Feel the difference:

How auditory and visual information differ in forming emotions.

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Abstract

This research is concerned with one of the major theories of media psychology, namely how emotions are transferred by means of the excitation transfer framework. This theory states that the stronger a stimulus gets the stronger the transfer is. By using excerpts of films, depicting mutilation and a neutral animation, and music, including the genres rock and classic, this theory was tested. Other theories state, that this process also is mediated by scores on the NEO-pi-r scale as well as previous knowledge about the stimulus or resembling experiences. Results indeed support the notion that when manipulating intensity the excitation transfer also is manipulated in the same direction, however a contradiction has been found, when paring disgust-trust stimuli together, even enhancing the effect, even if the intensity is lower. Only minor differences were found for the mediating effects of previous knowledge of the film and no effects were found for scores on the neuroticism subscale of the NEO-ff-I test influencing the excitation transfer process.

Samenvatting

Dit onderzoek houdt zich bezig met één van de hoofdtheorien op het gebied media psychologie, dat is de overdracht van emoties in door middel van excitation transfer. Deze theorie zegt uit, dat hoe intenser de stimulus is, hoe sterker is de overdracht. Door het gebruiken van films, welke mutilatie en een neutraal animatie tonen, en muziek, welke tot de genres van rock en classic behoren, was deze theorie onderzocht. Andere theorieën maken uitspraken daarover, dat dit process ook mede beinvloed wordt door scores op de NEO-pi-r scale als ook van tevoren opgedaane kennis van de stimulus of gelijke ervaringen. Resultaten ondersteunen daadwerkelijk de onderstelling, dat bij de manipulatie van de intensiteit, de excitation transfer in dezelfde richtig beinvloed zou worden. Toch is er één tegensstrijd gevonden, als het daarom gaat een stimulus in de combinatie vertrouwen-afkeer met elkaar te paren, daarbij wordt de excitation transfer effect zelfs nog verhoogd, zelf als de intensiteit lager is. Aleen enkele verschrillen zijn gevonden voor de mediatie van film kennis en geen effecten zijn gevonden voor verschillen op de Neuroticisme subtest van de NEO-ff-I test op het proces van excitation transfer.

1. Introduction

This articles intent is to make a contribution to the field of media psychology and specifically human-media interaction, with a focus on the one-sided emotion transmission from films to persons. Especially through time the focus in media psychology has changed constantly, as a result of the technological advancements. May it be the invention and application of the television in the late 20´s and early 30´s or the invention and ever growing use of the internet in the 90´s until today. It is not surprising, that the focus early on has been more on the television area and closely tied to it, the applications of advertisement and the effects of music and pictures on human emotions and behavior. Later on this focus has shifted to the more widely used internet with its possibilities, which exceeded those of the television a lot. Nevertheless for television and internet applies the same rule, namely that they are important means to transfer information in form of films and pictures and therefore the focus of this article will lie in the field of human emotion in correspondence to visual and acoustic stimuli. One of the theories, as part of this broad spectrum is the excitation transfer theory, which will be the main focus in this paper.

Excitation transfer has always been an object of interest to media psychologists and related fields. As Eich, Ng, Macaulay, Percy and Grebneva (2007, p. 125) already said: "Experimental methods for modifying mood are a mainstay of modern research in the area of cognition and emotion ...the past three decades reveals a steady increase in the number of research reports dealing with experimentally engendered moods…" Researching the influence of excitation transfer on the physiology of human beings, as a mean to understand, how the body reacts to certain stimuli and what influence it can have on people´s perception of emotions, feelings and moods is a very important line of research in that field.

What are emotions? Before getting into theory imagine a person walking through a park at night, already being intimidated by the dark, when this person hears a howling of a wolf and promptly starts running out of a intense feeling of fear, after running a short distance the person calms down again and

rests for a bit. Which are the emotions elicited in this situation? What can we learn about the characteristics of emotions in general, when looking at this situation and the outcome? Looking at the most basic theories about emotions Gray & Watson (2007) as well as Rottenberg, Ray & Gross, (2007) and Cabanac (1996) define emotions as a very intense but short-lived reaction, triggered by a specific event or time, also they are inconsistent and do not have frequent and constant output as moods, this means that emotions are always superimposed on bigger emotional states or moods. Linking this to an evolutionary context, Gray and Watson (2007) state that "emotions prompt the organism into action or decision" and a constant flow of these high intense emotions would be maladaptive and disadvantageous to humans. Coming back to the example, the feeling of intimidation can be labeled as a mood in contrast to the intense feeling of fear, which marks the emotional state the person is experiencing, this reaction is triggered by the howling of a wolf, a specific event in time. The evolutionary explanation can also be supported, as a constant feeling of fear can be leading to extreme exhaustion in combination with the fight or flight reflex. Considering all that's said, Rottenberg et al. (2007) pointed out, that assessing emotions is something quite difficult to do, as emotions are short-lived, so one has to find a way to gather information, where the evaluation methods do not interfere with the emotion elicitation process (continuous measures), not leaving too much time between the elicitation and the assessment process and also establishing some kind of baseline to nullify the effects of general moods.

Having cleared up the basic issue of emotions and what they are, one can now turn to the main questions of this research: *How do humans in general experience emotions when watching films or listening music? What processes and factors interact with this experience?* Going through a lot of articles on this subject, a rather interesting main trend is apparent: Films and music do not generate emotions. *So why is it, that we mostly experience emotions when watching films or listening to music?* Going with the example that was used earlier: When someone watches a scary movie about a person walking through the woods then showing a reaction of fear by running from a howl of a wolf, why do we experience related emotions, too? The answer lies in the importance of emotional appraisal, that is: a film or music in itself does not produce the wanted emotion, rather humans *mostly* feel emotions

through the interpretation of that stimulus using past personal experiences. (Koneč, Brown & Wanic, 2008, Silvia, 2005, Rickard, 2004, Pavlović & Marković, 2011) To find a more detailed answer one has to start at the most basic level, namely the findings from cognitive-physical science. Regarding music Bharucha, Curtis & Paroo (2006) explain this phenomenon through the formal eliciting codes which would be the acoustic code or a physical process of carrying information through the air and the representational code, which also can be explained as a cognitive top-down process that happens mostly unconscious and is nothing else then the mapping of the acoustic signal on auditory codes and the interpretation of the same. Those mappings and representations are not always innate and can be learned, just like one learns the cultural specific harmonic paradigms better, than different harmonic patterns. (Castellano, Bharucha, & Krumhansl, 1984) Their explanation of the word formal, which originates from research papers of Fodor (1983, 2000), also acknowledges the fact, that those codes in themselves hold no meaning, but they definitely can evoke auditory experiences which can get the body into a reactive state and create a form of tension (as Bharucha et al. 2006 (p23) put it: "an ebb and flow of musical tension"), which in turn can elicit stronger emotional reactions. Cohen (2001, 2010) in fact defines the central meaning of music as amplification of attention and to direct it on certain properties of the film. Codispoti & De Cesarei (2007) as well as Schupp, Stockburger, Codispoti, Junghofer, Weike & Hamm (2007) support this additive relationship between attention and emotion in films, attention is essential to the conscious experience of music and films and with them the conveyed target emotions.

Does this necessarily mean, that we must have experienced the same situation? Cohen (2001, 2010) goes on to explain, long before Pavlović & Marković (2011), that music only carries information in the broader visual context and is not directly linked to any *specific* long-term memory. So Cohen (2001, 2010) gives a more detailed example of how emotions are influenced on a cognitive level rather than through specific recalled live events. As mentioned, later on Pavlović & Marković (2011) provide a differentiated and deeper view on how music and films affect humans. As films deliver a very detailed story, picture and context, one can imagine, that it is easy for humans to judge the personal emotional importance (e.g. fighting experience and watching a film depicting fighting

scenes). Auditory stimuli in contrast only can be interpreted in a broader experiential and visual context, as Koneč et al. (2008) put it, music gets linked to an emotional state while experiencing the emotion and the music at the same time and therefore is music is used as a vehicle to convey emotional information. Rickard (2004) results support this view as they found that music pieces, which held high emotional meaning to the participants, were correlated with higher physiological arousal, than arousing pieces of music unknown to the participant and that held no further emotional meaning to them. Interestingly the arousing and calm music peaces used by Rickard (2004) held no significant differences in eliciting emotions. So as mentioned earlier, the only conclusion can be, that we in fact do not have to experience the same situation beforehand (e.g. running from the howling of a wolf), rather than linking it to a broad experiential context (e.g. running from a scary situation independent of the trigger) and that high arousing music can indeed point out climaxes and bring the body into a physically aroused state or help to change or amplify the mood.

The most logical question that has to follow, when considering past experiences, is "*if we have been exposed to the same stimulus before, does the experience of emotion rise?"* So if for example, one has watched this horror scene with a man running out of fear to get caught by a wolf, would this person experience a more extreme emotional reaction when watching this scene a second time? Rottenberg et al. (2007) highlighted, if a participant are indeed familiar with a certain film, this could interfere with the elicitation of emotions, more precisely it is more likely that the film elicits the target emotion, if the film is known. The same goes for music as earlier mentioned, music seems to act as a vehicle, to transport emotion, which have been experienced earlier on. (Rickard, 2004, Koneč et al., 2008)

Differences do not only occur by level of knowledge as discussed above, but also by several other human factors. Gender, race, class, culture and personality traits should be a point of concern when researching emotions (Rottenberg et al., 2007). Some of those factors mentioned right know, I will try to highlight in the following sections, however not all will find attention here, as for example class, race and cultural differences would go beyond the scope of this paper and the very limited possibilities to conduct a research about those factors.

First off starting with gender and personality differences, a lot of researchers have pointed out that gender differences tend to occur in context of the content. All of them support the notion that woman tend to be more aroused when watching unpleasant pictures/films and men in turn tend to be more aroused, when exposed to pleasant erotic stimuli (Codispoti, Surcinelli, Baldaro, 2008; Bradley, Codispoti, Sabatinelli and Lang, 2001; Gard and Kring, 2007). Some researchers try to explain this effect through the Behavioral Inhibition- and Behavioral Activation Systems (BIS and BAS), as the BIS is more active in woman, which have a greater defensive reactivity to unpleasant/negative stimuli and the BAS which is more active in men, as they tend to have a greater appetitive reactivity, which in turn makes them more attentive for pleasant/erotic stimuli (Bradley et al., 2001, Gard & Kring, 2007). It also seems that the factor Neuroticism of the NEO-pi-r correlates with the BIS and the unpleasantness of stimuli as well as with excitation transfer in general (Gard & Kring, 2007; Bunce,Larsen and Cbuz, 1993). So in terms of the given example woman would react more negatively to the horror scene than men would because of their high scores on neuroticism and on the BIS factor. One research opposing this notion is given by Bradleyet al. (2003). While conducting an experiment about motivated attention, they measured brain activations using an fMRI, resulting in no difference between gender when looking at the activation of regions associated with appetitive and defensive reactions. An interesting fact in this context is, that woman in general tend to rate all stimuli as less pleasant, so not only the unpleasant ones. (Costa, Braun, Birbaumer, 2003; Codispoti et al., 2008; Bradley et al. 2001). As stated before Bradley et al. (2003) did not find any difference in appetitive and defensive activities, but what they found out is that scenes depicting sex or mutilation in general trigger higher activations in the object identification pathway for woman as well as men, which is proposed to be located in the primary visual cortex (the right ventral posterior area). Not only in this region, also in all other parts related to visual information processing, was a higher activation measured compared to other themes. Thus gender differences have a possibility to influence

Having outlined the raw profile of human experience on emotion one can conclude that in the given example woman tend to react with stronger emotion to the scene, especially when the scene is known to them, also a scene will have more effect, when it is backed up by music that is familiar to the

listener and supports the climaxes in a congruent manner, however fast paced music will probably enhance the physical arousal regardless of the musical background.

On important point about emotions however has not been considered yet. Bradley & Lang (1994) state in their article, emotions can manifest in different ways and for most researchers it is a threat to choose a measure, which assesses only a specific characteristic emotion. This differs in regards of what the analysis of emotions beforehand has brought forth, namely the pure physical side of emotion assessment by the factor arousal. With their invention of the SAM-scale they tried to avoid this problem. In their research the dimensions however were not directly positive correlated to each other, rather they show a trend of a negative correlation, while the arousal ratings will rise, people will have a tendency to feel more unpleasant stimuli and the other way around. This will also be considered as a major point of this research.

So just now it was considered what cognitive characteristics influences the experience of emotions but what still needs to be clarified is, what technical means are necessary to accomplish this goal. Factors like content complexity, validity, stimulus intensity and the physical component like picture size, room lighting, temperature, color, and other people being in the vicinity of the participants are important to consider.

Firstly videos and pictures in general can be used to elicit high intense and complex stimuli, so that one has to consider wisely, which material to chose, as it can be harmful to participants or is too complex to be good research material, when having children or impaired adults as participants (Rottenberg et al., 2007). This can, if using complex videos, automatically foreclose the search for participants, as certain groups of society cannot participate, which in turn can influence the generalizability and the recreation of data in follow-up research projects. Furthermore high intense content of pictures leads to heightened arousal measurements and the capture of attentional resources, which can have effect on the performance on other tasks, if it is required that the participants do more than one task at a time (Rottenberg et al., 2007; Codispoti et al., 2008; Bradley, Sabatinelli, Lang, Fitzsimmons, King & Desai, 2003).

In this context, so called demand characteristics (Rottenberg et al., 2007) are important to consider. Depending on the instructions and the cover stories told to the participants, expectations can be shaped

pretty easily, one has to keep in mind, if one wants to let the participants know of one's intentions or rather to conceal them, so that participants are not influenced by their knowledge, however one also has to take into account ethical principles not to harm the participants.

A positive and very practical point of films is highlighted in the article of Rottenberg et al. (2007) that describes especially the use of films for experiments and their validity. Films in general are standardized and are therefore practical for experimental purposes as little to no unforeseen variations have to be considered. He also points out that a high ecological validity is present as films can capture reality in a way, creating a very strong illusion or image which in turn can help to elicit emotions in humans. This point is one of the most important as the capture of emotions is one of the central pillars, this experiment will be build upon. Two other considerations have to be made as Rottenberg et al. (2007) points out, firstly one has to keep in mind, that a film is mostly longer than just a few seconds, therefore throughout the film not just one single and short emotion will be triggered, it is rather a stream of emotions, which gets longer as the film goes. This leads to one of the most important questions, on how to extract the emotion, one wants to measure and how long should the scene, shown to the participants, be? Truly one has to find a balance in length as longer films may have the advantage of eliciting longer lasting and possibly stronger emotions, but the disadvantage is as mentioned above the diversity of emotions, which could be triggered instead of the target emotion.

Going onwards to the physical context, Codispoti & De Cesarei (2007) pointed out that picture size influences the impact of stimuli. In general the impact of stimuli on the viewer, independent of the emotional valence, is lessened by decreasing picture size; those results have been accessed through conducting heart rate and skin conductance measurements. There is a difference between the two most used genres, namely mutilated body scenes and erotica, both are influenced by this phenomenon, but scenes with mutilated bodies seem to be more sensible to this phenomenon.

Regarding music Rickard (2004) as well as Bharucha et al. (2006) found a difference in listening experience, dependent on the cultural environment we grew up in, we will interpret and recognize different kinds of music as well as having the ability to tell which harmonic patterns will occur. This can elicit a certain kind of arousal depending on this knowledge. Rock music for example is found to have higher arousal ratings, when using a relative slow pace in contrast to classical music, which

arouses people more, the higher the pace rises. Rickard (2004) explains this phenomenon with the personal preference of music patterns and the knowledge of the same. Bharucha et al. (2006) give a more detailed explanation. They, too, are supporting the idea, that music itself cannot elicit emotions, but harmonic patterns can be learned through a cultural and educational context. Depending on what we learned, and are used to, one recognizes auditory patterns and can get aroused as a result of feeling somewhat familiar with the stimulus, on the other hand, people can get surprised, if such patterns are changed, so that our predictions fail to be right. This surprise is also arousing in a way that attentional resources are drawn to the stimulus.

Following hypotheses can be derived from theory:

H1: 1) More intense stimuli elicit stronger physical reactions and/or show a higher difference in valence.

2) Differences exist between visual and auditory information and how they influence emotions regarding arousal and/or valence.

3) High auditory and visual stimuli will have a greater effect regarding arousal and/or valence, when joined together, than when presented with the low intensity counterpart.

H2: Knowledge about film and music will enhance the emotion elicitation process in arousal and/or valence

H3: High scores on the Neuroticism subtest have a positive correlation with negative emotion excitation transfer.

2. Method

2.1. Sample

61 Dutch female participants, between the ages of 19 and 42 participated in this experiment. They have been recruited through an internal recruiting system called “sona system” and the internet. They have been divided into 4 groups of 16 participants in the High-High condition, 14 in the High-Low

condition, 15 in the Low-High condition, and 16 in the Low-Low condition, the groups will be explained in detail in section 2.3.

2.2. Setting and Materials

The experiment will be carried out in a dim-lit room with a 19-inch laptop monitor and Logitech stereo equipment to deliver images and sound to an appropriate degree.

The film scene used for the high visual groups originates in the horror movie SAW III and depict the scene from minute 7:38 till minute 9:47. In the low stimulus setting a scene with reoccurring, virtually generated "sticks" will be shown for the same duration of 2:09 minutes.

The title of the music chosen for the high auditive group is taken from the album "Inquisition Symphonie" of the group Apocalyptica, title 6 "M.B.". The low auditive group will get to hear the title "River flows in you" that appeared on his first album "First Love" and is composed and played by Yiruma.

The NEO-ffi test will be used to determine the scores on the neuroticism subtest as well as the Self Assessment Mannequin scale (Bradley & Lang, 1994), which is a paper and pencil test to assess the factors valence and arousal of the emotion elicited by the film. giving the researcher the possibility to assess these two main dimension independent of the language understanding, also a self-written background-knowledge test will be administered to determine the viewing history and knowledge about the film and music played.

2.3. Procedure

At first the participants will be divided into 4 groups, which will be as followed:

- Group 1: High visual stimulus + high auditory stimulus
- Group 2: High visual stimulus +low auditory stimulus
- Group 3: Low visual stimulus + high auditory stimulus
- Group 4/control group: Low visual stimulus + low auditory stimulus

The following procedure consists of three parts which are the relaxation part, a divided questionnaire part and the film part.

The first questionnaire part will be administered before the film part. In this part the Dutch version of the NEO-ffi neuroticism subtest will be applied to measure the independent factor of difference in personality and with that the differences in reactivity to the phenomenon of negative emotion excitation transfer, namely disgust. Furthermore the SAM scale will be used to establish a baseline from which differences can be measured.

With the completion of this section, the film part will be administered, and the film will be shown to the participant without the presence of the researcher in the room. Depending on the group, the according music and film pieces will be selected and shown to the participant. The groups and materials are stated in the sections above. Following the film part, again the SAM scale has to be completed by the participants to assess the dependent factor of the actual difference between the two points in time, as an addition, the participants have to fill in a knowledge questionnaire, about their viewing history to determine if the independent variable of knowledge has an effect on the independent variable.

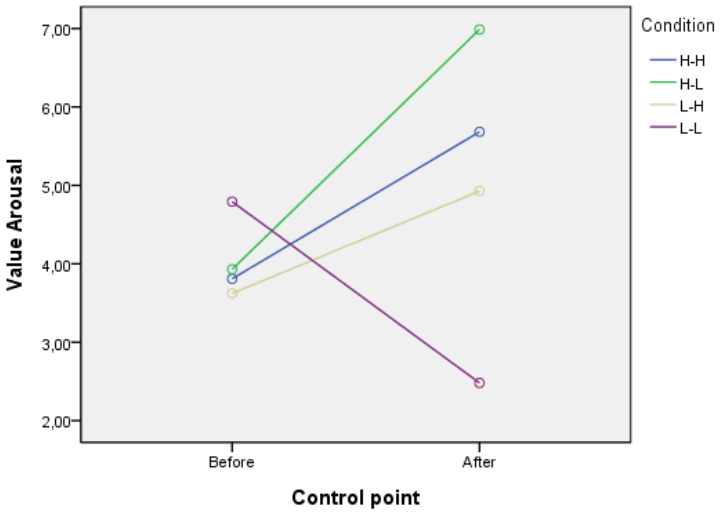
3. Results

3.1. Test of Hypothesis 1.1-3 & 3

Before starting with the analysis of main and interaction effects on the factor of *Arousal*, conducting an analysis on the matter of covariance is rather important, insofar that I want to control the independent factors "Age" and "NEO" over the control groups and the knowledge based scores, however results show significant values that would argue against the null hypothesis.

No main effect has been found for the independent factor *Arousal* (F(1,44)=1.84, p=.183) as well as the dependent variables *Condition*

Figure 1: The separate scores on Arousal for the different groups of pre- and post-measurements with a clear interaction effect between the control group and the other groups and a difference in slope for the latter.



Covariates appearing in the model are evaluated at the following values: NEO = 37,9821, Age = 21,3214

(F(1,44)=1.78, p=.165), *KnowledgeF* (F(1,44)=.13, p=.719) and *KnowledgeM* (F(1,44)=.05, p=.826). The only significant effect that has been verified is the interaction effect *Arousal*Condition*. With a significance value of F(3,44)=3.17 and p=.033 it is evident, that such an effect exists and further analysis shows that the group *L-L* scores exactly in the opposite direction than the other three groups, showing a negative mean difference (M_1=4.79, M_2=2.48), on top of that the *L-L* group crosses the other three groups regression lines. All the other groups are only interacting insofar that they show a different degree in their slope. This is made clear in Figure 5 and Table 1 with the given means of M_{LH1}=3.62, M_{LH2}=4.93, M_{HH1}=3.81, M_{HH2}=5.68, M_{HL1}=3.93 and M_{HL2}=6.99, starting with the lowest slope to the highest slope.

For the examination of the effects on the dependent factor *Valence* also the results show clearly that the variables "Age" (F_C(3,38) =.68, p = .570 and "NEO" (F(3,38) =1.19, p = .325 do not conflict with the null hypothesis, which states that the slopes of the variables are identical and that the regression lines intercept the Y-axis at the same point. This is proof that these variables can indeed be used as covariates.

Table 1: Mean and confidence interval for interaction condition*arousal demonstrating an opposite direction for the group L-L

Condition	Arousal	Mean	Std. Error
H-H	1	3,809[a,b]	,701
	2	5,682[a,b]	,638
H-L	1	3,930[a]	,699
	2	6,987[a]	,636
L-H	1	3,622[a,b]	,500
	2	4,927[a,b]	,455
L-L	1	4,793[a,b]	,897
	2	2,480[a,b]	,816

a. Covariates appearing in the model are evaluated at the following values: NEO = 37,9821, Age = 21,3214.
b. Based on modified population marginal mean.

No significant main effect has been found for the effect of *Valence* (F(1,44) = 1.45, p = .235), however modified by a significant interactional effect between *Valence*Condition* (F(3,44) = 3.08, p = .037) as well as *Valence*Condition*KnowledgeF* with F(1,44)=5.29, p=.026 respectively.

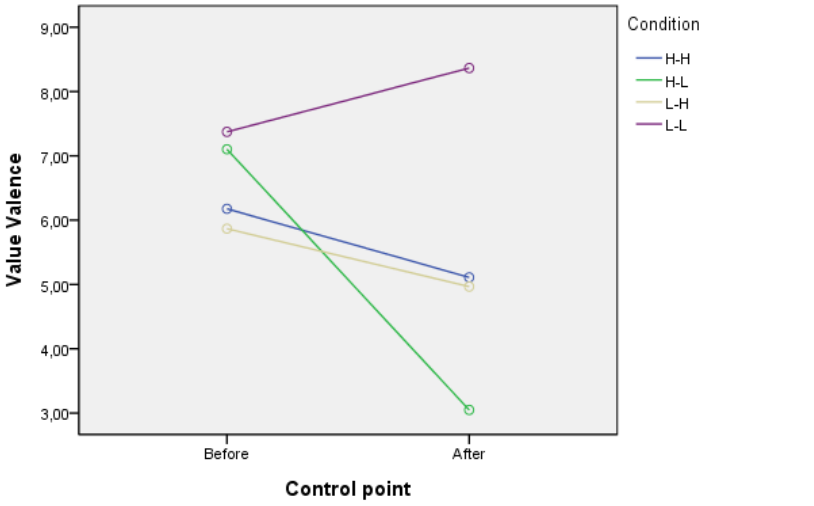
Through the application of a one-way ANOVA a significant main effect on the independent factor *Condition* has been found with F(3,44)=3.56 and p=.022. All three intervention groups, independent of the method inducing arousal, showed a very low mean (M_{HH}= 5.16, M_{HL}=5.25, M_{LH}=5.70). Only the control group would show the opposite reaction, scoring slightly higher after the intervention

(M_{LL}=7.44, M_{LL1}=7.07; M_{LL2}=7.60). *Figure 1* illustrate the mean differences between the groups. After making use of the Post Hoc test of Bonferroni, the before mentioned main effect was supported by significance values of p_{HL-LL}=.023 and p_{LH-LL}=.030.

In regard of the interaction effects, the following figures 2, 3 and 4clearly outline them respectively for the factors *Condition*Valence* and the factors *Condition*KnowledgeF* Valence.*

The interaction effect *Condition* Valence* is clearly visible for the *high-low* group, it shows a cross-over interaction, evidently a higher negative effect for the *high-low* group, with the groups *high-high* (M_1=6.18, M_2=5.11)and *low-high* (M_1=5.87, M_2=4.97), expressed by the wider mean margin with M_1=7.10 before the intervention and with M_2=3.049 after the intervention, also the control groups interaction with the other groups is clearly visible, as its direction is reversed compared to the others, showing a positive effect between the measurement points in time. (M_{LL1}= 7.74, M_{LL2}=8.36)

Figure 2: Interaction effect Condition*Valence showing a higher baseline for the control and H-L group with a positive slope for the first and a stronger negative slope for the latter in comparison to the other groups.



Covariates appearing in the model are evaluated at the following values: NEO = 37,9821, Age = 21,3214

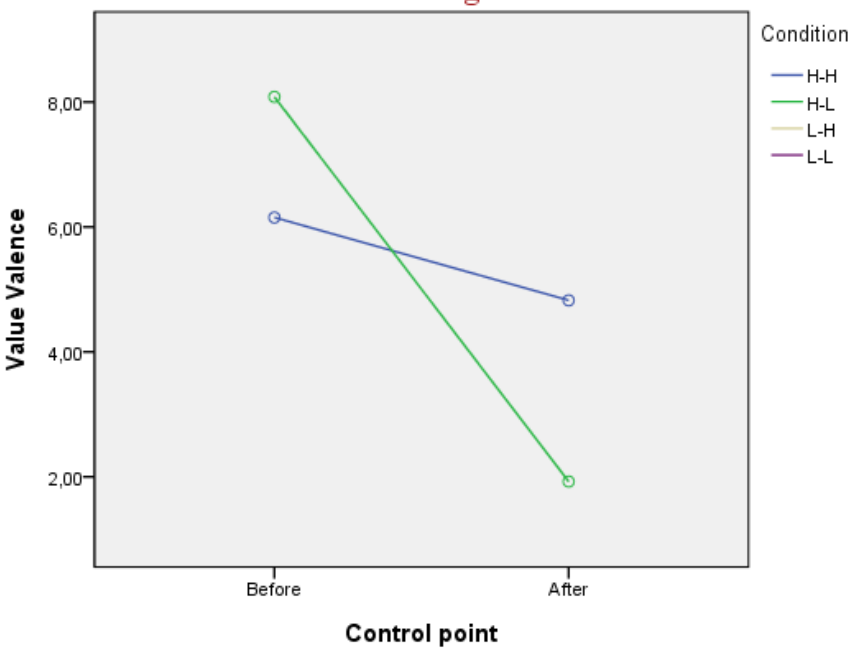
3.2. Test of Hypothesis 2

It has to be noted that the results for the interaction effect *Condition*KnowledgeF*Valence* have been based on the available data, so for some conditions a lack of data/cases is evident especially for the true condition of the factor *KnowledgeF* where only for the *high-high* and the *high-low* groups data is available. The *H-H* (M_1=6.15, M_1=4.83) and *H-L* (M_1=8.08, M_2=1.93) conditions show a hybrid interaction pattern, while they have a cross-over interaction in the *true* condition of the factor

KnowledgeF, with a higher negative effect for the *H-L* group, on the *false* condition they do not show a crossing interaction pattern, however the *H-L* group still shows a higher negative effect according to the means M_{HH1}=6.19, M_{HH2}=5.25 and M_{HL1}=6.11, M_{HL2}=4.18. In contrast to that, the *H-L* group does cross-over with the *L-H* group in the false condition for the factor KnowledgeF, just as for the control group the means have not changed.

Figures 1&4: Showing the Interaction effect Condition* Valence while on the left scoring true and on the right scoring false on the independent factor KnowledgeF. No scores for the L-H and control group are available in the true condition, and on this condition the H-L group scores higher on the baseline variable then in the false condition.

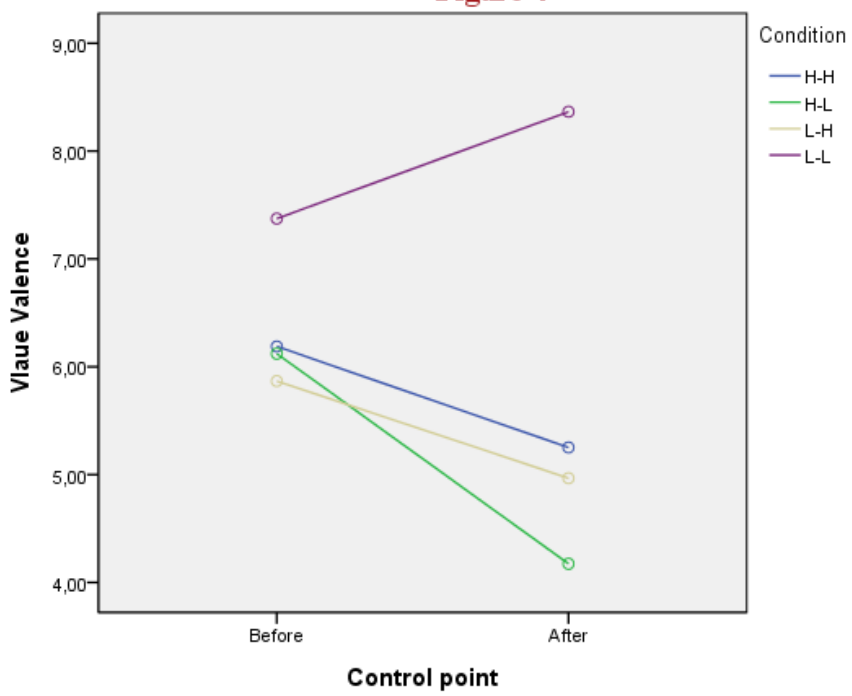
Figure 3



Covariates appearing in the model are evaluated at the following values: NEO = 37,9821, Age = 21,3214

Non-estimable means are not plotted

Figure 4



Covariates appearing in the model are evaluated at the following values: NEO = 37,9821, Age = 21,3214

3.3. Test of Hypothesis 3

The independent factor *NEO* has been assessed by means of an ANOVA. The analysis has been conducted for each group separately so that the influence of the independent variable "Condition" does not interfere with the analysis. Results for the group H-L show a clear main effect for the factor *NEO* for the dependent variable *Arousal*. Further research showed that only in the L-H group a significant main effect can be found for the Arousal ratings with F(9,13)=13.32 and p=.012. Seeing the mean of all *NEO* scores however shows clear peaks at a value of 32 and 38 with M_{32}=8.50 and M_{38}=9.

Table 2: Results for the Group H-L on the dependent factors Valence and Arousal, showing a clear main effect for on the factor Arousal.

Condition			Sum of Squares	df	Mean Square	F	Sig.
L-H	EffectA	Between Groups	99,933	10	9,993	13,324	,012
		Within Groups	3,000	4	,750		
		Total	102,933	14			

4. Discussion

Hypothesis 1.1-3

We have consider the theory of Bradley & Lang (1994) and the analysis will follow this direction in considering both dependent factors *Valence* and *Arousal* equally and as correlated with each other. The research findings also support this theory, given that participants in the control group with low intensity show a trend contrary to those of the other groups, by lowering *Arousal* ratings but at the same time increasing positively in *Valence* ratings.

So the most important question, whether high intense stimuli trigger higher *Arousal* and *Valence* reactions in the participants has to be answered before even considering the other hypotheses. While participants in the groups H-L and L-H have indeed reported to feel significantly more negative emotions than the control group, people in the H-H group showed only a slightly more positive but not significant difference than the L-H group, this supports the hypothesis that more intense stimuli elicit stronger emotional responses to a certain degree. The arousal ratings in contrary do not differ between the groups. This result could lead one astray, that is participants in the L-H group reported afterwards that they expected a horrifying movie scene due to the explanation of my research online. With this the people, while watching a neutral stimulus but hearing high intense music, expected something shocking to happen and as a result their arousal ratings have been heightened, influencing these results. An effect similar to this indeed has been mentioned by Rottenberg et al. (2007). In this study, considering ethical guidelines, the research description has manipulated the expectations of the participants. This however only has been reported for the L-H group, the control group participants have not reported such expectations. An explanation could be, that the high intense music would indeed trigger an expectation to what the film should show.

Not only main effects have been found, but also interaction effects which support the second hypothesis very strongly. Results show a much greater negative regression for the H-L group, than all the other groups (especially L-H) for both *Arousal* and *Valance*. This means that high intense visual stimuli seem to have a greater effect on emotion elicitation than auditory stimuli. Indeed as mentioned before by Pavlović and Marković (2011) visual stimuli are much easier to interpret as they already

transport emotional information, which is conveyed by a story which in turn can easily be interpreted by broader emotional experiences of the participant. This also leads to the third hypothesis because of the very surprising finding, that when both stimuli are intense it has a lesser negative regression, then when high intense visual stimuli are paired with a less intense auditory stimulus. Does this mean that all the authors that have researched this matter are wrong? (Codispoti & De Cesarei, 2007, Schupp et al., 2007) Rather than being wrong, they have most likely researched the same topic with different stimuli. In this matter Pavlović´s and Marković´s (2011) research reviews the results of incongruent conditions between film and music. One of their results marks a significant effect in the dimension of the trust-disgust opposite. This is, that films eliciting disgust, paired with trustful music would trigger an even higher rating of disgust. The H-L group in this research clearly fits into this category. All of those results are illustrated by Pavlović and Marković (2011) by the high cognitive load, which occurs through the problem of emotional appraisal of either film or music. The result if this finding is, that at least in this combination no significant additive function can be found.

Combining the findings one can conclude that intense stimuli indeed trigger stronger emotional reactions with a higher effect for visual stimuli and with an opposite additive effect as described earlier. Even though no main effects have been found for the research on *Arousal*, it is clearly visible, that *Arousal* ratings indeed follow a more intense positive slope then do *Valence* in the opposite direction. So researchers indeed have not been wrong emphasizing bodily reactions, however as one can see, significant differences can be found on the emotional appraisal of the stimuli, so all in all these findings support theory for most parts.

Now coming back to one of the matter of the knowledge based enhancement of emotional reactions, especially the factor knowledge of the film and music is tested (Rottenberg et al., 2007) and not the factor of real life event knowledge as introduced by some authors (Rickard, 2004, Koneč et al., 2008, Cohen 2001,2010, Pavlović and Marković, 2011). The findings of this research support this theory to at least a certain degree. Results show a much stronger negative effect for the H-L group for the interaction between the dependent factor *Valence* and the independent factor condition when indeed having knowledge of the film, in contrast to not knowing the film; other than that no significant effect has been found, neither for the other groups, nor for the dependent factor *Arousal*, nor regarding

musical knowledge. Does one have to conclude that therefore the already existing theories are wrong? Most likely the answer would be no. Especially given the fact that only three respondents in the H-H group and two respondents in the H-L group responded with having watched the film before. The fact that in the other two groups no pre-knowledge has been found is due to the fact, that it is only an animation and not an actual film, also supposedly the target group (woman mostly at an age between 17-27) does not normally watch films of this sort (movies depicting mutilation) as a response to major emotional distress when watching films like those. This has also been reported by most of the participants that they rather would not like to see the horror movie if there is a chance not to. The same is visible for the factor knowledge about music. Only 1respondent in the rock music conditions and five respondents in the classic music condition have stated to know the piece of music. Given those results, one cannot conclude that research on this matter is neither significant, nor representative due to a deficiency on data. Aside the research setting participants reported to have recognized the classical music piece due to knowledge of another film and attached to that a slight notion of emotional appraisal, however no data on those reports are available due to the oral statements offside the research. This matter can be of concern for later research projects including personal reports and/or a method to evaluate emotion appraisal on music. Also as a point for future research it would be most interesting to understand the appraisal of music that has been experienced in company of another film and placing the same piece of music in another film. A possible hypothesis emerging from my findings could be, if the music disturbs the emotional appraisal of the new film, if the film does elicit a different kind of emotion than the first one, the music has been accompanied with.

The last hypothesis, too, is concerned with personal/character differences namely the independent factor *NEO*. The theory introduced by Gard and Kring (2007) as well as Bunce et al. (1993) says that the NEO-pi-r scale corresponds with the BIS scale and therefore is a mean to measure in how far people tend to experience negative emotional excitation transfer. This theory however is not supported by the findings of this research; the main effect that has been verified is that in the H-L group for the dependent factor *Arousal* the peaks appear at the values of 32 and 38. 31 to 32 which is also the average score for woman in general. These results do not support theory at all; moreover it conflicts with earlier theories in general.

Explanations for not finding the desired significant differences can be drawn from two research parameters: reliability and validity. Reliability has been damaged by two factors. At first the sample of 61 respondents, too, small, as a minimum of 80 respondents has to be reached to meet the requirements to speak of a reliable research for this kind of statistical construct. This could indeed explain the inability to reproduce findings at least to a certain degree, however at least a drift of the results to theory should have been observable. This is not the case for all factors. The tests on the factors *Intensity*, *NEO* and *Knowledge* are definitely influenced by this matter, but as mentioned before, it cannot be the only thing to explain for this phenomenon. Another factor as mentioned earlier are the insufficient skills for manipulating visual and auditory material to achieve a satisfactory result in viewing experience. This could indeed have had an influence on the factor music, with which a reproduction has not been successful. Especially the accentuation of the climaxes in the film has not been worked out quite well and therefore may have had not the desired impact concerning the higher effect when both high stimuli are joined together.

Now it is also important to highlight the parameter validity. After having questioned half of the participants an important fact has occurred, namely regarding training or priming effects for the SAM-scale. The SAM-scale has been applied right before the film and right after the film, however this time span could have been, too, short, so that participants could have remembered their answer from before and could have been biased by that knowledge and with that internal validity is in danger to be really low. Half-way through the time span has been lengthened by about 15, as the SAM-scale has been applied before the NEO-ff-I test, also assuming that the cognitive load required to answer the NEO-ff-I test would overwrite the priming effects on the SAM-scale is, could be fairly accurate. Not concerning validity and reliability directly but never the less related to this issue is that the findings could represent reality quite well and are repeatable, however the narrow target group would suggest that the relevance of this research is rather low, this is that woman supposedly are less likely to watch films depicting mutilation scenes and therefore do not share the same relevance for woman than for men, hence the questions of some participants if it would be possible to be placed in a group without having to see the high intensity scene.

Resuming the results it is made clear that when assessing intensity and the effects on excitation transfer, that it is possible to create a difference to a sufficient degree. This however is not only restricted to a pure physical domain but also includes the cognitive or emotion domains. One more point is, that the differences, may not support theory to a sufficient degree. Main explanations for the inability to reproduce the findings of earlier research projects are firstly the insufficient width if the sample, secondly the limited technical and medial skills needed for this kind of research, thirdly the procedural inaccuracies and last but not least the limited target group and accordingly the low relevance.

Suggestions for further research would definitely concern the deficits of this research like group size, target group, measurement process and technical realization. One point however that is at least as important as the mentioned factors would be the research about the influence of musical knowledge on excitation transfer. This research only accounted for the specific knowledge of the musical piece, however more interesting in this matter would be, how theory suggests, if general music understanding of genre and patterns does influence the transfer of emotions. All in all this research holds only partially significant results on the matter of excitation transfer and may not share the relevance than other articles on this matter, however for future research this may present a help to avoid certain pitfalls and may serve as a stepping stone to explore the influence of films and music on excitation transfer with a focus on emotional appraisal.

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Appendices

Table 1: Means and Std. Deviations for all groups and conditions

	Condition	Mean	Std. Deviation	N
MiddelC	H-H	5,1563	1,12129	16
	H-L	5,3462	2,09548	13
	L-H	5,4167	1,04083	12
	L-L	7,3333	,69864	15
	Total	5,8393	1,57569	56
MiddelA	H-H	5,0313	1,27107	16
	H-L	5,1154	1,08309	13
	L-H	4,2500	1,11803	12
	L-L	3,1667	1,33184	15
	Total	4,3839	1,43334	56
MiddelI	H-H	5,1250	1,14746	16
	H-L	4,9615	1,89804	13
	L-H	5,4167	,92524	12
	L-L	5,6333	1,24595	15
	Total	5,2857	1,33436	56

A: Repeated measures Valence

Table 2: Test of co variation between the independent variables on the dependent factor Valence, without proof that the regression lines are not parallel to each other

Source	F	Sig.
NEO	,226	,636
Age	,003	,956

Table 3: Multivariate Tests to determine interaction-effects with significant values for Valence*Condition and Valence*Condition*KnowledgeF

Effect		Value	F	Hypothesis df	Error df	Sig.
Valence * Condition						
	Wilks' Lambda	,826	3,079[a]	3,000	44,000	,037
Valence * Condition * KnowledgeF						
	Wilks' Lambda	,893	5,290[a]	1,000	44,000	,026

a. Exact statistic

Table 4: Test for between-subject effects for the dependent factor Valence, showing that a significant difference between groups exists.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Condition	41,171	3	13,724	3,558	,022

Table 5: Bonferroni Post hoc test for group differences, showing a high difference of effect for the parings of H-L>L-L and L-H>L-L

					95% Confidence Interval for Difference[b]	
(I) Condition	(J) Condition	Mean Difference (I-J)	Std. Error	Sig.[b]	Lower Bound	Upper Bound
H-H	H-L	,567[a]	,800	1,000	-1,643	2,777
	L-H	,226[a,c]	,698	1,000	-1,702	2,154
	L-L	-2,226[a,c]	,907	,109	-4,732	,280
H-L	H-H	-,567[c]	,800	1,000	-2,777	1,643
	L-H	-,341[c]	,690	1,000	-2,247	1,564
	L-L	-2,793[c,*]	,917	,023	-5,326	-,260
L-H	H-H	-,226[a,c]	,698	1,000	-2,154	1,702
	H-L	,341[a]	,690	1,000	-1,564	2,247
	L-L	-2,452[a,c,*]	,829	,030	-4,742	-,162
L-L	H-H	2,226[a,c]	,907	,109	-,280	4,732
	H-L	2,793[a,*]	,917	,023	,260	5,326
	L-H	2,452[a,c,*]	,829	,030	,162	4,742

Based on estimated marginal means

a. An estimate of the modified population marginal mean (I).

b. Adjustment for multiple comparisons: Bonferroni.

c. An estimate of the modified population marginal mean (J).

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

Table 6: Test for interaction effect Condition * Valence with a higher slope for the H-L group, intersecting the L-H and H-H groups and a slope in opposite direction for the L-L group.

Condition	Valencel	Mean	Std. Error
H-H	1	6,177[a,b]	,620
	2	5,110[a,b]	,791
H-L	1	7,103[a]	,618
	2	3,049[a]	,789
L-H	1	5,867[a,b]	,442
	2	4,967[a,b]	,564
L-L	1	7,373[a,b]	,793
	2	8,365[a,b]	1,012

a. Covariates appearing in the model are evaluated at the following values: NEO = 37,9821, Age = 21,3214.

b. Based on modified population marginal mean.

Table 7: Test for the interaction effect between the factors Condition*KnowledgeF*Valence with a clear more negative slope for the H-L group when having knowledge of the film

Condition	KnowledgeF	Valencel	Mean	Std. Error
H-H	true	1	6,153[a,b]	,892
		2	4,826[a,b]	1,137
	false	1	6,189[a]	,809
		2	5,252[a]	1,032
H-L	true	1	8,084[a]	1,080
		2	1,925[a]	1,377
	false	1	6,122[a]	,607
		2	4,173[a]	,774
L-H	false	1	5,867[a,b]	,442
		2	4,967[a,b]	,564
L-L	false	1	7,373[a]	,793
		2	8,365[a]	1,012

a. Covariates appearing in the model are evaluated at the following values: NEO = 37,9821, Age = 21,3214.

b. Based on modified population marginal mean.

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B: Repeated measures Arousal

Table 8: Test of co variation between the independent variables on the dependent factor Arousal, without proof that the regression lines are not parallel to each other

Source	F	Sig.
NEO	2,727	,105
Age	2,185	,146

Table 9: Multivariate Tests showing a significant interaction effect between Condition*Arousal

Effect		Value	F	Hypothesis df	Error df	Sig.
Arousal * Condition	Wilks' Lambda	,822	3,172[a]	3,000	44,000	,033

a. Exact statistic

Table 10: Means for interaction of condition*activity

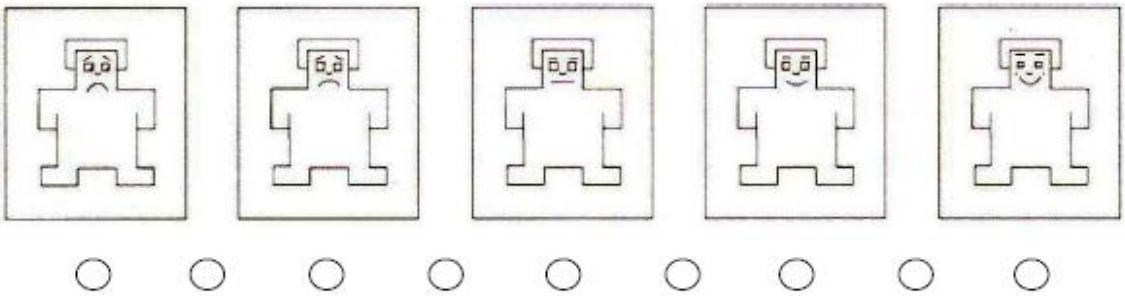
Condition	Activity	Mean	Std. Error
H-H	1	3,809[a,b]	,701
	2	5,682[a,b]	,638
H-L	1	3,930[a]	,699
	2	6,987[a]	,636
L-H	1	3,622[a,b]	,500
	2	4,927[a,b]	,455
L-L	1	4,793[a,b]	,897
	2	2,480[a,b]	,816

a. Covariates appearing in the model are evaluated at the following values: NEO = 37,9821, Age = 21,3214.

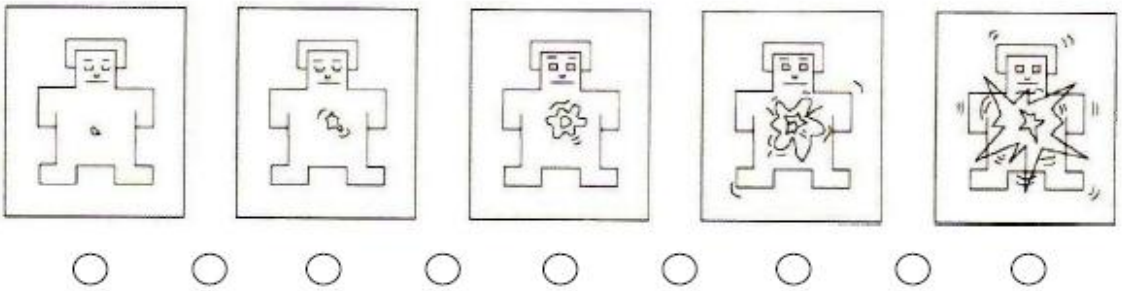
b. Based on modified population marginal mean.

C: SAM-Scale

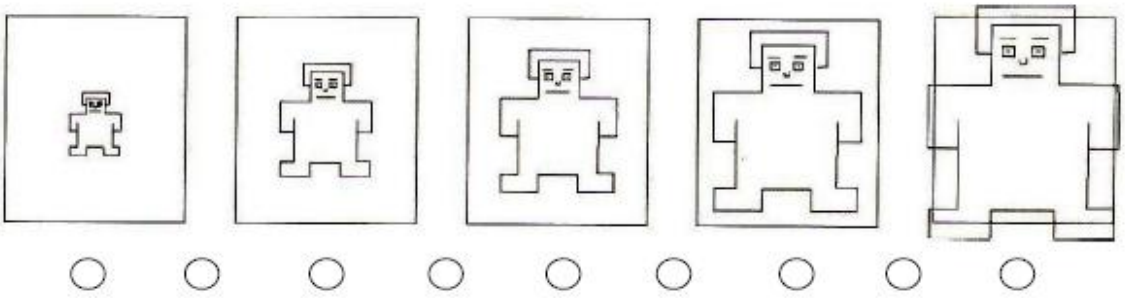
Hieronder zie je drie verschillende schalen (onplezierig-plezierig; kalm-opgewonden; beheerst worden (gedomineerd worden)- beheersen (domineren).
Geef voor elk schaal aan welke figuur het meest overeenkomt met het gevoel dat de videoclip bij jou opriep. Kruis bij elke schaal één van de negen rondjes aan.



Onplezierig **Plezierig**



Kalm **Opgewonden**



Beheerst worden (gedomineerd worden) **Beheersen (domineren)**

D: Voorkennis

1. Vragenlijst Voorkennis Rock

2. Heeft u de net bekeken film al een keer gezien? JA/NEE

3. Luistert u vaker naar rockmuziek? JA/NEE

4. Kent u de band Apocalyptica en heeft u al eens naar liederen van deze band geluisterd?

   JA/NEE

➔ Alleen doorgaan, als u op vraag 3 “JA” als antwoord gegeven heeft.

5. Kent u de net beluisterde titel “M.B.” uit het album “Inquisition Symphonie”?

   JA/NEE

2. Vragenlijst Voorkennis Klassiek

6. Heeft u de net bekeken film al een keer gezien? JA/NEE

7. Luistert u vaker naar klassieke muziek? JA/NEE

8. Kent u de pianist Yiruma en heeft u al eens naar liederen van deze pianist geluisterd?

   JA/NEE

➔ Alleen doorgaan, als u op vraag 3 “JA” als antwoord gegeven heeft.

9. Kent u de net beluisterde titel “River flows in you” uit het album “First Love”?

   JA/NEE

E: NEO-ff-I

NEO-FFI • Vorm S •

SCHRIJF NIET IN DIT BOEKJE

INSTRUCTIE

Lees alle instructies zorgvuldig door voor u begint met antwoorden.

Deze vragenlijst bevat 60 uitspraken. Lees elke uitspraak zorgvuldig.
Kruis **op het aparte antwoordformulier** aan welke uitspraak uw mening het beste weergeeft. Let er op dat u geen regels overslaat.

Kruis het vakje **HO** aan als u het **helemaal oneens** bent met de uitspraak,
of als u de uitspraak absoluut onwaar vindt.

Kruis het vakje **O** aan als u het **oneens** bent met de uitspraak,
of als u de uitspraak grotendeels onwaar vindt.

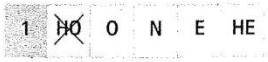
Kruis het vakje **N** aan als u **neutraal** bent, niet kunt beslissen,
of als u de uitspraak ongeveer even waar als onwaar vindt.

Kruis het vakje **E** aan als u het **eens** bent met de uitspraak,
of als u de uitspraak grotendeels waar vindt.

Kruis het vakje **HE** aan als u het **helemaal eens** bent met de uitspraak,
of als u de uitspraak absoluut waar vindt.

Voorbeeld

Als u het bijvoorbeeld helemaal oneens bent met de uitspraak "Ik zou wel een miljoen willen winnen", dan kruist u op het antwoordblad als volgt aan:



Kruis slechts één mogelijkheid aan bij elke uitspraak. Beantwoord alle uitspraken.

Wilt u een antwoord veranderen, maak dan uw eerste keuze ongeldig door deze helemaal zwart te maken en kruis alsnog uw juiste keuze aan.

Vult u eerst de gevraagde persoonsgegevens op het antwoordformulier in.

1. Ik ben geen tobber.
2. Ik houd ervan veel mensen om me heen te hebben.
3. Ik hou er niet van mijn tijd te verdoen met dagdromen.
4. Ik probeer hoffelijk te zijn tegen iedereen die ik ontmoet.
5. Ik houd mijn spullen netjes en schoon.
6. Ik voel me vaak de mindere van anderen.
7. Ik lach gemakkelijk.
8. Als ik eenmaal de goede manier om iets te doen gevonden heb, dan blijf ik daarbij.
9. Ik verzeil vaak in meningsverschillen met mijn familie en collega's.
10. Ik kan mijzelf vrij goed oppeppen om dingen op tijd af te krijgen.
11. Wanneer ik onder grote spanning sta, heb ik soms het gevoel dat ik er aan onderdoor ga.
12. Ik zie mezelf niet echt als een vrolijk en opgewekt persoon.
13. Ik ben geïntrigeerd door de patronen die ik vind in de kunst en de natuur.
14. Sommige mensen vinden mij zelfzuchtig en egoïstisch.
15. Ik ben niet erg systematisch.
16. Ik voel me zelden eenzaam of triest.
17. Ik vind het echt leuk om met mensen te praten.
18. Ik vind dat leerlingen alleen maar in verwarring worden gebracht door ze te laten luisteren naar sprekers met afwijkende ideeën.
19. Ik werk liever met anderen samen dan met ze te wedijveren.
20. Ik probeer alle aan mij opgedragen taken gewetensvol uit te voeren.
21. Ik voel me vaak gespannen en zenuwachtig.
22. Ik ben graag daar waar wat te beleven valt.
23. Poëzie doet mij weinig tot niets.
24. Ik ben vaak cynisch en sceptisch over de bedoelingen van anderen.

25. Ik heb duidelijke doelen voor ogen en werk daar op een systematische manier naartoe.

26. Soms voel ik me volkomen waardeloos.

27. Ik geef er meestal de voorkeur aan om dingen alleen te doen.

28. Ik probeer vaak nieuwe en buitenlandse gerechten.

29. Ik denk dat de meeste mensen je zullen gebruiken als je ze de kans geeft.

30. Ik verknoei veel tijd voordat ik echt aan het werk ga.

31. Ik voel me zelden angstig of zorgelijk.

32. Ik voel me vaak alsof ik barst van de energie.

33. Ik merk zelden de stemmingen of gevoelens op, die verschillende omgevingen oproepen.

34. De meeste mensen die ik ken mogen mij graag.

35. Ik werk hard om mijn doelen te bereiken.

36. Ik word vaak kwaad om de manier waarop mensen me behandelen.

37. Ik ben een vrolijk en levendig iemand.

38. Ik vind dat we beslissingen in morele zaken van onze religieuze leiders mogen verwachten.

39. Sommige mensen vinden mij koel en berekerend.

40. Als ik iets beloof, kan men erop rekenen dat ik die belofte nakom.

41. Wanneer dingen mis gaan raak ik maar al te vaak ontmoedigd en heb ik zin om het op te geven.

42. Ik ben geen vrolijke optimist.

43. Wanneer ik een gedicht lees of naar een kunstwerk kijk, voel ik soms een koude rilling of een golf van opwinding.

44. Ik ben zakelijk en onsentimenteel in mijn opvattingen.

45. Soms ben ik niet zo betrouwbaar als ik zou moeten zijn.

46. Ik ben zelden verdrietig of depressief.

47. Ik heb een jachtig leven.

48. Ik ben niet erg geïnteresseerd in het speculeren over het wezen van het universum of van de mens.

49. Over het algemeen probeer ik attent en zorgzaam te zijn.

50. Ik ben een productief mens die een klus altijd voor elkaar krijgt.

51. Ik voel me vaak hulpeloos en wil dan graag dat iemand anders mijn problemen oplost.

52. Ik ben een heel actief persoon.

53. Ik heb een breed scala aan intellectuele interessen.

54. Als ik mensen niet mag, laat ik dat ook merken.

55. Het lijkt mij maar niet te lukken om de dingen goed op orde te hebben.

56. Soms schaam ik me zo dat ik wel door de grond wil zakken.

57. Ik ga liever mijn eigen gang dan dat ik leiding geef aan anderen.

58. Ik heb vaak plezier in het spelen met theorieën of abstracte ideeën.

59. Als het nodig is ben ik bereid om mensen te manipuleren om te krijgen wat ik wil.

60. Ik streef ernaar uit te blinken in alles wat ik doe.