04$, $p < .01$), and information rate, $F(1, 79) = 5.58$, $p = .02$.

Chunking by Themes

There were several design x chunking interactions. Grouping slot machines with similar themes increased gambling intention for the gaming model, but had no effect on the playground model, $F(1, 101) = 4.00$, $p = .05$. Chunking led to lower scores on attitude, approach, pleasure, arousal, and legibility in the playground design, but had no effect on these variables in the gaming design. For coherence, chunking increased scores in the playground design, but decreased scores in the gaming design, $F(1, 101) = 13.10$, $p < .01$.

Study 2: Décor Manipulations Interpretation and Summary

The incremental arousal afforded by flashing lights in a casino setting should be avoided for both playground and gaming macro designs. Incremental arousal induced by flashing lights appears to aggravate poor decisions made by gamblers who may be chasing losses by betting more than planned, spending more money than planned, or engaging in unplanned additional games. This situation is more acute in the gaming model than the playground model.

Complementary colours appear to be more influential, perhaps more expected, and more likely to attenuate irresponsible gaming intentions in a gaming casino model. Monotone colours in a gaming setting may seem incongruent and sufficiently psychologically distressing to motivate unplanned gambling behaviour. Neither a monotone nor a bright colour scheme affected feelings and behavioural intentions in the playground model. The design of playground-type casinos is traditionally inspired by a greater variety of colour schemes, sometimes monotone in nature, and sometimes using brighter colours. The same is not true for a gaming design casino, which tends to rely on a complementary colour scheme. We had thought that a monotone scheme for the gaming model might motivate more serene feelings, increasing restoration and reducing the likelihood of gambling beyond planned levels. Instead, monotone colours stimulated gambling intentions, likely because they were unexpected in a gaming setting. Monotone or complementary colours can be used in a playground design, but a monotone colour scheme should be avoided for a gaming design casino.

A crowded casino motivates increased gambling beyond planned levels. The sociability aspect afforded by the presence of people may create the kind of involuntary attention to something with “soft fascination” (Kaplan & Kaplan, 1989) for gamblers, thereby partially refreshing their mental capacity that is strained by gambling. This conceptualization is consistent with the notion that "people like people," and individuals find the presence of others fascinating to observe. Gambling intention, however, also increases with crowding.

A symmetrical design layout negatively alters reactions on several dimensions that are key to the essence of the playground design. Pleasure, restoration, and overall liking all declined for the playground design with symmetry. The playground model inherently conveys harmony and well-being. A symmetrical layout appears to have attenuated fascination in the playground setting and, consequently, the transfer of positive emotions. The likelihood of gambling beyond planned levels in the playground casino did not change. Nevertheless, symmetrical layouts do not have a benefit within playground designs based on the analysis of supportive sentiments generated by the environment. For the traditional cluttered and random layout of the gaming design, symmetry was more salient; pleasure increased, as did overall attitude and restoration. Since gambling intention remained static, it is possible that the benefit of a symmetrical layout in a gaming casino is that it enhances individual psychological well-being without negatively impacting irresponsible gambling.

Grouping similar machines appears to have been more noticeable in a gaming casino than a playground casino. Since the layout of the gaming design is dense with machines and mazes of machines, grouping them by theme appears to have made it easier for patrons to decide where they want to play, thereby increasing gambling intention. On the other hand, when similar machines are consciously grouped together in a playground design, restoration, liking of the casino, approach, pleasure, arousal, and legibility all decreased, while gambling intention remained the same. Since the layout of the playground casino is already pleasing, the chunking of similar machines appears to have been too monotonous for patrons. Consequently, many positive psychological emotions experienced in the playground casino decreased even though this did not translate to a change in gambling intention.

Study 2: Effects of Matching and Mismatching Environment Ratings and Temperament

A scatterplot (see Appendix 2D) of individual environmental pleasure by pleasure temperament across the entire sample shows that, across both the playground and gaming simulations, most participants registered a match between their pleasure temperament and the pleasure they experienced in the gambling settings. Sixty-six percent of respondents reported that their natural predisposition with regards to pleasure was greater than the midpoint on the pleasure temperament score and environmental pleasure scale (i.e., > 4 on both of the 1-7 scales). Only 4% reported a match between environmental pleasure and pleasure temperament (i.e., > 4 on both of the 1-7 scales). Therefore, 70% of respondents reported a match between the pleasure they prefer to experience temperamentally and the pleasure induced by the gambling scenarios. Only 30% of respondents experienced a mismatch between their pleasure temperament and the pleasure induced by the gambling scenarios. Twenty-six percent specified that pleasure in the setting corresponded to less than the midpoint of the scale (i.e., < 4) while their pleasure predispositions were higher than the midpoint (i.e., > 4); the remaining 4% indicated the mismatch in the opposite direction.

For arousal, a slightly more even distribution resulted for individuals matching versus mismatching temperament to the gambling scenarios. Sixty-four percent of respondents recorded a match between environment and temperament on the arousal dimension. For the majority, both environmental arousal and arousal temperament were higher than the midpoint (i.e., > 4) of each scale (see Appendix 2E). A mismatch in environmental experience and temperament occurred for 36% of respondents.

Given the match-mismatch discrepancy for pleasure, a more specific examination was conducted of the playground versus the gaming macro designs. When rating the playground design, 74% of individuals rated a match between experienced environmental pleasure in a playground setting and pleasure temperament. For the majority (i.e., 71% of the 74%), both environmental and temperamental pleasure were higher than the midpoint (i.e., > 4) of each scale. Only 26% of gamblers indicated a mismatch between their own temperament and the pleasurable feelings induced by the playground setting. In the majority of cases, the pleasure felt in the playground setting was lower than they were seeking (see Appendix 2F). For the gaming design, it was equally likely that a match or mismatch between perceived environmental pleasure and pleasure disposition resulted (see Appendix 2G).

A series of linear regressions were conducted to determine which factors predicted irresponsible gambling intention for the playground design. A regression including restoration, whether environmental pleasure and pleasure temperament direction matched or mismatched, and CPGI as independent variables explained 29% of the variance in the data. All variables predicted intention (restoration standardized $\beta = .44$, $t = 11.09$, $p = .00$; CPGI $\beta = .29$, $t = 7.35$, $p = .00$ and pleasure match/mismatch $\beta = .07$, $t = 1.75$, $p = .07$). A similar regression on gambling intention for the gaming scenario explained 31% of data variance, with both CPGI and restoration as significant predictors, but not pleasure match/mismatch. The standardized β for CPGI was .24 and .43 for restoration ($t = 5.98$, $p = .00$ and $t = 9.92$, $p = .00$, respectively). The relationship between gambling intention for the two macro designs and CPGI is shown in Table 3.

Table 3. Gambling Intention Means (*SD*) for Macro Designs and CPGI

	Gambling Intention Means (*SD*)	
CPGI Category	**Gaming Model**	**Playground Model**
Non Problem	2.30 (1.43)	2.64 (1.65)
Low Risk	2.88 (1.57)	3.27 (1.57)
Moderate Risk	3.68 (1.83)	4.26 (1.82)
Problem	4.35 (1.75)	4.89 (1.77)
Total	3.26 (1.80)	3.73 (1.88)

Differences in ratings of environmental emotion and temperament across the four CPGI categories are provided in Appendix 2H. Problem gamblers indicated that they experienced more pleasure in the settings tested, felt more restored, felt the setting provided more mystery, was more complex, and they liked it better than gamblers in other categories.

A cross-tab of whether environmental pleasure matched/mismatched pleasure temperament was run across the four CPGI categories. Problem gamblers were more likely than expected to record a match between the pleasure in the settings they experienced and their personality with respect to pleasure, $X^2(9) = 21.34$, $p = .01$. Non-problem gamblers were more likely to record a mismatch (see Appendix 2I). For a similar analysis on the incidence of matching versus mismatching environmental arousal and arousal temperament, $X^2(9) = 13.82$, $p = .13$. Problem gamblers tended to be more likely to rate a match between desirable levels of arousal and the arousal experienced in the settings (see Appendix 2J), and non-problem gamblers tended to record more of a mismatch.

Discussion

Across four studies in the current research program, the playground design has consistently scored higher in restoration, pleasure, and gambling intention. This stability in findings validates our research methodology involving the use of video simulations to provoke emotions induced by gaming scenarios.

Restoration is a key variable in the study of the psychological effects of gambling environments on problem gambling behaviour. Lower levels of restoration help to explain problem gambling behaviour for a gaming macro design and high levels of restoration help to explain gambling intent for a playground design. An important goal of our research program is to identify manipulations that will increase or maintain a feeling of restoration, while decreasing irresponsible gambling intention. This was the case for the use of static lights in the current research.

In addition to restoration, the recognition of a match between one's own pleasure temperament and the pleasure encountered in a setting predicts one's likelihood of excess gambling within a playground-designed casino. The playground design is characterized by a higher degree of environmental pleasure than is experienced in the gaming design. Furthermore, the study participants drawn from a population of individuals with gambling interests tend to skew high in their aspirations towards experiencing pleasure. The match between personal pleasure temperament and the pleasure experienced in the playground setting partially drives the probability that individuals will gamble in excess in a playground setting.

Environmental and temperament matching, with respect to pleasure or arousal, had no significant influence on excessive gambling in a gaming design casino. Besides the lower restorative qualities of the gaming setting, the propensity to be a problem gambler is the only other variable explaining irresponsible gambling intentions. The lack of psychological rejuvenation or restoration aggravates the propensity to gamble beyond planned levels. Poorer gambling-related decisions are made more than expected, playing more games than planned or spending more than the allotted time.

Both casino macro designs can have harmful effects. The playground design rejuvenates so that gambling can continue beyond planned levels. The gaming design exhibits poor restorative qualities related to decisions about continuing to gamble. Research should identify décor variations within each design that reduce gambling intention and maintain psychological well-being, or conversely, hold gambling intention static while increasing psychological well-being.

The effectiveness of décor varies depending on the macro design of the casino with only two exceptions: a less dense crowd of people and the use of stationary rather than flashing lights. Both of these décor variations reduced gambling intentions for the playground and gaming macro designs. Individuals making the decision to frequent a gambling institution may be advised through their counsellor-driven treatment plans to avoid gaming areas characterized by excessive flashing lights and to visit casinos at less hectic time periods. Casino designers should avoid the use of flashing lights that may stimulate emotions that are detrimental to gamblers with problem tendencies. Conversely, specific rooms could be developed within casinos where only static lighting is used. Patrons that decide to not abstain from gambling, but instead attempt to moderate their behaviour, could be advised to gamble only in these particular gaming rooms.

The effects of the remaining three décor variables (i.e., monotone vs. complementary colour scheme, clustering vs. random slot machine positioning, and symmetric vs. asymmetric design features) vary depending on the macro design of the casino in which they were tested.

Due to its unexpected nature in a gaming casino, the use of a monotone colour scheme is detrimental to psychological well-being and the incidence of problem gambling. Only complementary colours should be used in the design of gaming-style casinos, whereas the use of colour appears to have little effect in playground design casinos.

The chunking or grouping of similar machines is not a positive décor feature for either macro design, but for different reasons in each case. Chunking appears to facilitate the identification of locations within a gaming design casino for patrons to gamble, thereby increasing intentions. For the playground design, the grouping of similar machines moderates fascination in the setting, resulting in a reduced level of rejuvenation.

For the gaming design, a symmetrical layout appeared to be a noticeable and positive departure from the norm. Positive effects were realized for restoration and pleasure with no lift in gambling intention. Symmetry, on the other hand, reduced the captivating qualities of the playground design, damaging the sense of renewal traditionally felt in these casinos. Casino designers should incorporate symmetrical dimensions in their layout when designing a gaming type venue.

Limitations

One major limitation of the current research is that our conclusions cannot be generalized to Ontario as we are not permitted to videotape in Ontario casinos. To the extent that our simulations capture the essence of Ontario casinos, the generalization will be valid. A second limitation concerns the use of simulations. While the videos may lack some of the richness of the in situ environment, we are confident that a simulated scenario will capture the psychologically relevant processes (Bornstein, 1999). Stamps (1990) reported a meta-analysis of literature on how well preferences for photographs of environments correlate with preferences of environments. Across 1,300 studies, he found an overall correlation of 86% between preferences obtained in situ and preferences obtained through photographs. Video simulations are judged a step closer to reality than are photographs. Furthermore, they are economical, feasible (in this case, while access to gaming floors for research purposes is not), and provide a reliable and valid approximation of the effects of the variables under study (Blomqvist, Luhtanen, Laakso, & Keskinen, 2000; Rohrmann & Bishop, 2002). Even imagined gambling situations create emotions that subserve problem gambling (Sharpe, 2004). Although there is general support for analogue studies (e.g., MacLin, Dixon, & Hayes, 1999; Floyd, Whelan, & Meyers, 2006), it is possible to enhance the correspondence with actual gambling venues by implementing virtual-reality technology. We are currently exploring the use of this methodology.

As is typical of studies on gambling, caveats precluding broad generalizations are warranted due to methodological limitations. For example, all the psychological indices relied on self-report measures rather than overt gambling behaviour. It should be noted, however, that Ladouceur, Jacques, Sévigny, and Cantinotti, (2005) showed that self-report measures yield stronger effects of experimental manipulations than do behavioural measures (e.g., number of games played, amount of money bet). The self-report data provide a substantive basis for confidence in the effectiveness of environmental manipulations.

The recruitment of participants was restricted to gamblers leading to relatively low participation rates for non-problem gamblers. Future research should aim to attract more evenly distributed representation across gambling severity sub-types. Generalizations across sub-culture and cross-national groups may also not be justified (McMillen, 2006).

An assumption of the current research is that spending more than planned is an at-risk gambling behaviour for all gamblers. Future research should examine whether the relationship between over-spending (time and money) and problem behaviour is linear. It may be that over-spending is not problematic for recreational gamblers. An alternate hypothesis is that problems escalate with levels of spending.

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Appendix 1

Appendix 1A: Reliability Estimates of Various Key Scales (Study 1)
n = 104

	Standard Coefficient Alpha - All Items	Items Removed	Items Included	Standard Coefficient Alpha – Remaining Items
Scales – Video				
Environment – Pleasure	.899	None	All 6 items	.899
Environment – Arousal	.821	None	All 6 items	.821
Environment – Dominance	.309	None	All 6 items	.309
Information Rate	.782	6, 7	1-5, 8-13	.822
Restorative	.784	4	1-3, 5-8	.844
Scales – Individual				
Individual – Trait Pleasure	.952	None	All 22 items	.952
Individual – Trait Arousal	.744	None	All 12 items	.744
Individual– Trait Dominance	.888	None	All	.888

Appendix 1B: Pearson Correlations among Dependent Measures (Study 1)

		CPGI	Intention	Enviro Pleasure	Enviro Arousal	Enviro Dominance	Info Rate	Restoration	Pleasure Tempera -ment	Arousal Tempera - ment	Dominance Tempera-ment
CPGI	Correlation	1	.206(*)	-.027	.184	.071	-.049	.029	.289(**)	.141	-.162
	Sig. (2-tailed)		.043	.791	.073	.496	.633	.776	.004	.160	.106
	N		97	97	96	95	97	97	100	100	100
Intention	Correlation		1	.108	.211(*)	-.159	-.012	.352(**)	.037	.100	-.071
	Sig. (2-tailed)			.281	.035	.116	.903	.000	.717	.320	.481
	N			101	100	99	101	101	100	100	100
Enviro Pleasure	Correlation			1	.077	.069	-.499(**)	.659(**)	-.074	.006	.002
	Sig. (2-tailed)				.445	.495	.000	.000	.466	.952	.985
	N				100	99	101	101	100	100	100
Enviro Arousal	Correlation				1	-.215(*)	-.145	.156	.027	-.036	-.118
	Sig. (2-tailed)					.032	.150	.121	.794	.725	.244
	N					99	100	100	99	99	99
Enviro Dominance	Correlation					1	.183	-.064	.063	.009	-.033
	Sig. (2-tailed)						.070	.530	.536	.933	.745
	N						99	99	98	98	98
INFO Rate	Correlation						1	-.359(**)	.109	-.073	-.018
	Sig. (2-tailed)							.000	.279	.470	.862
	N							101	100	100	100
Restoration	Correlation							1	-.121	-.061	-.060
	Sig. (2-tailed)								.232	.544	.555
	N								100	100	100
Pleasure Temperament	Correlation								1	-.059	-.247(*)
	Sig. (2-tailed)									.555	.012
	N									103	103
Arousal Temperament	Correlation									1	-.202(*)
	Sig. (2-tailed)										.041
	N										103
Dominance Temperament	Correlation										1

* Correlation is significant at the .05 level (2-tailed). ** Correlation is significant at the .01 level (2-tailed).

Appendix 1C: Summary of Means (*SD*) and *F*-Tests (Study 1)

			Playground		Gaming	
			Original	**Rock Music**	**Original**	**Rock Music**
SCALE	**MACRO DESIGN**		***n* = 34**	***n* = 34**	***n* = 18**	***n* = 18**
Gambling Intention Means			3.20 (1.73)	3.15 (1.43)	2.72 (1.37)	2.97 (1.87)
	ANOVA	Design	$F(1,200) = 1.97$, $p = .17$			
		Music	$F(1,200) = .18$, $p = .67$			
		D x M	$F(1,200) = .37$, $p = .54$			
Resorativeness Means			4.35 (1.26)	4.61 (1.19)	3.70 (1.44)	3.97 (1.27)
	ANOVA	Design	$F(1,200) = 10.96$, $p < .001$			
		Music	$F(1,200) = 1.85$, $p = .18$			
		D x M	$F(1,200) = .00$, $p = .97$			
Pleasure Means			1.06 (1.34)	1.30 (1.00)	-.30 (1.41)	.18 (1.21)
	ANOVA	Design	$F(1,197) = 41.40$, $p < .001$			
		Music	$F(1,197) = 3.49$, $p = .06$			
		D x M	$F(1,197) = .40$, $p = .53$			
Arousal Means			.47 (.99)	.70 (.99)	.44 (1.32)	.58 (1.13)
	ANOVA	Design	$F(1,196) = .21$, $p = .67$			
		Music	$F(1,196) = 1.29$, $p = .26$			
		D x M	$F(1,196) = .08$, $p = .77$			
Information Rate			.58 (1.27)	.42 (1.12)	-1.09 (1.12)	-.66 (.93)
	ANOVA	Design	$F(1,199) = 65.70$ $p < .001$			
		Music	$F(1,199) = .62$, $p = .43$			
		D x F	$F(1,199) = 3.05$ $p = .08$			

Design = Design Main Effect, Music= Music Manipulation Main Effect, D x M = Interaction between Design and Music.

Appendix 2

Appendix 2A: Reliability Estimates (Study 2)
n = 484

	Standardized Coefficient Alpha - All Items	Items Removed	Items Included	Standardized Coefficient Alpha – Remaining Items
Scales – Video Booklet				
Environment – Pleasure	.852	None	All 6 items	.852
Environment – Arousal	.783	None	All 6 items	.783
Environment – Dominance	.625	None	All 6 items	.625
Approach	.791	None	All 5 items	.791
Attitude	.843	None	All 3 items	.843
Information Rate	.623	6, 7	1-5, 8-13	.633
Restorative	.856	None	All 8 items	.856
Legibility	.719	None	Both 2 items	.719
Complexity	.619	None	Both items	.619
Mystery	.475	None	Both items	.475
Scales – Individual Booklet				
Individual – Trait Pleasure	.919	None	All 22 items	.919
Individual – Trait Arousal	.599	None	All 12 items	.599
Individual – Trait Dominance	.696	None	All	.696
CPGI	.857	None	All 9 items	.857

Appendix 2B: Demographic Details (Study 2)

Age in years	
Category	**Percent**
19-24	20.5
25-35	20.1
36-45	20.7
46-55	17.4
56-65	12.4
66+	8.9
Total	100.0

Occupation	
Category	**Percent**
Managerial, Professional	14.9
Technical, Sales, Admin.	14.5
Service	13.8
Farming, Forestry, Fish	.6
Crafts, Retail	3.9
Operator, Labourer	12.2
Student, Armed Forces	14.9
Not currently working	25.2
Total	100.0

Education	
Category	**Percent**
< High School	17.1
High School	41.9
College Degree	22.9
Undergraduate Degree	12.4
Graduate Degree	5.7
Total	100.00

Children Under 18 Years of Age	
Category	**Percent**
None	65.3
1 or 2	27.5
3 or more	7.2
Total	100.0

Employment Status	
Category	**Percent**
Part Time	18.6
Full Time	44.8
Neither - am not working	36.6
Total	100.0

Household Income	
Category	**Percent**
<$15,000	13.2
$15,001-$25,000	11.6
$25,001-$35,000	8.7
$35,001-$45,000	13.2
$45,001-$55,000	8.9
$55,001-$65,000	9.1
$65,001-$75,000	8.9
$75,001-$85,000	6.8
$85,001-$95,000	5.0
>$95,001	13.6
Did not answer	1.0
Total	100.0

Gender	
Category	**Percent**
Female	50.2
Male	49.8
Total	100.0

Appendix 2C: Manipulation Techniques

Flashing Lights Manipulation - Means (*SD*) and *F*-Tests (Study 2)

			Kranes (Playground)		**Friedman (Gaming)**	
			Static	**Flashing**	**Static**	**Flashing**
SCALE	**MACRO DESIGN**		***n* = 50**	***n* = 47**	***n* = 50**	***n* = 47**
Gambling Intention Means			3.61 (1.66)	4.14 (2.10)	2.94 (1.56)	3.61 (2.08)
	ANOVA	Design	*F*(1,90) = 14.13,*p* = .00			
		Flashing	*F* (1,90) = 2.87, *p* = .09			
		D x F	*F* (1,90) = .20, *p* = .65			
Resorativeness Means			4.70 (1.05)	4.49 (1.37)	3.89 (1.24)	3.86 (1.20)
	ANOVA	Design	*F* (1,95) = 40.8, *p* = .00			
		Flashing	*F* (1,95) = .30, *p* = .58			
		D x F	*F* (1,95) =.64, *p* = .43			
Attittude Means			5.27 (1.42)	5.21 (1.74)	3.92 (1.64)	4.12 (1.70)
	ANOVA	Design	*F* (1,95) = 39.17, *p* = .00			
		Flashing	*F* (1,95) = .07, *p* = .79			
		D x F	*F* (1,95) = .42, *p* = .52			
Approach Means			5.08 (1.39)	5.02 (1.44)	3.70 (1.26)	3.86 (1.33)
	ANOVA	Design	*F* (1,95) = 55.49, *p* = .00			
		Flashing	*F* (1,95) = .54, *p* = .82			
		D x F	*F* (1,95) = .41, *p* = .52			
Environment Means	Pleasure		4.79 (1.23)	4.70 (1.29)	4.07 (1.33)	4.15 (1.52)
	ANOVA	Design	*F* (1,95) = 22.33, *p* = .00			
		Flashing	*F* (1,95) = .01, *p* = .93			
		D x F	*F* (1,95) = .69 *p* = .41			
	Arousal		4.93 (.90)	5.19 (1.03)	4.16 (1.22)	4.90 (1.36)
	ANOVA	Design	*F* (1,94) = 17.05, *p* = .00			
		Flashing	*F* (1,94) = 6.75, *p* = .01			

SCALE	MACRO DESIGN		Kranes (Playground) Static *n* = 50	Kranes (Playground) Flashing *n* = 47	Friedman (Gaming) Static *n* = 50	Friedman (Gaming) Flashing *n* = 47
		D x F	*F* (1,94) = 3.62, *p* = .06			
	Dominance		3.99 (1.00)	4.34 (.77)	3.70 (.88)	4.41 (.85)
	ANOVA	Design	*F* (1,94) = .90, *p* = .34			
		Flashing	*F* (1,94) = 14.14, *p* = .00			
		D x F	*F* (1,94) = 2.63, *p* = .11			
Legibility Means			4.74 (1.49)	4.39 (1.44)	4.10 (1.42)	3.91 (1.50)
	ANOVA	Design	*F* (1,95) = 12.44, *p* = .001			
		Flashing	*F* (1,95) = 1.42, *p* = .24			
		D x F	*F* (1,95) = .25, *p* = .62			
Coherence Means			5.06 (1.25)	4.66 (1.70)	4.55 (1.34)	4.30 (1.53)
	ANOVA	Design	*F* (1,94) = 6.06, *p* = .20			
		Flashing	*F* (1,94) = 1.86, *p* = .18			
		D x F	*F* (1,94) = .17, *p* = .68			
Complexity Means			5.81 (1.16)	5.63 (1.85)	4.92 (1.69)	4.65 (2.00)
	ANOVA	Design	*F* (1,95) = 21.03, *p* = .00			
		Flashing	*F* (1,95) = .66, *p* = .42			
		D x F	*F* (1,95) = .05, *p* = .83			
Mystery Means			5.01 (1.32)	5.27 (1.43)	4.43 (1.37)	4.59 (1.56)
	ANOVA	Design	*F* (1,95) = 15.45, *p* = .00			
		Flashing	*F* (1,95) = .74, *p* = .39			
		D x F	*F* (1,95) = .10, *p* = .75			
Information Rate Means			3.88 (.69)	3.76 (.82)	3.23 (.72)	3.22 (.81)
	ANOVA	Design	*F* (1,94) = 43.13, *p* = .00			
		Flashing	*F* (1,94) = .28, *p* = .60			
		D x F	*F* (1,94) = .42, *p* = .52			

Colour Manipulation – Means (*SD*) and *F*-Tests for Key Dependent Measures

			Kranes - Playground		Friedman – Gaming	
			Analagous (Monotone)	Complementary (Bright)	Analagous (Monotone)	Complementary (Bright)
SCALE	**MACRO DESIGN**		***n* = 51**	***n* = 40**	***n* = 51**	***n* = 40**
Gambling Intention Means			3.60 (1.76)	3.75 (1.53)	3.49 (1.89)	2.82 (1.52)
	ANOVA	Design	*F*(1,89) = 11.81, *p* = .00			
		Colour	*F*(1,89) = .66, *p* = .42			
		D x CO	*F*(1,89) = 7.08, *p* = .01			
Resorativeness Means			4.56 (1.32)	4.66 (1.20)	4.10 (1.32)	3.75 (1.15)
	ANOVA	Design	*F*(1,89) = 24.48, *p* = .00			
		Colour	*F*(1,89) = .32, *p* = .58			
		D x CO	*F*(1,89) = 2.60, *p* = .11			
Attittude Means			5.56 (1.34)	5.09 (1.83)	4.52 (1.80)	3.79 (1.54)
	ANOVA	Design	*F*(1,89) = 30.13, *p* = .00			
		Colour	*F*(1,89) = 4.93 *p* = .03			
		D x CO	*F*(1,89) = .37 *p* = .54			
Approach Means			4.84 (1.78)	5.14 (1.24)	4.43 (1.31)	3.93 (1.28)
	ANOVA	Design	*F*(1,89) = 29.22, *p* = .00			
		Colour	*F*(1,89) = .23, *p* = .63			
		D x CO	*F*(1,89) = 7.18, *p* = .01			
Environment Means	Pleasure		4.86 (1.07)	4.88 (1.11)	4.34 (1.36)	3.90 (1.17)
	ANOVA	Design	*F*(1,89) = 29.94, *p* = .00			
		Colour	*F*(1,89) = .99, *p* = .32			
		D x CO	*F*(1,89) = 2.94, *p* = .09			
	Arousal		4.64 (1.07)	4.75 (1.02)	4.56 (1.26)	4.35 (1.09)
	ANOVA	Design	*F*(1,89) = 3.70, *p* = .06			
		Colour	*F*(1,89) = .06, *p* = .81			
		D x CO	*F*(1,89) = 1.56, *p* = .22			

SCALE	MACRO DESIGN		Kranes - Playground		Friedman – Gaming	
			Analagous (Monotone)	**Complementary (Bright)**	**Analagous (Monotone)**	**Complementary (Bright)**
			***n* = 51**	***n* = 40**	***n* = 51**	***n* = 40**
	Dominance		4.08 (.72)	4.13 (.67)	4.02 (.93)	4.01 (.65)
	ANOVA	Design	$F(1,89) = .77, p = .38$			
		Colour	$F(1,89) = .02, p = .88$			
		D x CO	$F(1,89) = .08, p = .77$			
Legibility Means			4.48 (1.86)	4.16 (1.68)	4.00 (1.77)	3.73 (1.46)
	ANOVA	Design	$F(1,89) = 5.32, p = .02$			
		Colour	$F(1,89) = .96, p = .33$			
		D x CO	$F(1,89) = .01, p = .91$			
Coherence Means			5.33 (1.44)	5.10 (1.66)	4.47 (1.64)	4.25 (1.72)
	ANOVA	Design	$F(1,89) = 14.81, p = .00$			
		Colour	$F(1,89) = .78, p = .38$			
		D x CO	$F(1,89) = .00, p = .98$			
Complexity Means			5.41 (1.47)	5.86 (1.14)	5.17 (1.47)	4.70 (1.54)
	ANOVA	Design	$F(1,89) = 15.33, p = .00$			
		Colour	$F(1,89) = .00, p = .97$			
		D x CO	$F(1,89) = 6.51, p = .01$			
Mystery Means			5.33 (1.34)	5.15 (1.27)	4.52 (1.54)	4.33 (1.28)
	ANOVA	Design	$F(1,89) = 21.20, p = .00$			
		Colour	$F(1,89) = .68, p = .41$			
		D x CO	$F(1,89) = .001, p = .98$			
Information Rate Means			3.89 (.74)	4.24 (.86)	3.75 (.71)	3.46 (.55)
	ANOVA	Design	$F(1,89) = 18.09, p = .00$			
		Colour	$F(1,89) = .06, p = .80$			
		D x CO	$F(1,89) = 8.87, p = .00$			

Crowding Manipulation – Means (*SD*) and *F*-Tests for Key Dependent Measures

SCALE	MACRO DESIGN		Kranes (Playground) Low *n* = 56	Kranes (Playground) High *n* = 56	Friedman (Gaming) Low *n* = 56	Friedman (Gaming) High *n* = 56
Gambling Intention Means			3.49 (1.94)	4.08 (1.96)	2.91 (1.73)	3.68 (1.82)
	ANOVA	Design	*F*(1,110) = 10.53,*p* = .00			
		Crowding	*F*(1,110) = 4.51,*p* = .04			
		D x CR	*F*(1,110) = .33, *p* = .57			
Resorativeness Means			4.54 (1.26)	4.83 (1.22)	3.62 (1.19)	3.98 (1.26)
	ANOVA	Design	*F*(1,110) = 51.37, *p* = .00			
		Crowding	*F*(1,110) = 2.60, *p* = .11			
		D x CR	*F*(1,110) = .07, *p* = .80			
Attittude Means			4.71 (1.83)	4.85 (1.87)	3.97 (1.83)	4.32 (1.54)
	ANOVA	Design	*F*(1,110) = 34.95, *p* = .00			
		Crowding	*F*(1,110) = .60, *p* = .44			
		D x CR	*F*(1,110) = .93 *p* = .34			
Approach Means			4.90 (1.20)	4.87 (1.41)	3.81 (1.27)	4.38 (1.31)
	ANOVA	Design	*F*(1,110) = 37.29, *p* = .00			
		Crowding	*F*(1,110) = 1.69, *p* = .20			
		D x CR	*F*(1,110) = 5.33, *p* = .02			
Environment Means	Pleasure		4.63 (1.09)	4.63 (1.26)	3.78 (1.26)	4.17 (1.28)
	ANOVA	Design	*F*(1,110) = 26.69, *p* = .00			
		Crowding	*F*(1,110) = 1.01, *p* = .32			
		D x CR	*F*(1,110) = 2.36, *p* = .13			
	Arousal		4.76 (1.14)	4.60 (.89)	4.55 (1.17)	4.54 (1.07)
	ANOVA	Design	*F*(1,110) = 1.53, *p* = .22			
		Crowding	*F*(1,110) = .21, *p* = .65			
		D x CR	*F*(1,110) = .46, *p* = .50			
	Dominance		3.99 (.91)	3.91 (.92)	3.90 (.81)	3.93 (.69)

SCALE	MACRO DESIGN		Kranes (Playground)		Friedman (Gaming)	
			Low	High	Low	High
			$n = 56$	$n = 56$	$n = 56$	$n = 56$
	ANOVA	Design	$F(1,110) = .11, p = .73$			
		Crowding	$F(1,110) = .03, p = .86$			
		D x CR	$F(1,110) = .38, p = .54$			
Legibility Means			4.39 (1.44)	4.74 (1.49)	3.91 (1.50)	4.10 (1.42)
	ANOVA	Design	$F(1,110) =12.44, p = .00$			
		Crowding	$F(1,110) = 1.41, p = .24$			
		D x CR	$F(1,110) = .25, p = .62$			
Coherence Means			5.07 (1.33)	5.18 (1.44)	4.63 (1.45)	4.30 (1.61)
	ANOVA	Design	$F(1,110) = 12.81, p = .00$			
		Crowding	$F(1,110) = .27, p = .60$			
		D x CR	$F(1,110) = 1.35, p = .25$			
Complexity Means			5.63 (1.35)	5.52 (1.57)	5.04 (1.46)	4.83 (1.62)
	ANOVA	Design	$F(1,110) = 16.84, p = .00$			
		Crowding	$F(1,110) = .44, p = .51$			
		D x CR	$F(1,110) = .10, p = .76$			
Mystery Means			5.06 (1.24)	5.11 (1.29)	4.27 (1.52)	4.44 (1.27)
	ANOVA	Design	$F(1,110) = 21.21, p = .00$			
		Crowding	$F(1,110) = .32, p = .57$			
		D x CR	$F(1,110) = .18, p = .67$			
Information Rate Means			4.11 (.79)	3.94 (.73)	3.45 (.65)	3.65 (.66)
	ANOVA	Design	$F(1,110) = 28.55, p = .00$			
		Crowding	$F(1,110) = .03, p = .87$			
		D x CR	$F(1,110) = 4.42, p = .04$			

Symmetry Manipulation – Means (*SD*) and *F*-Tests for Key Dependent Measures

			Kranes - Playground		Friedman - Gaming	
			Asymmetrical	Symmetrical	Asymmetrical	Symmetrical
SCALE	**MACRO DESIGN**		***n* = 30**	***n* = 51**	***n* = 30**	***n* = 51**
Gambling Intention Means			3.75 (1.99)	3.58 (1.92)	3.16 (1.74)	3.45 (1.93)
	ANOVA	Design	*F*(1,79) = 3.93,*p* = .05			
		Symmetry	*F*(1,79) = .02,*p* = .89			
		D x S	*F*(1,79) = 1.52, *p* = .21			
Resorativeness			4.83 (.94)	4.44 (1.41)	3.64 (1.10)	4.17 (1.27)
	ANOVA	Design	*F*(1,79) = 20.54, *p* = .00			
		Symmetry	*F*(1,79) = .09, *p* = .76			
		D x S	*F*(1,79) = 8.25, *p* = .01			
Attittude Means			5.72 (1.02)	5.21 (1.75)	3.75 (1.63)	4.38 (1.81)
	ANOVA	Design	*F*(1,79) = 34.03, *p* = .00			
		Symmetry	*F*(1,79) = .04, *p* = .84			
		D x S	*F*(1,79) = 5.71, *p* = .02			
Approach Means			4.54 (1.49)	4.60 (1.32)	4.18 (1.38)	4.18 (1.38)
	ANOVA	Design	*F*(1,79) = 8.75, *p* = .00			
		Symmetry	*F*(1,79) = .04, *p* = .84			
		D x S	*F*(1,79) = .05, *p* = .82			
Environment Means	Pleasure		5.09 (.98)	4.53 (1.38)	3.96 (1.19)	4.41 (1.32)
	ANOVA	Design	*F*(1,79) = 21.80, *p* = .00			
		Symmetry	*F*(1,79) = .05, *p* = .83			
		D x S	*F*(1,79) = 14.04, *p* = .00			
	Arousal		4.87 (.87)	4.76 (.97)	4.81 (1.10)	4.68 (1.00)
	ANOVA	Design	*F*(1,79) = .31, *p* = .580			
		Symmetry	*F*(1,79) = .42, *p* = .52			
		D x S	*F*(1,79) = .01, *p* = .94			
	Dominance		4.11 (.73)	3.73 (1.02)	4.03 (.88)	3.82 (.89)

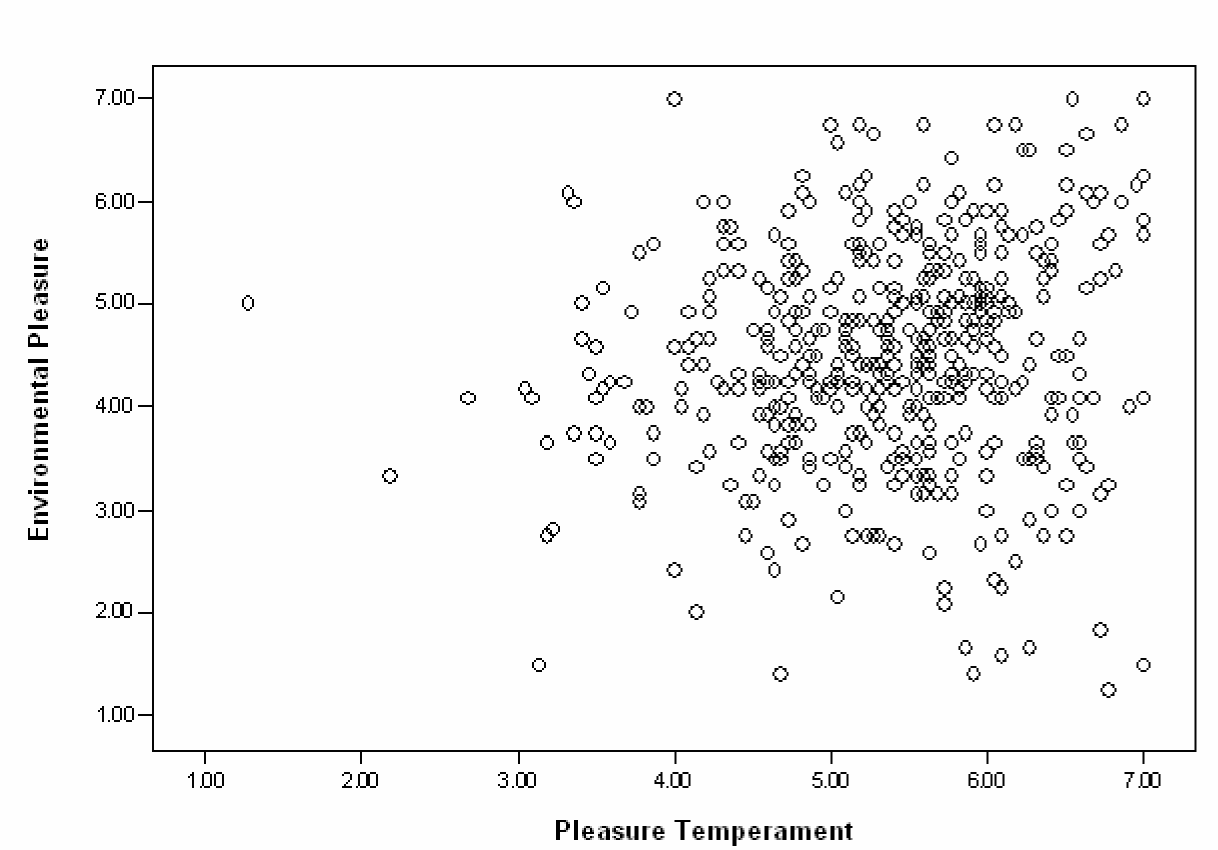
SCALE	MACRO DESIGN		Kranes - Playground Asymmetrical *n* = 30	Kranes - Playground Symmetrical *n* = 51	Friedman - Gaming Asymmetrical *n* = 30	Friedman - Gaming Symmetrical *n* = 51
	ANOVA	Design	*F*(1,79) = .01, *p* = .93			
		Symmetry	*F*(1,79) = 2.55, *p* = .11			
		D x S	*F*(1,79) = .74, *p* = .39			
Legibility Means			4.37 (1.77)	3.98 (1.68)	3.83 (1.57)	4.27 (1.78)
	ANOVA	Design	*F*(1,79) = .22, *p* = .64			
		Symmetry	*F*(1,79) = .01, *p* = .93			
		D x S	*F*(1,79) = 2.68, *p* = .11			
Coherence Means			5.60 (1.22)	4.92 (1.72)	4.23 (1.63)	4.67 (1.70)
	ANOVA	Design	*F*(1,79) = 9.75, *p* = .00			
		Symmetry	*F*(1,79) = .21, *p* = .65			
		D x S	*F*(1,79) = 4.58, *p* = .04			
Complexity Means			5.48 (1.29)	5.75 (1.36)	5.05 (1.54)	5.00 (1.57)
	ANOVA	Design	*F*(1,79) = 10.20, *p* = .00			
		Symmetry	*F*(1,79) = .16, *p* = .69			
		D x S	*F*(1,79) = .747, *p* = .390			
Mystery Means			5.22 (1.04)	5.32 (1.23)	4.53 (1.32)	4.94 (1.25)
	ANOVA	Design	*F*(1,79) = 10.83, *p* = .00			
		Symmetry	*F*(1,79) = 1.27, *p* = 0,26			
		D x S	*F*(1,79) = .86, *p* = .36			
Information Rate Means			4.02 (.83)	3.85 (.81)	3.36 (.69)	3.70 (.77)
	ANOVA	Design	*F*(1,79) = 13.81, *p* = .00			
		Symmetry	*F*(1,79) = .33, *p* = .57			
		D x S	*F*(1,79) = 5.58, *p* = .02			

Chunking Manipulation – Means (*SD*) and *F*-Tests for Key Dependent Measures

SCALE	MACRO DESIGN		Kranes Random *n* = 49	Kranes Chunked *n* = 54	Friedman Random *n* = 49	Friedman Chunked *n* = 54
Gambling Intention Means			3.69 (1.91)	3.62 (1.97)	2.93 (1.77)	3.46 (1.78)
	ANOVA	Design	*F*(1,101) = 9.66, *p* = .00			
		Chunking	*F*(1,101) = .48, *p* = .49			
		D x CH	*F*(1,101) = 4.00, *p* = .05			
Resorativeness Means (Std. Dev.)			5.10 (1.31)	4.49 (1.42)	4.19 (1.34)	4.08 (1.34)
	ANOVA	Design	*F*(1,101) = 22.66, *p* = .00			
		Chunking	*F*(1,101) = 2.46, *p* = .12			
		D x CH	*F*(1,101) = 3.23, *p* = .07			
Attittude Means			5.99 (1.01)	5.05 (1.80)	4.46 (1.76)	4.42 (1.79)
	ANOVA	Design	*F*(1,101) = 35.66, *p* = .00			
		Chunking	*F*(1,101) = 3.52, *p* = .06			
		D x CH	*F*(1,101) = 6.12 *p* = .02			
Approach Means			5.38 (.99)	4.75 (1.50)	4.32 (1.44)	4.48 (1.37)
	ANOVA	Design	*F*(1,101) = 16.43, *p* = .00			
		Chunking	*F*(1,101) = 1.37, *p* = .25			
		D x CH	*F*(1,101) = 5.71, *p* = .02			
Environment Means	Pleasure		5.43 (.98)	4.59 (1.34)	4.42 (1.31)	4.27 (1.17)
	ANOVA	Design	*F*(1,101) = 21.86, *p* = .00			
		Chunking	*F*(1,101) = 6.91, *p* = .01			
		D x CH	*F*(1,101) = 5.91, *p* = .02			
	Arousal		5.01 (1.05)	4.53 (1.05)	4.49 (1.19)	4.52 (.98)
	ANOVA	Design	*F*(1,101) = 6.44, *p* = .01			
		Chunking	*F*(1,101) = 1.49, *p* = .23			
		D x CH	*F*(1,101) = 6.11, *p* = .02			
	Dominance		3.91 (.82)	3.84 (.64)	3.73 (.85)	3.91 (.77)

SCALE	MACRO DESIGN		Kranes Random *n* = 49	Kranes Chunked *n* = 54	Friedman Random *n* = 49	Friedman Chunked *n* = 54
	ANOVA	Design	*F*(1,101) = .53, *p* = .47			
STUDY 1						
		Chunking	*F*(1,101) = .21, *p* = .65			
		D x CH	*F*(1,101) = 2.51, *p* = .12			
Legibility Means			4.96 (1.54)	4,19 (1.36)	4.34 (1.80)	4.39 (1.63)
	ANOVA	Design	*F*(1,101) =1.34, *p* = .22			
		Chunking	*F*(1,101) = 2.02, *p* = .16			
		D x CH	*F*(1,101) = 4.90, *p* = .03			
Coherence Means			4.86 (1.47)	5.72 (1.11)	5.02 (1.38)	4.23 (1.87)
	ANOVA	Design	*F*(1,101) = 7.89, *p* = .01			
		Chunking	*F*(1,101) = 1.41, *p* = .53			
		D x CH	*F*(1,101) = 13.10, *p* = .00			
Complexity Means			5.66 (1.39)	5.26 (1.59)	4.85 (1.79)	5.04 (1.58)
	ANOVA	Design	*F*(1,101) = 8.02, *p* = .01			
		Chunking	*F*(1,101) = .17, *p* = .68			
		D x CH	*F*(1,101) = 2.69, *p* = .10			
Mystery Means			5.29 (1.33)	5.10 (1.20)	4.81 (1.44)	4.89 (1.35)
	ANOVA	Design	*F*(1,101) = 4.80, *p* = .03			
		Chunking	*F*(1,101) = .07, *p* = .79			
		D x CH	*F*(1,101) = .74, *p* = .39			
Information Rate Means			3.84 (.90)	3.73 (.83)	3.48 (.68)	3.37 (.73)
	ANOVA	Design	*F*(1,101) = 13.84, *p* = .00			
		Chunking	*F*(1,101) = .80, *p* = .37			
		D x CH	*F*(1,101) = .00, *p* = .97			

Appendix 2D: Scatterplot of Environmental Pleasure and Pleasure Temperament



2D

Matching %'s:

Environmental Pleasure and Pleasure Temperament > 0: 4%
Environmental Pleasure and Pleasure Temperament ≤ 0: 66%

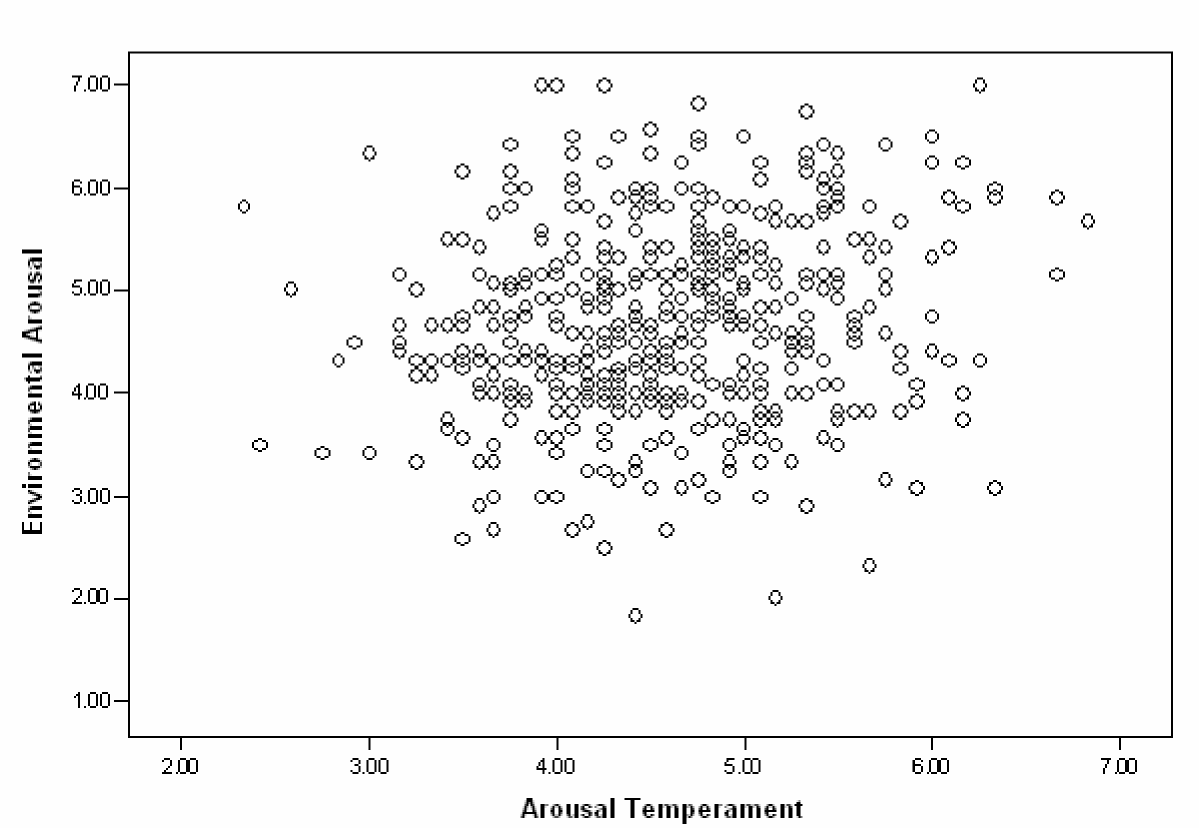
Total Match: 70%

Mis-matching %'s:

Environmental Pleasure > 0 and Pleasure Temperament ≤ 0: 4%
Environmental Pleasure ≤ 0 and Pleasure Temperament > 0: 26%

Total Mis-match: 30%

Appendix 2E: Scatterplot of Environmental Arousal and Arousal Temperament



Matching %'s:

Environmental Arousal and Arousal Temperament > 0: 7%
Environmental Arousal and Arousal Temperament ≤ 0: 57%

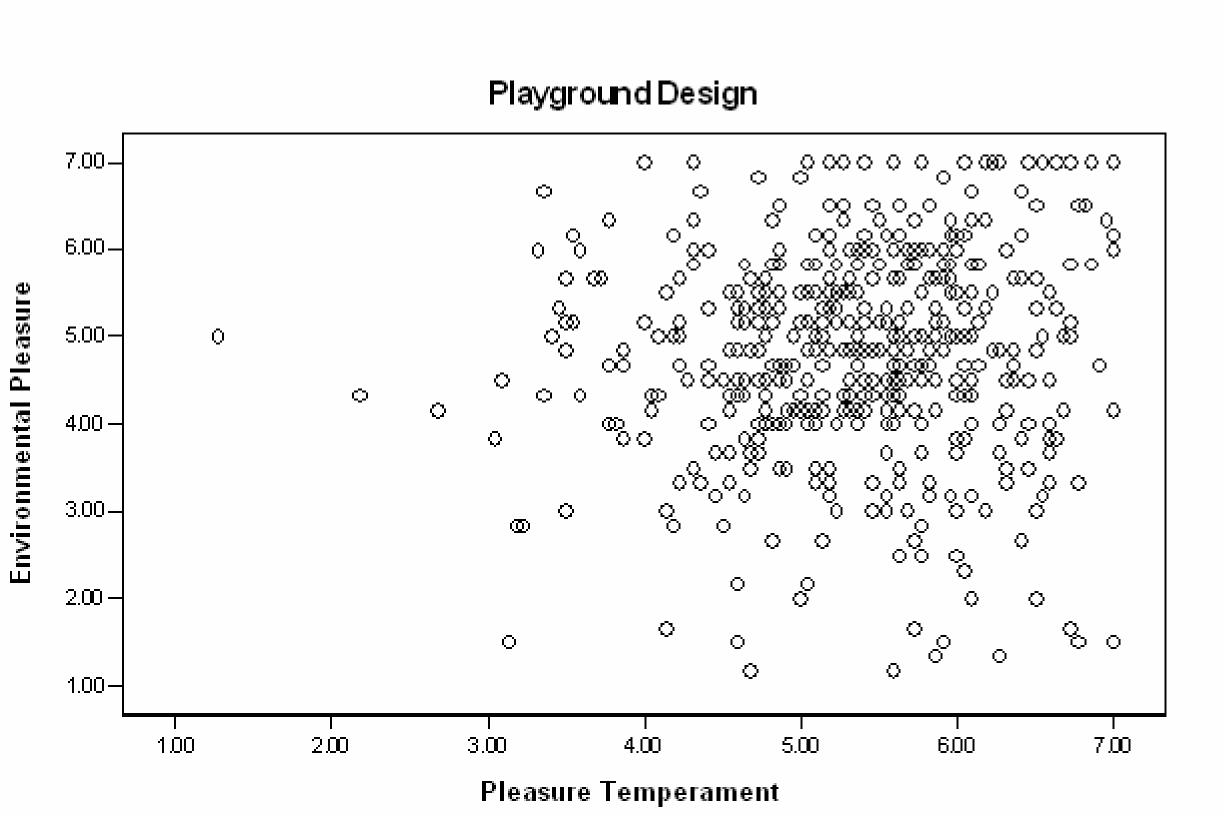
Total Match: 64%

Mis-matching %'s:

Environmental Arousal > 0 and Arousal Temperament ≤ 0: 18%
Environmental Arousal ≤ 0 and Arousal Temperament > 0: 18%

Total Mis-match: 36%

Appendix 2F: Scatterplot of Environmental Pleasure and Pleasure Temperament



Matching %'s:

Environmental Pleasure and Pleasure Temperament > 0: 3%
Environmental Pleasure and Pleasure Temperament ≤ 0: 71%

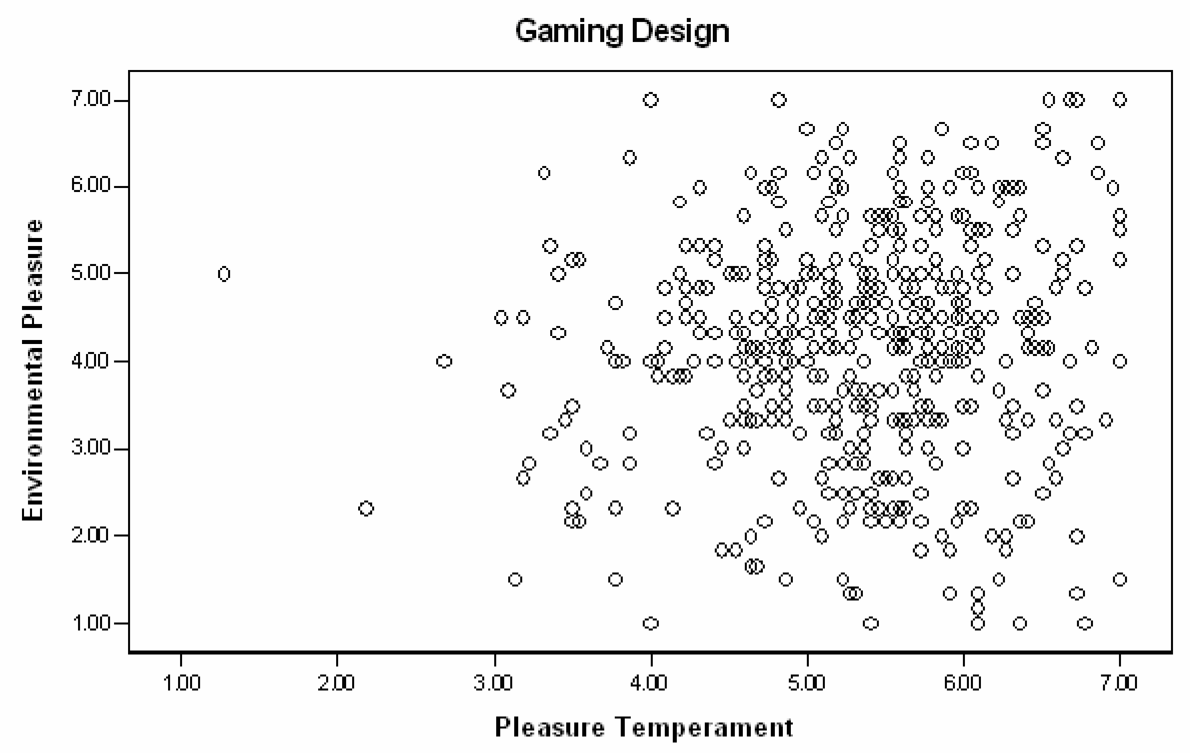
Total Match: 74%

Mis-matching %'s:

Environmental Pleasure > 0 and Pleasure Temperament ≤ 0: 5%
Environmental Pleasure ≤ 0 and Pleasure Temperament > 0: 21%

Total Mis-match: 26%

Appendix 2G: Scatterplot of Environmental Pleasure and Pleasure Temperament



Matching %'s:

Environmental Pleasure and Pleasure Temperament > 0: 5%
Environmental Pleasure and Pleasure Temperament ≤ 0: 53%

Total Match: 58%

Mis-matching %'s:

Environmental Pleasure > 0 and Pleasure Temperament ≤ 0: 3%
Environmental Pleasure ≤ 0 and Pleasure Temperament > 0: 39%

Total Mis-match: 42%

Appendix 2H: Cross-tabs of Pleasure Match and Mismatch Conditions by CPGI

			PLEASURE TRAIT AND PLEASURE ENVIRO GROUPS				
			MATCH both: ≤ 4	>4	MISMATCH E>4,T≤ 4	E≤ 4, T>4	Total
CPGICAT	1.00	Count	2	63	4	41	110
		Expected Count	4.1	72.9	4.3	28.7	110.0
		% within CPGICAT	1.8%	57.3%	3.6%	37.3%	100.0%
	2.00	Count	4	87	2	32	125
		Expected Count	4.7	82.8	4.9	32.6	125.0
		% within CPGICAT	3.2%	69.6%	1.6%	25.6%	100.0%
	3.00	Count	7	116	9	46	178
		Expected Count	6.6	117.9	7.0	46.4	178.0
		% within CPGICAT	3.9%	65.2%	5.1%	25.8%	100.0%
	4.00	Count	5	54	4	7	70
		Expected Count	2.6	46.4	2.8	18.3	70.0
		% within CPGICAT	7.1%	77.1%	5.7%	10.0%	100.0%
Total		Count	18	320	19	126	483
		Expected Count	18.0	320.0	19.0	126.0	483.0
		% within CPGICAT	3.7%	66.3%	3.9%	26.1%	100.0%

Note: E = Environmental pleasure; T = Pleasure Temperament (Trait)

CPGI Categories: 1 non problem gambler, 2 low risk gambler, 3 moderate risk gambler, 4 problem gambler

$X^2(9) = 21.34$, $p = .01$

Appendix 2I: Cross-tabs of Arousal Match and Mismatch Conditions by CPGI

			AROUSAL TRAIT AND AROUSAL ENVIRO GROUPS				
			MATCH both: ≤ 4	>4	MISMATCH E>4,T≤ 4	E≤ 4, T>4	Total
CPGICAT	1.00	Count	6	65	10	29	110
		Expected Count	8.0	62.3	19.4	20.3	110.0
		% within CPGICAT	5.5%	59.1%	9.1%	26.4%	100.0%
	2.00	Count	10	68	21	26	125
		Expected Count	9.1	70.8	22.0	23.1	125.0
		% within CPGICAT	8.0%	54.4%	16.8%	20.8%	100.0%
	3.00	Count	10	99	44	24	177
		Expected Count	12.9	100.3	31.2	32.7	177.0
		% within CPGICAT	5.6%	55.9%	24.9%	13.6%	100.0%
	4.00	Count	9	41	10	10	70
		Expected Count	5.1	39.6	12.3	12.9	70.0
		% within CPGICAT	12.9%	58.6%	14.3%	14.3%	100.0%
Total		Count	35	273	85	89	482
		Expected Count	35.0	273.0	85.0	89.0	482.0
		% within CPGICAT	7.3%	56.6%	17.6%	18.5%	100.0%

Note: E= Environmental arousal; T = Arousal Temperament (Trait)

CPGI Categories: 1 non problem gambler, 2 low risk gambler, 3 moderate risk gambler, 4 problem gambler

$X^2(9) = 21.87$, $p = .01$

Appendix 2J: Study 2: Means (*SD*) of Key Measures by CPGI Category

CPGI Category	No Risk (*N* = 110)	Low Risk (*N* = 125)	Moderate Risk (*N* = 178)	Problem Gambler (*N* = 70)	*F*-value *df* (3, 479), *p* value
Intention to Gamble Irresponsibly	2.45 (1.45)	3.07 (1.41)	3.95 (1.58)	4.62 (1.58)	39.4, < .0001
Information Rate	3.65 (.53)	3.78 (.58)	3.63 (.67)	3.73 (.60)	1.91, .13
Environmental Pleasure	4.18 (1.14)	4.36 (1.01)	4.58 (1.00)	4.88 (.98)	7.73, <.0001
Environmental Arousal	4.48 (.96)	4.52 (.85)	4.82 (.97)	4.79 (.91)	4.66, .003
Environmental Dominance	3.96 (.71)	3.95 (.72)	3.89 (.73)	4.13 (.72)	1.81, .14
Restoration	3.88 (1.13)	4.13 (.93)	4.41 (1.04)	5.01 (.97)	19.01, <.0001
Coherence	5.10 (2.45)	5.35 (2.23)	5.72 (2.67)	5.57 (2.17)	1.62, .18
Legibility	3.96 (1.37)	4.04 (1.27)	4.26 (1.34)	4.81 (1.33)	6.88, .0002
Mystery	4.63 (1.13)	4.71 (.94)	5.00 (1.09)	5.31 (1.03)	7.84, < .0001
Complexity	5.33 (1.32)	5.08 (1.17)	5.23 (1.27)	5.58 (1.18)	2.49, .06
Attitude (Liking of Environment)	4.41 (1.47)	4.48 (1.33)	4.88 (1.38)	5.24 (1.37)	7.05, .0001
Pleasure Temperament	5.58 (.81)	5.41 (.75)	5.17 (.89)	5.26 (.99)	5.84, .0006
Arousal Temperament	4.72 (.73)	4.60 (.75)	4.47 (.74)	4.47 (.76)	3.13, .03
Dominance Temperament	4.15 (.78)	4.30 (.80)	4.35 (.83)	4.03 (.93)	3.29, .02