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Advertising our “soldiers”; testing effectiveness of ingame advertising

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Contents

1.Abstract

This study assessed whether playing an arousing video game interfered with the memory of advertisements shown in a subsequent videogame. Participants playing an arousing videogame were hypothesized to have worse performance on a memory test for advertisements. The worse performance was tested by comparing a group of subjects who played an arousing videogame with a group of subjects who played a non arousing videogame. The results did not support the hypothesis; both groups had bad performance on the memory tests, no difference was found between both groups. An alternative explanation is given by a limited resource capacity model of attention. The model predicts that when participants have to attend to a primary task like playing the game they would not have sufficient resources left to attend to the secondary task which would be the advertisements.

2.Introduction

After years of playing videogames I recently stumbled across an article about in game advertising (IGA). IGA is advertising embedded into games where players for instance see a real world brand like coca cola on a virtual billboard or less obvious product placement such as a coca cola machine in the game world or cans of coca cola on a table while playing a videogame. In the aforementioned article several games which the author himself played, some quite vigorously, were mentioned. Much to my surprise several games I had played featured this form of advertising.

I could not remember any brand advertised in these games and soon began to wonder if others did remember the brands advertised in their favorite videogames. The use of advertising in videogames is increasing in frequency (e.g. more games feature them) and in amount spent on advertising. Relatively small in scale in comparison to other forms of advertising, for instance in 2008 the projected in-game advertising spending was 332.4 million dollars, compared to an estimated 154,070 million dollars spent on advertisement in magazines, radio and TV (NAA, 2005). Although not yet able to compare to the more regular outlets, projected spending on IGA is estimated to reach 971.3 million dollars in 2011 (Yankee group, 2005). With such increases in spending; a valid question concerns the effectiveness of advertising placed in videogames. If indeed gamers are like the author, this might be bad news for advertising companies and game developers alike. Much research into advertising on television (e.g. Gunther, 2007) or the internet (Donthu & Garcia, 1999) has been done, but relatively little research has been done into advertising into videogames, with examples being research into brand placement done by Lee and Faber (2007), who found poor results in brand memory (only 12% of brands were remembered) and Chaney, Lin and Chaney (2004) who found that half of the participants did not remember any brands placed inside the videogame.

Indeed brand placement has long been a form of advertisement used in videogames; one need only pick up a first person shooter to find Colt's signature rifle the M16 or Kalashnikov's assault rifle the AK-47. Racing simulators have always been a place to advertise car brands. But the inclusion of more visible advertising such as virtual billboards has been a more recent addition to IGA (An early example being the FIFA international soccer series, which has had billboard advertisement since 1994). In the past it was commonplace to include billboards of imaginary brands to first person shooters, but recently this has been changed to real life brands such as Nike and Ford paying for advertising space in videogames. Recently there have even been games announced and released which are free to play and where the developers receive revenue from the advertising in game (such as EA games battlefield heroes' game which is due to be released in September 2008). This

business model is quite common in other parts of the world such as Korea but is quite new to the western world.

In game advertising has been seen as a way for developers to create more revenue to offset growing development costs, development of a videogame for a 7th generation videogame console is projected to rise to an average of 20 million US dollar (13 million Euros). Advertisers on the other hand are attracted to video gaming because of its potential to target the 18-34 year old consumer market (Guardian, 2006; VGChartz.com, 2008). Estimates about gaming suggested that up to 75% of households between with males between ages 8 and 34 owned a video game system (be it pc or console) (Comscore, 2006). Developers furthermore welcome the concept of IGA since it allows them to develop better and more creative games, since advertising fees offset the cost and dangers of failure. In short IGA seems to be here to stay.

2.1 Excitation transfer

The concept of excitation transfer (Zillman, 1971) is a well known and relatively well researched concept, mainly in the realm of television and movies (e.g. Bushman & Bonnanci, 2002 ; Gunter, 2007). The idea of excitation transfer is relatively simple. When a person is excited or aroused by something this arousal will be carried over from one situation to the next, the adrenalin produced by arousal (Zillman, 1994) will remain active for a while. This arousal will then influence subsequent performance and actions. It can even lead to misattributions of emotions, such as when arousal is thought to come from another person instead of the situation (which is why maybe confessing to your lifelong love on a shaky bridge above a canyon or a rollercoaster may not be such a bad idea, (Meston & Frohlich, 2003).

When a person watches a movie or television program that is stimulating or arousing and is subsequently exposed to advertising the arousal the person has is bound to have an effect. Previous research done into the excitation transfer effect points to a detrimental effect for memory performance when trying to remember advertisements. (Bushman & Bonacci, 2001; Furnham, Gunter & Richardson, 2007;Parker & Furnham, 2007). The advertising shown after exciting and arousing programs or movies is usually remembered worse than advertisement shown in neutral programs or movies. This is of course not a mayor boon for advertising companies who have purchased advertising time right in the middle of an American super bowl match or the championship final of the UEFA cup.

Playing a videogame has also been found to be arousing (Barlett, Harris & Baldassaro 2007; Ivory & Kalyanaraman, 2007; Ravaja, Turpeinen & Saari ,2008) dependent of course on the subject of the game and the level of action or violence the game contains as well as the length of play (Bartlett et al, 2007). When a person playing a videogame is aroused this is also expected to have an effect on subsequent tasks or actions the person enacts, as is seen in television or movies (Zillman, 1971).

When confronted with advertising in a videogame the question is whether the arousal that the player has at that time has an effect on the advertisement perceived and in this study specifically the memory of the advertisement or more specifically whether arousal of the player will impede memory of said advertisement.

Games are specifically designed to let people take control of the action and to allow them to play through the stories like they are the main character themselves. One of the biggest genres in video games is the first person shooter, in which players are supposed to take control of an in game character and fight it out using either guns, swords or fists. Games like these have been shown to arouse players (Barlett et al 2007).

It should be noted however, that excitation transfer is a transient effect that fades rapidly. In fact duration of excitation transfer has been estimated to be around two and a half minutes (Mundorf, Zillmann & Drew, 1999). This is no problem in the traditional research on television advertisement since most adverts only last for twenty to thirty seconds, but exposure to advertising in videogames is for extended periods, lasting as long as the gamer decides to continue playing.

However, when showing advertisement in movies or television programs the advertisements are separate from the programming and viewers can calm down. While playing videogames, gamers continue to be aroused for as long as they continue to play the video game. This means that any excitation transfer effect while playing videogames will probably have a larger effect than in the more traditional media.

Comparing arousing and non arousing videogames however is very hard to do. Brands that are advertised in multiple videogames are presented in a very different manner in different videogames. In certain racing games for instance advertising can be found at the traditional locations, one the cars and on the sides of the road as well as billboards located above the road, but in a first person shooter advertisement is usually placed in less obvious locations, such as a vending machine for coca cola standing in the corner or a poster of an advertised brand pasted to the wall. Further difficulty in comparing advertisement in videogames is that advertisers usually pick one videogame or one videogame genre to place their adverts in (e.g. NIKE placing their advertisements in several action games). This of course leads to problems in keeping conditions for both experimental groups the same except in the variable of interest.

This leads us to use a method similar to research done in television advertising (e.g. Gunther, et al, 2007). Participants will first play an arousing or non arousing videogame that displays no advertising, followed by both groups playing a videogame that displays advertising. If indeed excitation transfer causes decrements in the memory for advertising, we expect the participants in the high arousal condition to perform worse on memory tests compared to the low arousal condition.

Also, given the short time the excitation transfer is thought to last (roughly two and a half minutes) we expect that memory for advertisements that are displayed early will be worse than for advertisements that will be displayed later on.

2.2 Choice of videogames

In this experiment the choice was made to use existing videogames for several reasons. Firstly development of a modern day videogame requires a lot of expertise in coding, scripting, graphics and more, without such extensive knowledge developing a believable videogame that is comparable to “real” video games is an impossible task. Secondly development of a videogame is a long process and can take up to six years to develop, which is furthermore done by teams of tens if not hundreds of people. Development of a videogame is a costly process as well. These factors did not make the development of a videogame a feasible option, and as such existing videogames were used in the current experiment.

The videogames used were a first person shooter, in which the objective is to shoot enemies to get to an objective safely, in this case the game Black was used and the objective was to cross a valley in to a nearby location. The valley in this case was occupied by enemies which had to be shot down in order to reach the objective. This game was chosen for the high arousal condition because of its emphasis on fast paced action. The game used in low arousal condition was World Championship Poker, in which the objective is to play a competitive poker game in order to get maximum profit.

The game in which the advertisement was displayed was Grant Turismo 4, a racing simulation. This game was chosen because of its relative ease of playing and the fact that advertising was clearly visible throughout the game. Furthermore the length of one round was lasted roughly two and a half minutes for each participant which was the required length of playing for the second game, all participants were able to complete the course once (and thus seeing all the advertisements displayed in game). Skill with videogames was not a requirement for participation in the experiment but was measured using a questionnaire to be able to distinguish novice and expert gamers.

2.3 Hypothesis

In light of the preceding discussion one might question the decision to include advertising in video games. If indeed the gamer is aroused and is thus unable to recall seeing any advertising, advertising would have a limited, if any, use in videogames.

Participants in this study will first either play an arousing or a non arousing game followed by a game in which advertising will be displayed. As stated before when one is aroused memory for advertisements following shortly after arousal will be impeded. This leads us to the hypothesis of this experiment:

> **H1:** *Participants playing an arousing videogame will perform worse on the subsequent memory tasks than participants playing a non arousing game.*

We will test this hypothesis by comparing a low arousal condition with a high arousal condition using a 1 (low arousal) x 1 (high arousal) research design.

3. Method

3.1 Participants

Fifty participants aged 18-31 (average age 21) were recruited from students from the University of Twente, one law student, two business students, thirty five undergraduate psychology students and furthermore twelve communications science students (TCW). There were twenty eight male participants and twenty two female participants. Participants received credits for their participation when they registered for the study via a website, forty five students received credits.

The remaining students did not receive any credits nor any other form of compensation for their participation in the experiment. No restraints were placed on the participants as long as they were able to hold a controller with both hands and play a videogame. No restraints were placed on participation in the experiment, previous videogame experience was measured by filling in a self report questionnaire about their previous videogame experience.

Participants were required to fill in an informed consent form before participating in the study. After that participants were randomly assigned to their respective conditions.

3.2 Apparatus

The game console used in this experiment is the Playstation 2 console supplied by Sony Computer Entertainment, the controller used is a standard PlayStation 2's DualShock 2 controller. The videogames the participants had to play are for the arousing condition: Black, a first person shooter produced by Criterion Games and published by EA Games for the neutral condition participants had to play World Championship Poker, a poker simulation, developed by Coresoft and published by Crave Entertainment. Both conditions played Gran Turismo IV; a racing simulator developed by Polyphony Digital and published by Sony Computer Entertainment. The participants played the game on a 21 inch Sony Trinitron television set at a refresh rate of 60 Hz.

3.3 Questionnaires

To test the effectiveness of IGA several questionnaires were developed for use in this experiment. The first questionnaire is an existing questionnaire, namely the Self Assessment manikin (SAM), a visual scale, which directly assesses the arousal, pleasure and dominance (whether participants felt in control of the situation or if they were being controlled) associated with an object or an event (Lang, 1980; Hodes, Cook, & Lang, 1985). Each of the three scales are formed by five figurines which each ranges from one emotion to the other. The pleasant –unpleasant scale for instance ranges from a happy smiling figurine to sad figurine. The participant can place an X below any of the five figurines as well as indicating an X between two of the figurines, thus giving nine scoring options to the participant. Participants thus indicated their current arousal, pleasure or dominance by choosing an answer on a nine point scale. Figure 1 illustrates the SAM used in this study.

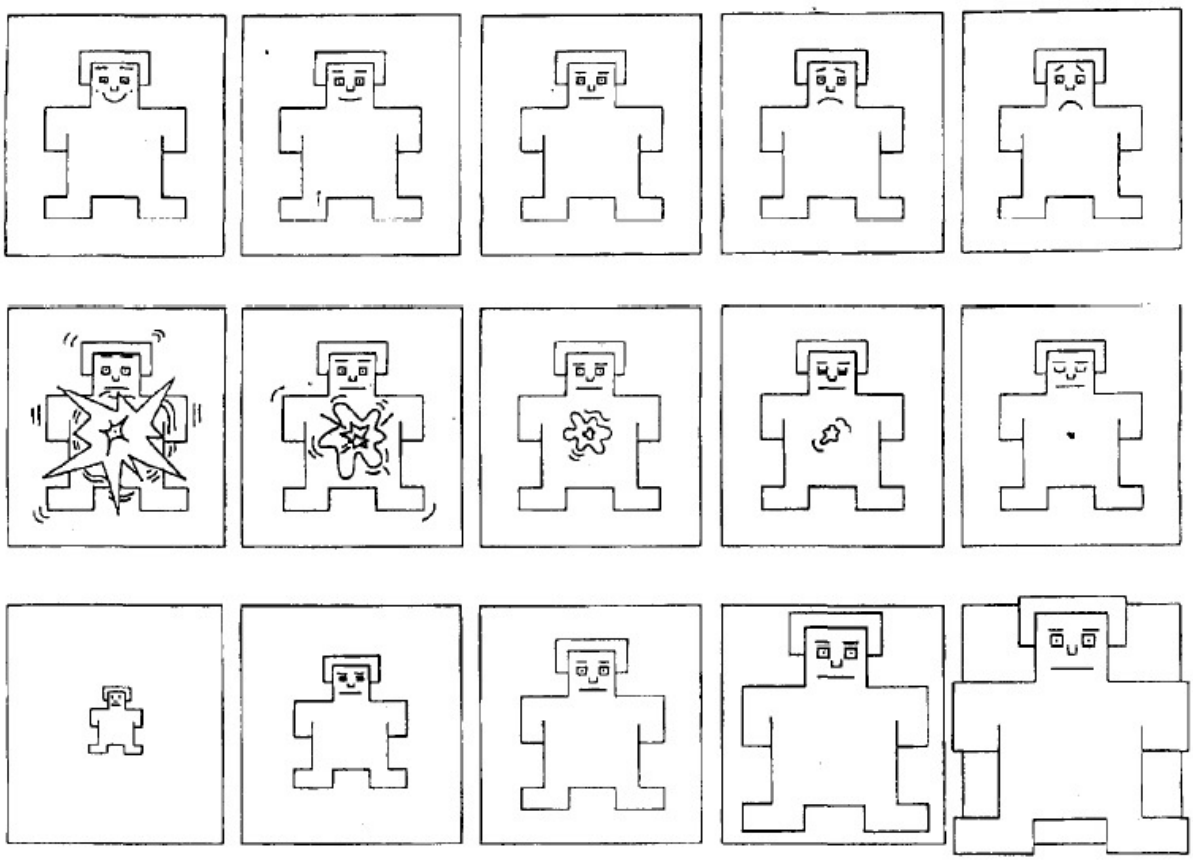


Figure 1. The self assessment manikin (SAM) used to measure valence (top panel), arousal (middle panel) and dominance (bottom panel)

The second questionnaire was a free recall questionnaire, participants had to indicate the number of advertisements they thought to have seen, followed by writing these advertisements down. Furthermore the participants had to write down the order in which these advertisements were seen to be able to check whether the effect of arousal subsided over time, and if it perhaps only influenced the beginning of playing the second game. The next questionnaire was a recognition questionnaire in which participants had to pick out brand names they had seen in the advertisements. Seven brand names advertised in game

were displayed among eighteen other randomly selected (related) brands and participants had to choose as many of these seven as they could. The recognition questionnaire was placed before the cued recall questionnaire with reason, firstly this order was used in other studies researching similar questions with television advertisements (e.g. Gunther et al, 2007) and secondly the cued recall cued the participants to certain brands before asking them to answer any questions, which means that if and when this questionnaire were to be used before the recognition questionnaire this would influence the results of the subsequent recognition questionnaire.

The third questionnaire was a cued recall questionnaire in which participants were cued with the brand name and had to answer multiple choice questions about these advertisements, such as what the main colour of the advertisement was, if there was a company logo in the advert or if the company motto was advertised in the advertisement. Fifteen of these multiple choice questions had to be answered. The last questionnaire was a questionnaire to check participant's previous gaming experience and knowledge. The first fifteen questions entailed previous console and game experiences as well as time spent playing videogames.

The next six questions were general video gaming knowledge questions in which participants had to answer open ended questions about video gaming in general such as what is a frag or what is a MMORPG. This was followed by four questions about racing in general to test familiarity with racing seeing the similarity between actual races and the videogame used. Participants in the low arousal condition were also asked to indicate their familiarity with playing poker. The questionnaires used in this study can be viewed in their entirety in Appendix A.

3.4 Task

Participants in this experiment were assigned to a high or a low arousal condition and the task for either condition was a little different. In the high arousal conditions participants had to play the first person shooter Black. They were told verbally to try and stay alive as long as possible and to play as best as possible. Participants who expressed concerns over their ability to play videogames were reassured that they simply needed to play as well as possible and that their actual performance did not really matter. If the participant died in the game he or she was instructed to restart the level. In the low arousal condition participants had to play a poker simulation in which they were instructed to stay in the game as long as possible, the game played was Texas hold em up with 2 card blind and a 1000 dollar pot.

Participants who were beaten in the game (lost all their money) were instructed to sit out the remainder off the game. After playing the videogames in either the low or high arousal conditions both groups had to play a round of Gran Turismo IV where they were simply instructed to finish the course as fast as possible. All participants received a brief instruction about the control scheme used in the game to ensure they would be able to interact with, and play the game.

3.5 Procedure

Verbal instructions to participants were given according to a standard protocol which was the same for all participants. After signing an informed consent form participants were told to play the videogame (dependent on the condition the participant was assigned to) for a total of seven minutes. After these seven minutes participants were verbally instructed to fill in the first SAM questionnaire. After they filled this out they were instructed to play the racing simulator which they were allowed to play for two and a half minutes (roughly 2 laps across the circuit, dependent on the ability of the participants) all participants were allowed to complete at least one lap.

After playing the second videogame the participants were told to fill in the remainder of the questionnaires. The standard order of these questionnaires was first the SAM after the first game, the second SAM after the second game and then the following questionnaires in order, the free recall questionnaire, the recognition questionnaire, the cued recall questionnaire followed at the end by the gaming aptitude and racing knowledge questionnaire. After this last questionnaire the participant was done and was thanked for his or her participation. Participants who wanted to know more about the experiment were told to leave their email addresses for further clarification.

3.6 Analysis

To ensure participants in the high arousal were actually aroused a MANOVA was used to compare scores on the SAM excitement scale in the first condition with scores for SAM excitement scale in the second condition. The score on the Excitement-Calm scale was used as a dependent variable; the condition the participants were in was used as an independent variable. Further analysis to investigate differences between SAM measures in the first and second measurement were done using a repeated measures MANOVA with the scores on the first and second as between subject variables and condition as between subject variables.

To analyze the results a between groups MANOVA was used comparing the two conditions taking performance on the free recall, recognition and cued recall as variables. The performances of interest were the results on several questions in the questionnaires. The first question of interest was the free recall question where participants had to write down the brands he or she remembered to see in the game they had just played.

The second question of interest was a question where participants were directed to write down the previous mentioned brands in the correct order in which they saw then. The third performance of interest was the correct amount recognized in the recognition questionnaire and the fourth performance of interest was the performance on the cued recall (multiple choice) questionnaire. For ease of notation these will subsequently be referred to as questionnaires. The results of the aptitude questionnaire were taken as concomitant variables. The concomitant variables that reached significance were subsequently analyzed

using MANOVA's with the performance on questionnaires as dependent variables and score on the concomitant variables as between subject variables. Errors were analyzed with a MANOVA taking errors as dependent variables and condition as between subjects variable.

Lastly comparisons between high and low experienced gamers as well as high and low experienced racing viewers were also done using MANOVA with performance on the questionnaires as dependent variables and classification of high or low experience as between subject variables.

4. Results

4.1 Manipulation Check

The participants in the high arousal condition (playing the first person shooter) were significantly more aroused (as measured with the SAM excitement scale) than the participants in the low arousal condition (playing the poker game) (F (1, 45) = 22.08, p < .01). When measured for the second time, both conditions no longer differed in arousal (F (1, 45) = 2.26, p = .14). This means that the manipulation was successful in creating a higher and a lower arousal group, at least when comparing the two this was analyzed by using a MANOVA with the scores on the SAM as dependent variables and condition as fixed factor.

To check whether playing the racing game was arousing as well the scores on the SAM aroused- calm scale before and after playing the racing game (the second videogame) were compared using a repeated measures MANOVA using the score before and after as between subject variables, and the condition as between subject variables. This analysis showed that there was no significant difference between arousal before and after playing the second videogame (F = (1, 48) = 1.82, p =.18) but there was a significant interaction between arousal and condition (F = (1, 48) 23.99, p <.01). This interaction means that while there is no significant difference in arousal between the high and low condition on the second measure, scores for the conditions are significantly different when compared to the scores on the first measure of the excitement scale. The interaction is shown in figure 2. further analysis of this interaction using one way ANOVA's showed that there was no significant difference between arousal in the high and low condition (F = (1, 48) = 2.03, p =.16) for the second measure.

The difference in arousal between low arousal condition before and after was significant (F = (2, 23) = 156.05, p <.01) the mean score for the low arousal group was M = 6.6, SD = 1.84, before playing the second videogame. The mean score after playing the game was M = 4.8, SD = 1.90. The fact that no significant difference was found between the low and high arousal condition on the arousal scale can be explained by the finding that there was also a significant difference in scores on the SAM arousal scale before and after playing the second videogame (F = (2,23) = 166.41, p<.01). The mean score for the high arousal condition before playing the videogame was M = 4.6, SD = 1.75, the mean score for the high arousal condition was M = 5.6, SD = 1.86. This means while the arousal off the low condition group rose (a higher score on this scale means you are less aroused, e.g. more calm) the arousal for the high condition group decreased.

As stated before this can explain the result found that there was no significant difference in the arousal scale on the second measure when comparing the conditions, while the arousal of the high condition was less for the second measure than for the first measure, arousal for the low condition was more for the second measure than the first measure. This means the scores for the high and low condition would be closer together on the second measure, thus showing no significant difference for the second measure. The difference in scores can be

observed in figure 2. The high arousal condition felt less arousal after playing the second videogame while the low arousal condition felt more. This could either mean that the second game was arousing for the low arousal condition or that the first game offered so little in terms of arousal the scores for the second measure was bound to be higher, but with the current data we cannot test either assumption.

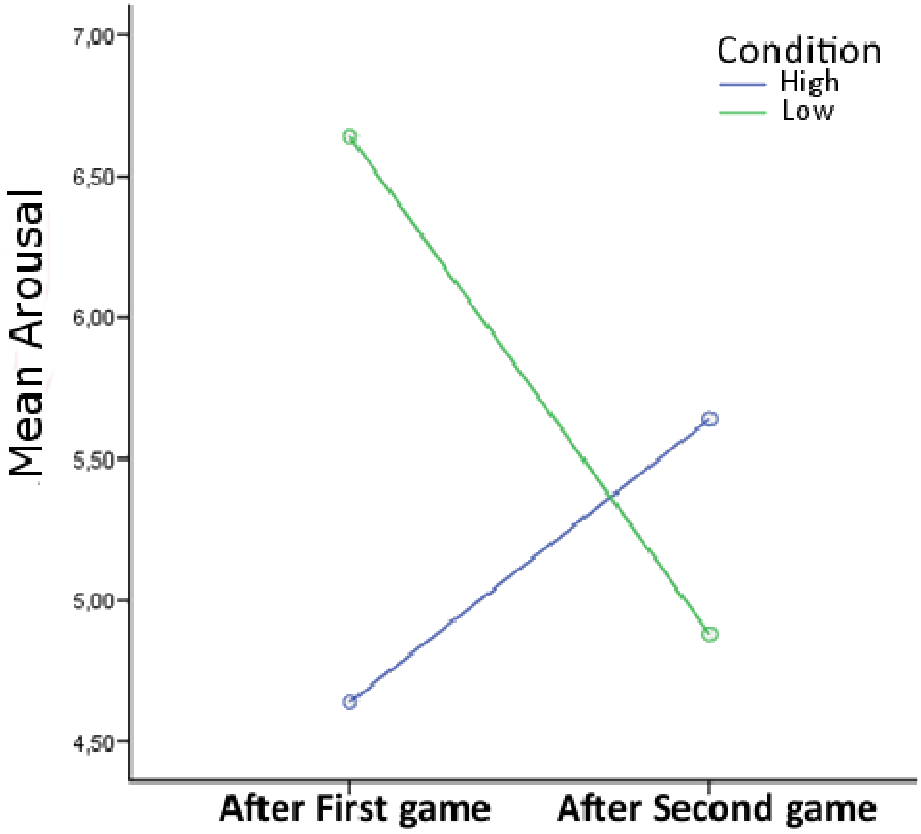


Figure 2. Differences in arousal between first and second measure of SAM, compared between high and low arousal condition.

Differences in the other two SAM scales used in this study were compared using repeated measures MANOVA's with the score on the first and second test being the within subject variables, and condition as a between subject variable. The pleasure- displeasure scale did not show a significant difference between the first and second measurement (F = (1, 48) = 0.14, p=.71), the interaction between pleasure and condition was also not found to be significant (F = (1, 48) = 2.41, p=.13).

A significant difference between the high and low arousal condition on the first SAM measurement was found however (F = (1, 48) = 11.52, p=.02). With mean score for the high condition being M = 3.8, SD = 1.63, and the mean score for the low arousal condition being

M=2.84, SD= 0.98. The low arousal condition thus indicated that they had more pleasure (lower score means more pleasure) than the high arousal condition. The scores on the dominance scale did not significantly differ before and after playing the second videogame (*F* = (1, 48) = 2.46, *p*=.12), there was no significant interaction between condition and dominance either (*F* = (1, 48) = 0.52, *p*=.43). The other significant effect found was that whether the participant watched racing had a significant effect on the first measure of the SAM pleasure- displeasure scale (*F* = (2, 44) = 3.21, *p*=.05)

4.2 Performance

The average amount of brands that participants remembered was M= 5.60, SD= 12.04. An analysis was done using a MANOVA with performance on the four questionnaires as dependent variables and condition as a fixed factor. Responses on the aptitude questionnaire about video gaming and racing experience were used as concomitant variables. All the concomitant variables used can be seen in Appendix B.

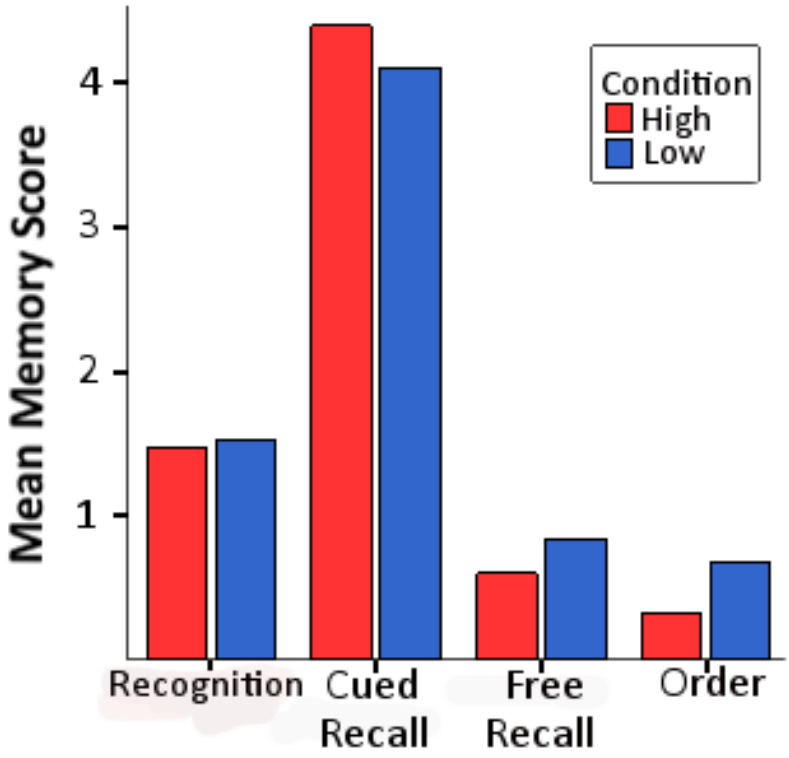


Figure 3. Differences in Mean arousal on the four questionnaires between the high and low arousal condition.

The actual amount of brands remembered however paints a different picture. When comparing the two conditions (high and low arousal) no significant difference was found between performance in the two conditions (*F* = (4, 16) = 0.41, *p* =.21). The two conditions

did not differ significantly when comparing the two for performance on the free recall questionnaire (F = (1, 19) = 1.22, p = .28) for the high arousal condition the average number of correct brands recalled was M = 0.42, SD = 0.228, for the low arousal condition the average score was M = 1.13, SD = 0.228. There was no significant difference between the two conditions on the number of brands put into correct order (F = (1, 19) = 0.12, p = .73) the average score for the high arousal condition was M = 0.34, SD = 0.215, the average score for the low arousal condition was M =0 .72, SD = 0.215. Average score can be seen in figure 2.

Performance on the multiple choice questionnaire did not significantly differ between groups either (F = (1, 19) = 1.10, p = .31). The average score for the high arousal condition was M = 3.91, SD = 0.642, the average score for the low arousal condition was M = 4.52, SD = 0.642. Performance on the cued recall did not significantly differ between the two conditions either, although this effect nearly reached significance (F = (1, 19) = 3.49, p = .08). The mean score for the high arousal condition was M = 0.9, SD = 0.363, the mean score for the low arousal condition was M = 2.12, SD = 0.363. Thus although the main effect was not found to be significant, the direction of the effect was as expected. The low arousal condition did score higher than the high arousal condition. A check was also done for age, gender and education, but none of these reached significance. (F = (4, 14) = 0.64, p = .64) for gender, (F = (16,43) = 0.49, p =.95) for age and (F = (4, 13) < 0.01, p = 1.00) for education. The brand that was mentioned the most was the brand Lotus, which was the brand of the car the participants drove in the car, this brand was mentioned by 23 of the participants, 10 times by participants in the high condition and 13 times by participants in the low arousal condition.

4.3 Errors

Errors on the multiple choice questionnaire were not analyzed further and neither were the errors on the recognition questionnaire or the order questionnaire. The amount of correct answer on the multiple choice questionnaire determined the amount of errors on the questionnaires, the same goes for the recognition questionnaire. The errors on the order questionnaire were determined by the answers given on the free recall questionnaire. Furthermore neither of these questionnaires reached significance (see the previous section). The only questionnaire where errors were truly independent of other questionnaires was the free recall questionnaire. Errors were analyzed using an ANOVA with error on the free recall as dependent variable and condition as between subject variable. The effect found was not significant (F = (2, 28) = 1.36, p=.27) but there was a tendency for participants in the high arousal condition to report more incorrect brands.

4.4 Co variants

Off the co variants used several reached significance, the grade that participants gave themselves (F = 4, 16) = 6.21, p <.01). Whether participants currently watched racing (F (4, 16) = 8.10, p <.01) or watched racing in the past (F (4, 16) = 6.41, p <.01) also reached significance. As did the amount of racing that was currently being watched (F (4, 16) = 7.61, p <.01) and the amount of racing watched in the past (F (4, 16) = 5.91, p <.01) which also reached significance. The amount of hours spent playing videogames neared significance (F (4, 16) = 2.66, p =.07) as did the amount of consoles owned by the participant (F (4, 16) = 2.969, p =.05), as these did not reach significance they were not analyzed any further.

The other covariant to reach significance was the score on the SAM pleasure- displeasure scale before (F (4, 16) = 5.28, p < .01) and after playing the racing game reached near significance (F (4, 16) = 2.64, p = .07). These effects were further analyzed to see what their influence is on the performance on the four questionnaires.

The direction and influence of co variants on the scores of the memory questionnaires were tested by using a MANOVA taking performance on the four questionnaires (free recall, recognition, cued recall and putting the brands into correct order) as dependent variables and taking the co variants as independent variables. Of the co variants used having watched racing in the past had a significant effect on the performance on the recall questionnaire (F = (1, 46) = 4.0, p=.05) those participants that had watched racing in the past tended to score higher on the recall questionnaire (M= 1.86, SD= 1.407, compared to M= 0.90, SD =0.87 for those that did not watch racing) when they were in the high arousal condition. When they were in the low arousal condition this effect was reversed, those that did not watch racing (M= 1.83, SD=1.74 compared to M= 1.23, SD = 1.23 for those who did watch racing) scored higher than those that did watch racing in the past.

The amount of racing watched in the past also had a significant effect on the recall questionnaire (F = (1, 46) = 4.37, p=.04). Those participants that watched more than two hours of racing in the past performed better when they were in the higher arousal condition than when they were in the low arousal condition. Those who watched less than two hours of racing performed better in the low arousal condition, scoring higher than those who watched more than two hours of racing. Furthermore those participants who watched more than two hours scored significantly higher on the multiple choice questionnaires than those who watched less than two hours (F = (1, 46) = 4.56, p=.04). None of the other co variants used in this study had a significant effect on any of the questionnaires, although there was a tendency for those who watched racing to score higher in the high arousal condition and lower in the low arousal condition.

4.5 Comparisons between gamers

To allow direct comparison between experienced and non experienced gamers a few transformations were done on the data from the aptitude questionnaire. Firstly all the respondents who answered “yes” on questions 1,3,5,7 and 8 were given one point, while participants answering no received 0 points. For questions 9, 10 and 11 participants were given one to four points, one for answering 1-2 and four points for answering 7-8 or 7+. For questions 2 4 and 6 the averages of all participants were taken and participants scoring above the average received 1 point while those scoring below the average would receive 0 points. For questions 12, 13 and 14 participants received one point if they indicated that they preferred gaming as their activity. For each open question that was answered correctly the participants received one point.

This enabled participants to receive a score ranging from a minimum of three to a maximum of 29. Average score was M = 12.82. Participants scoring more than 15 (15 and above) were classified as being experienced gamers while participants whom scored 14 or below were classified as being inexperienced gamers. This was done to allow direct comparison between experienced and inexperienced gamers. There were 32 inexperienced gamers in the current experiment and 18 more experienced gamers.

The racing questionnaire was given the same treatment, in that everyone who indicated that they watched racing or watched racing in the past was given one point while everyone whom indicated they did not watch racing were granted one point. When indicating time watched was 1-2 hours one point was awarded, and when indicated that time watched was 7-8 hours four points were given, this allowed participants to get a minimum of 2 points and a maximum of 10 points. Average score was M = 3.66, participants scoring lower than 5 (4 or below) this were classified as inexperienced in watching races, participants scoring higher than 5 were classified as experienced in watching races. As with the classing of gamers as high or low experience this allowed direct comparison of people experienced in watching races and people inexperienced in watching races.

When comparing experienced gamers and inexperienced gamers for their memory concerning advertising, experienced gamers did perform better than the inexperienced group but this effect did not reach significance (F = (4, 45) =0.64 , p=.64) this was analyzed using a MANOVA with performance on the four questionnaires as dependent variables and the experience of the gamer as a fixed factor. The same kind of analysis was done for the experience in racing. This did prove to be significant F = (4, 43) = 5.86, p< .01), those participants that were more experienced in racing scored higher on the questionnaire concerned with recalling the correct brands F = (3, 46) = 5.86, p= .05). There was a tendency for people experienced with racing to score higher on the questionnaires, but this effect did not reach significance. This may be explained by the majority of people scoring 4 or lower (36 in total) compared to only 14 who were classified as being experienced racers.

Prior knowledge of brands did have a significant effect (F = (12, 119) = 2.63, p<.01) but no significant interaction was found with condition (F = (4, 37) <0.01, p=.00). No significant difference was found between those who were experienced in racing and those inexperienced in racing on prior knowledge (F = (2, 43) < 0.01, p=.00).

5. Discussion

The goal of this study was to get a closer look at the effectiveness of in game advertising. The hypothesis was that when playing an arousing videogame memory for advertising would show decrements, as compared to playing a non arousing videogame. The results did not show a difference between the high and low arousal groups. But the results did show a generally bad memory performance. The average number of advertisements recalled were just two out of 14 advertisements shown in the videogame. Comparing this performance and the performance on the other questionnaires with performance in other related studies from television (e.g. Gunther, 2007) the performance in this study is truly below average. The average number of correct responses on the multiple choice questionnaire for instance is barely higher than chance (28.4% correct). Furthermore excitation transfer is thought to be a short lasting effect of roughly two and a half minutes (Mundorf, Zillmann & Drew, 1999) but unfortunately due to the overall bad performance such an effect could not be found in the present data.

While the high arousal condition did indeed show a higher arousal than the low arousal condition the scores between the two conditions did not differ, this would indicate that the premise of the excitation transfer effect in the case of videogames is wrong. Excitation transfer does predict a decrement of score on the memory questionnaires when the participant is aroused, but when the participant is not aroused there should not be a decrement in performance. This is in direct contrast with findings from television that viewers who are aroused remember less advertising than viewers who are not aroused (Bushman & Bonacci, 2001; Furnham, Gunter & Richardson, 2007;Parker & Furnham, 2007). Thus while the excitation transfer effect is seen in television it does not seem to apply to videogames, this could be due to the different nature of videogames. One cause for this different finding may be the placement of advertisement in television compared to that in videogames. In most advertisements seen on television, advertising is separate from the main programming and this is the setup used in many research done with excitation transfer (e.g. Gunther, 2007) while advertising in videogames is shown during the playing of the videogame. Comparing video gaming to product placement may thus be a better comparison, but compared to product placement memory performance in videogames is poor as well (Lee & Faber, 2007).

Furthermore unlike television videogames is not passive entertainment, but it requires the user to take direct control of the situation and drive the story forward on the user's own pace. When viewers watch television in excitation transfer tasks they are not usually required to perform any other action besides watching. Participants who play a videogame thus have a different task than those who have to watch television. This difference in task could lead to different results than those predicted by excitation transfer. Arousal in this study did not seem to be the cause of bad performance on the memory questionnaires, but

the fact that participants who played a videogame had to directly control the action instead of passively viewing may supply an alternative explanation for the results found in this study.

One of the comments that were most often made by the participants was “I was paying attention to racing my car, I was trying to go as fast as possible, and make the turns as good as possible, I didn’t pay attention to anything else that was happening”. Another participant commented that “making the turns and keeping up speed is difficult enough as it is, I didn’t have the time to look at anything else”. These observations may be quite correct, as a lot of limited resource models for attention as well as working memory have been proposed, such as the limited resource model of Baddeley and Hitch (1974) or Broadbent (1985) and a more recent version (Baddeley, 2000). Whether this is a single resource or multiple component system is still up for debate (Cowan, Elliot, Saults, Morey, Mattox, Hismjutullina & Conway, 2005) but the idea of a limited resource model is generally accepted idea (e.g. Miyake & Shah, 1999).

One model that fits the current study the best is the limited capacity model of mediated message processing proposed by Annie Lang (2000). This model sees humans as active information processors, who have limited resources available to process information. Processing requires mental resources. Information processing is seen as a “group of simultaneously occurring component processes (or sub processes) that people perform on stimuli and on the mental representation of stimuli that they construct” (Lang, 2000, p.47).

Encoding, storage and retrieval are the sub processes proposed by Lang (2000). Each of these sub processes is involved in processing messages from media. These sub processes occur in parallel and each of these processes takes up mental resources. Every sub processes has automatic components that are not under control of the information processor as well as components that are under the control of the information processor (intention of the information processor). When viewing a message in the media information is stored in the sensory stores (Zechmeister & Nyberg, 1982) and a selection is encoded into working memory where a mental representation is formed which can be processed further by for instance combining it with previous information (retrieval) or storing it in long term memory (storage). The only limiting factor is that we can only attend to a limited amount of information at once.

Thus if people choose to attend to a certain kind of stimulus, in this situation the car they are driving, this information is bound to be selected from the sensory stores and to be transformed into mental representations into working memory, and thus ignoring the other stimuli in the environment which are in these case the stimuli of interest. This would explain several results found in the current experiment. For one the fact that the car participants were driving was remembered more often can be explained by the notion that due to the participant’s intention to attend to the car it was transferred into working memory. It can also explain the fact no difference was found between the high and low arousal condition as both conditions had to focus their attention on driving the car.

The fact that no difference was found between experienced and inexperienced gamers shows that even experienced gamers focus their attention on the car alone, and not on stimuli in the environment.

Another sub process of interest from Lang's limited capacity model is the storage component. During the encoding sub process a mental representation of the information is formed in working memory, as a person thinks about this information associations are formed between the new information and old information from long term memory (Carpenter, 1989; Chakbrabart & Basu, 2008). The more associations are formed with old information the better retrieval will work. Some parts of the information will be more thoroughly stored than others.

As with encoding, both automated and controlled processes are thought to operate here, and thus the amount of storage is dependent on individual differences and limitations of human processing. As with television the information presented in a racing game is continuous, while under more control than with television (the player may choose to break and look at the surroundings) when the goal is to drive a circuit as swiftly as possible the information will be as continuous as television, this will limit the amount of information that can be stored by the participant.

Furthermore the goal of driving the car will presumably call upon much of the attention of the player, causing fewer resources to be available for storing information. Another factor influencing the storage sub process are the goals and needs of the participants. The goal of the participants was to drive the car around the circuit, it was not to attend to the advertising and try to remember as much as possible. A participant that would have been explicitly instructed to attend to the advertising would presumably show better performance than a participant that has not been instructed to do so, but future research will have to look at the effects of different instructions given to participants who are required to play a videogame.

Another factor of influence on storage is stimuli that elicit emotions. Stimuli that elicit emotions may be remembered better than stimuli that do not elicit emotions (Christianson, 1992; Kapucu, Rotello, Read, Seidl, 2008; Parzuchowski, Szymkow-Sudziarska, 2008) as seen in the results the group that was experienced in racing did experience more pleasure than the group who wasn't experienced in racing. This could explain the results found in the high arousal condition that those experienced in racing tended to score higher than those not experienced in racing. Another possible explanation would be that simply due to the fact that those experienced in racing were more familiar with the advertising displayed on the racing circuit (they were after all advertisements connected to racing in general) and thus answered the multiple choice questions more often correctly from general knowledge about gaming. As seen in the results prior knowledge of brands did have a significant influence on performance, but there was no significant difference in prior knowledge between the experienced racing group and the inexperienced group, which seems to discredit this idea.

The tendency found for participants not experienced in racing to score higher in the low arousal group could be caused by the more displeasure that group felt, thus perhaps giving less attention to the racing itself and thus freeing up more processing resources for watching other stimuli, in this case advertising near the road. Research has shown that negative emotions impede motivation (Lang, Bradley & Cuthbert, 1999), and a lack of motivation would certainly allow the participants to attend to other stimuli in the game, most importantly the advertising shown next to the circuit.

The last sub process of importance in the limited capacity model of mediated message processing is the retrieval process. This sub process is most important during the filling out of the memory questionnaires when the participants have to remember as many brands as they can; this is not constrained by time demands in the present study.

The process that would interfere with performance the most would be concurrent retrieval, retrieving previously known information to aid in understanding, storage and acting. We expect previously known information to have little or no effect, as no prior knowledge is needed for playing the game. Retrieval might have some effect on those who are not familiar with operating a Playstation 2, as they would have to actively remember and attend to the buttons they would have to push to operate the car efficiently. Carrying out an unfamiliar action sequence would require step by step attention and control on every step off the sequence (Anderson, 1983), until the sequence is learned, after which it would form procedural rules which can act outside of attention and do not need this step by step attention (Anderson, 1993, Keele & Summers, 1976).

The failure to find a significant effect of previous knowledge off operating the Playstation 2, or ownership of the console disproves this. While certain participants did indeed have problems to control the game, no significant difference in performance or memory has been found between those who were familiar with the controls, and those that were not. Thus we believe that the participant would invest few or no resources in concurrent retrieval as the situation did not demand it. Furthermore the operations of the games were rather simple, with no more than 3 buttons requiring operation.

5.2 Conclusion

In summary, the limited capacity model of mediated message provides an alternative explanation for the results found in the current study. Due to the participants focusing their attention on controlling the vehicle they had no more resources available to process information from the surroundings of the car, and thus were not able to remember many of the advertisements displayed in game.

Results found in this study are much alike results found in the study of Lee and Faber (2007) who also looked at a limited resource model of attention, and who concluded that when focusing attention on the primary task (in this case playing the game) left little resources for

the secondary task (remembering the advertisements). The implications of the current study should be clear, until further research is done into the effectiveness of IGA, advertisers should perhaps take caution into placing advertising into video games as it may not be money well spent. Lee and Faber (2007) showed that incongruity of advertisement and videogame may be the best way to get gamers to remember the brands advertised in videogames.

5.3 Limitations and future research

Due to the difficulty of comparing advertisement in two separate videogames, this study used a slightly different method in comparing high and low arousal groups, by first letting them play one game followed by another videogame. While gamers in the real world will certainly switch to another videogame after a while of playing, it's more likely they will spend a lot of time playing one videogame, often for hours at a time. This means that the results may be different in a normal setting.

A second related limitation is the play time. Two and a half minutes of playtime for the second game is certainly not long, and normal playing time is bound to be longer than this. Future studies should definitely look to the effects of longer play time. Another related limitation in the current study is the reason players will play a game. In the current study playing a videogame was a needed part of getting a credit or completing the study, in real life it is assumed videogames will generally be played for entertainment or pleasure and seeing the effect emotions may have on the storage sub process, this may influence results.

Videogames is not solely first person shooters or racers dedicated to action, but there are a multitude of genres including the real time strategy and turn based strategy, which may be more suited for advertising. Furthermore several advertisement supported games do not display advertisement during play, but force the player to watch advertisements upfront before play, and this may be more successful in getting gamers to remember games.

As shown in the research of Lee and Faber incongruity of advertisements may be the best way to get gamers to remember advertising, for example deodorant advertisement during racing. Future research should indeed look to the effects of different genre's as well as different ways of presenting advertising (before playing a game or incongruous with the game subject itself).

5.4 Acknowledgement

I would like to thank Dr. Ard Heuvelman for his support and assistance in making this experiment possible and Dr. Oscar Peters for the loan of his office. As well as Eddy Groen for his support in writing this thesis.

6. Appendix A: Questionnaires

GEÏNFORMEERDE TOESTEMMING

Met ondertekening van dit formulier stem ik toe mee te doen aan dit onderzoek, ik ben me ervan bewust dat deelname aan dit onderzoek geheel vrijwillig is. Ik kan mijn medewerking op elk tijdstip stopzetten en de gegevens verkregen uit dit onderzoek terugkrijgen, laten verwijderen uit de database, of laten vernietigen.

Proefpersoonummer (indien ingeschreven via proefpersonenpool): .....

Leeftijd: .....

Studierichting: PSY/TCW/ Anders: .....

Geslacht: M/V

De volgende punten zijn nog van belang:

- Het onderzoek duurt ongeveer 40 minuten.
- Er behoort geen stress of ongemak voort te vloeien uit deelname aan dit onderzoek.
- De gegevens verkregen uit dit onderzoek zullen anoniem verwerkt worden en kunnen daarom niet bekend gemaakt worden op een individueel identificeerbare manier.
- De onderzoeker zal alle verdere vragen over dit onderzoek beantwoorden, nu of gedurende het verdere verloop van het onderzoek.
- Deelnemers die graag willen weten wat het doel is van het onderzoek kunnen hun email adres opgeven bij de onderzoeker die daarna een uitleg naar hun toe zal mailen.

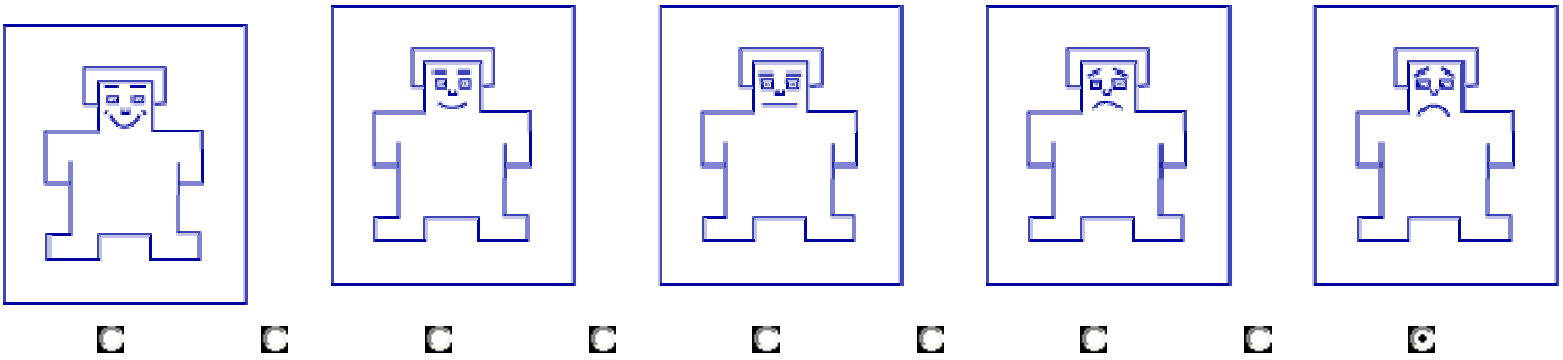
Handtekening onderzoeker: …… Datum: ……..

Handtekening proefpersoon: …… Datum: ……..

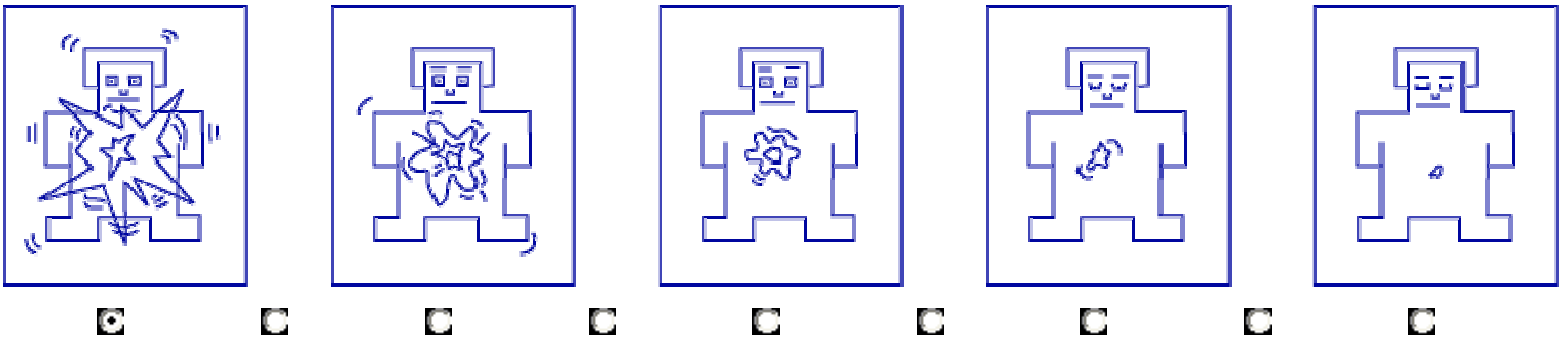
SAM QUESTIONNAIRE*:*

Hieronder zul je 3 sets van van 5 figuren zien, elk gearrangeerd langs een continuum. We noemen deze set van figuren SAM en deze figuren gebruik je om aan te geven hoe je je voelt. De SAM laat drie verschillende soorten gevoelens zien: Plezierig versus Onplezierig , Opgewonden versus Kalm, en Beheerst worden of Beheersen. Je kunt zien dat elke SAM-figuur langs een schaal gevarieerd wordt. Het is de bedoeling dat jij op deze schaal aangeeft in hoeverre de emotie op dit moment op jouw van betrekking is.

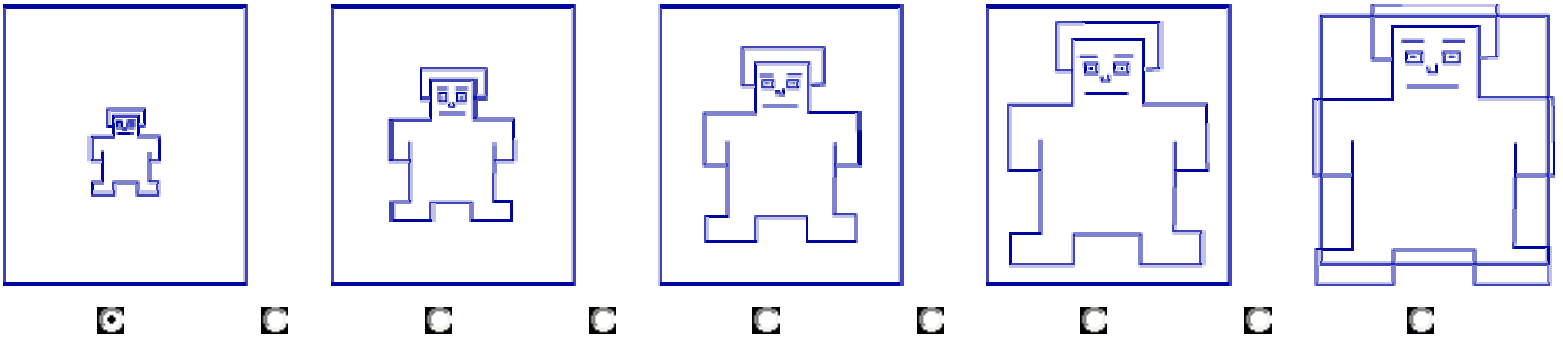
Plezierig - Onplezierig



Opgewonden-Kalm



Beheerst (gedomineerd) worden vs. Beheersen (domineren)



In de videogame Gran Turismo 4 dat je net gespeeld hebt was reclame voor een aantal merken ingevoegd. De volgende vragenlijst gaat over hoeveel merken jij nog kunt herrineren na het spel gespeeld te hebben. Vul deze vragenlijst zo volledig en accuraat mogelijk in. Neem rustig de tijd.

1. Hoeveel verschillende reclames denk je gezien te hebben in het spel?

   .....

2. Schrijf de merken die jij je nog kan herrineren op:

   .....
   .....
   .....
   .....
   .....
   .....
   .....

3. Schrijf de merken uit vraag 2 op in de volgorde waarin jij ze gezien hebt
   .....
   .....
   .....
   .....
   .....
   .....
   .....

4. Kende je deze merken al van voor dat je dit spel gespeeld hebt?

   Ja/Nee

5. Zo ja, welke?

   .....
   .....
   .....
   .....
   .....

Recognition Questionnaire

In de videogame Gran Turismo 4 die jij net gespeeld hebt komen een aantal reclames voor, een aantal van deze reclames die jij tijdens het spelen bent tegenkomen staan tussen de volgende 18 reclames; het is de bedoeling dat jij hieruit de (NUM) reclames aangeeft die jij daadwerkelijk bent tegengekomen. Neem rustig de tijd en doe dit zo accuraat mogelijk.

Heineken	EA Games
Firestone	Rolex
Activision	Ford
Mercedes	Pontiac
Dodge	Nvidia
Samsung	Texaco
Nissan	Volkswagen
Porsche	Mazda
Valvoline	Duracell

Cued Recall

Hieronder volgen een aantal meerkeuze vragen over de reclames die jij bent tegengekomen in het spel Gran Turismo 4, voor de vragen staat het merk waarop de vraag betrekking heeft, kruis telkens het goede antwoord aan, neem rustig de tijd.

Firestone

1: Wat was de kleur van deze reclame?

a) Groen
b) Geel
c) Rood
d) Oranje

2: Stond er een bedrijfslogo op bij deze reclame?

a) Ja
b) Nee
c) Weet niet

Halvoline:

3: Welk bedrijfslogo stond bij deze reclame?

a) Texaco
b) BP
c) Shell
d) Q4

4: Welke kleuren had deze reclame?

a) Blauw/Groen
b) Blauw/Geel
c) Zwart/Groen
d) Zwart/Geel

Ford

5: Wat stond er in de tekst bij de reclame?

a) Driving
b) Racing
c) Cars
d) Tires

6: Stond het bedrijfslogo van Ford bij de reclame?

a) Ja
b) Nee
c) Weet Niet

Valvoline

7: Stond het bedrijfslogo bij deze reclame?

a) Ja
b) Nee
c) Weet Niet

8: Welke kleur kwam in de reclame voor?

a) Blauw
b) Groen
c) Rood
d) Zwart

Cadillac:

9: Stond het logo van cadillac bij de reclame?

a) Ja
b) Nee
c) Weet Niet

10: Stond er verder nog tekst bij de reclame?

a) Ja
b) Nee
c) Weet niet

Texaco

11: Stond het bedrijfslogo in de reclame?

a) Ja
b) Nee
c) Weet niet

Chevrolet

12: Welke kleur had deze reclame?

a) Zwart
b) Blauw
c) Geel
d) Wit

13: Stond het bedrijfslogo bij de reclame?

a) Ja
b) Nee
c) Weet niet

Penzoil:

14: wat waren de kleuren van deze reclame?

a) Geel/zwart
b) Groen/zwart
c) Blauw/Geel
d) Groen/Blauw

15: Stond bij deze reclame het bedrijfslogo?

a) Ja
b) Nee
c) Weet niet

Gaming Aptitude

Hieronder volgen een aantal vragen die over jouw gebruik van videogames gaan. Neem rustig de tijd en vul deze vragen zo accuraat mogelijk in. Na deze vragen volgen een aantal vragen met betrekking van jouw kennis over videogames, vul deze ook zo accuraat mogelijk in.

1. Bezit je een game console? (omcirckel het juiste antwoord)

   Ja/ Nee

2. Welke?
   .....
   .....
3. Ben je bekend met de Playstation 2?

   Ja/Nee

4. Zo ja; hoeveel uur heb je gebruik gemaakt van de Playstation 2 of een andere console op weekbasis?

5. Speel je wel eens een videogame?

   Ja/Nee

6. Zo ja, welke?
   .....
   .....
   .....
   .....

7. Zo nee, heb je in het verleden ooit videogames gespeeld?

   Ja/Nee

8. Heb je ooit in het verleden wel eens een racing game gespeeld?

   Ja/Nee

9. Hoeveel games bezit je zelf?

   ☐1-2 ☐3-4 ☐5-6 ☐7+

10. Hoeveel uur besteed je per dag aan het spelen van videogames?

    ☐1-2 ☐3-4 ☐5-6 ☐7-8

11. Hoeveel uur ben je van plan de volgende week (gemiddeld) per dag te spelen?

    ☐1-2 ☐3-4 ☐5-6 ☐7-8

12. Als je een keuze moet maken tussen televisie kijken en videogames, wat zou je dan kiezen?
    Televisie kijken/Videogames

13. Als je een keuze moet maken tussen uitgaan en videogames, wat zou je dan kiezen?

    Uitgaan/Videogames

14. Als je een keuze moet maken tussen sporten en videogames, wat zou je dan kiezen?

    Sporten/Videogames

15. Hoe goed denk je dat je bent in het spelen van videogames? (geef jezelf een cijfer van 1-10)
    .....

Hieronder volgen een aantal open vragen, deze vragen gaan over jouw videogame kennis, beantwoord deze vragen zo accuraat mogelijk, neem de tijd.

1. Wat is een *MMORPG*
   .....
   .....
   .....
   .....
2. Wat is een *Frag*
   .....
   .....
   .....
   .....
3. In een *FPS* is het de bedoeling dat je?
   .....
   .....
   .....
   .....
4. Wat is *IGA?*
   .....
   .....
   .....
   .....
5. Welke game consoles ken je?
   .....
   .....
   .....
   .....
6. Wat voor spel is *World of Warcraft*?
   .....
   .....
   .....
   .....

Hieronder volgen nog een paar vragen over in hoe verre jij bekent met auto race's over het algemeen, beantwoord deze ook zo compleet en accurraat, mogelijk, neem de tijd.

1. Kijk jij wel eens naar auto races (Formule 1 etc)?

   Ja/Nee

2. Zo ja; hoeveel uur per week denk je hier gemiddeld naar te kijken?

   ☐1-2 ☐3-4 ☐5-6 ☐7-8

3. Zo nee; heb jij in het verleden wel eens naar auto races gekeken?

   Ja/Nee

4. Zo ja; hoeveel uur denk jij in het verleden gemiddel per week te hebben bekeken?
   ☐1-2 ☐3-4 ☐5-6 ☐7-8

Appendix B: Statistics

Test of arousal:

Multivariate Tests(b)

Effect		Value	F	Hypothesis df	Error df	Sig.
Arousal	Pillai's Trace	,037	1,819(a)	1,000	48,000	,184
	Wilks' Lambda	,963	1,819(a)	1,000	48,000	,184
	Hotelling's Trace	,038	1,819(a)	1,000	48,000	,184
	Roy's Largest Root	,038	1,819(a)	1,000	48,000	,184
Arousal * Conditie	Pillai's Trace	,333	23,985(a)	1,000	48,000	,000
	Wilks' Lambda	,667	23,985(a)	1,000	48,000	,000
	Hotelling's Trace	,500	23,985(a)	1,000	48,000	,000
	Roy's Largest Root	,500	23,985(a)	1,000	48,000	,000

a Exact statistic
b Design: Intercept+Conditie
Within Subjects Design: Arousal

Comparison between arousal in the low condition between first and second measure.

Multivariate Tests(b)

Effect		Value	F	Hypothesis df	Error df	Sig.
Arousal	Pillai's Trace	,569	31,738(a)	1,000	24,000	,000
	Wilks' Lambda	,431	31,738(a)	1,000	24,000	,000
	Hotelling's Trace	1,322	31,738(a)	1,000	24,000	,000
	Roy's Largest Root	1,322	31,738(a)	1,000	24,000	,000

a Exact statistic
b Design: Intercept
Within Subjects Design: Arousal

Performance on questionnaires; only the relevant covariants are shown, in the complete analysis, all the covariants were used, thus the values may differ slightly. But to reduce clutter (there are a lot of different co variants, only the relevant ones are shown.
Multivariate Tests(b)

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,001	,007(a)	4,000	39,000	1,000
	Wilks' Lambda	,999	,007(a)	4,000	39,000	1,000
	Hotelling's Trace	,001	,007(a)	4,000	39,000	1,000
	Roy's Largest Root	,001	,007(a)	4,000	39,000	1,000
Cijfergaming	Pillai's Trace	,154	1,779(a)	4,000	39,000	,153
	Wilks' Lambda	,846	1,779(a)	4,000	39,000	,153
	Hotelling's Trace	,182	1,779(a)	4,000	39,000	,153
	Roy's Largest Root	,182	1,779(a)	4,000	39,000	,153
Racingkijk	Pillai's Trace	,591	14,082(a)	4,000	39,000	,000
	Wilks' Lambda	,409	14,082(a)	4,000	39,000	,000
	Hotelling's Trace	1,444	14,082(a)	4,000	39,000	,000
	Roy's Largest Root	1,444	14,082(a)	4,000	39,000	,000
Uurkijk	Pillai's Trace	,597	14,420(a)	4,000	39,000	,000
	Wilks' Lambda	,403	14,420(a)	4,000	39,000	,000
	Hotelling's Trace	1,479	14,420(a)	4,000	39,000	,000
	Roy's Largest Root	1,479	14,420(a)	4,000	39,000	,000
ooitgekeek	Pillai's Trace	,411	6,797(a)	4,000	39,000	,000
	Wilks' Lambda	,589	6,797(a)	4,000	39,000	,000
	Hotelling's Trace	,697	6,797(a)	4,000	39,000	,000
	Roy's Largest Root	,697	6,797(a)	4,000	39,000	,000
hoeveelooit	Pillai's Trace	,402	6,562(a)	4,000	39,000	,000
	Wilks' Lambda	,598	6,562(a)	4,000	39,000	,000
	Hotelling's Trace	,673	6,562(a)	4,000	39,000	,000
	Roy's Largest Root	,673	6,562(a)	4,000	39,000	,000
Sam1PlezierigOnplezierig	Pillai's Trace	,209	2,575(a)	4,000	39,000	,053
	Wilks' Lambda	,791	2,575(a)	4,000	39,000	,053
	Hotelling's Trace	,264	2,575(a)	4,000	39,000	,053
	Roy's Largest Root	,264	2,575(a)	4,000	39,000	,053
Conditie	Pillai's Trace	,036	,359(a)	4,000	39,000	,836
	Wilks' Lambda	,964	,359(a)	4,000	39,000	,836
	Hotelling's Trace	,037	,359(a)	4,000	39,000	,836
	Roy's Largest Root	,037	,359(a)	4,000	39,000	,836

a Exact statistic
b Design:
Intercept+Cijfergaming+Racingkijk+Uurkijk+ooitgekeek+hoeveelooit+Sam1PlezierigOnplezierig+Conditie

Comparison between experienced gamers and in experienced gamers aswell as experienced racers vs inexperienced racers.
Multivariate Tests(b)

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	,763	34,662(a)	4,000	43,000	,000
	Wilks' Lambda	,237	34,662(a)	4,000	43,000	,000
	Hotelling's Trace	3,224	34,662(a)	4,000	43,000	,000
	Roy's Largest Root	3,224	34,662(a)	4,000	43,000	,000
racerank	Pillai's Trace	,129	1,594(a)	4,000	43,000	,193
	Wilks' Lambda	,871	1,594(a)	4,000	43,000	,193
	Hotelling's Trace	,148	1,594(a)	4,000	43,000	,193
	Roy's Largest Root	,148	1,594(a)	4,000	43,000	,193
gamerankalt	Pillai's Trace	,096	1,146(a)	4,000	43,000	,348
	Wilks' Lambda	,904	1,146(a)	4,000	43,000	,348
	Hotelling's Trace	,107	1,146(a)	4,000	43,000	,348
	Roy's Largest Root	,107	1,146(a)	4,000	43,000	,348
racerank * gamerankalt	Pillai's Trace	,082	,958(a)	4,000	43,000	,440
	Wilks' Lambda	,918	,958(a)	4,000	43,000	,440
	Hotelling's Trace	,089	,958(a)	4,000	43,000	,440
	Roy's Largest Root	,089	,958(a)	4,000	43,000	,440

a Exact statistic
b Design: Intercept+racerank+gamerankalt+racerank * gamerankalt

Appendix C: Flyer

Videogames en reclame

Heb jij nog credits nodig of wil je gewoon meedoen aan een leuk onderzoek?

Doe dan mee met het onderzoek "**Videogames en reclame**" waarmee je 1 credit kunt verdienen, na het spelen van een videogame moet je een paar reclames beoordelen

Meld je aan via de proefpersonenpool of mail naar mommer_b@hotmail.com

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