

## **Stereoscopic Death View**

### **Does the Third Dimension Add to Effects on the Audience of a Horror-Movie?**

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## **Abstract**

Research on violence in television and in computer games revealed that there are at least moderate effects on its viewers. In this paper, we raise this question again concerning violence in stereoscopic movies: Against the background of excitation transfer, the general aggression model, presence and involvement, we discuss the negative effects of violence in stereoscopic movies. We argue that through involvement and the feeling of presence, perceived realism and identification with the protagonists are higher in stereoscopic presentations of a movie compared to conventional presentation, increasing the likelihood of aggressive and violent behavior. Furthermore we argue that a higher level of activation because of the mode of presentation might lead to a general higher willingness to act.

## Introduction

After James Cameron's success with his stereoscopic movie *Avatar* this old technology to add depth perception to the reception experience is back in focus of movie makers and their marketers. This paper discusses how psychological concepts like involvement, activation, and aggression can be theoretically linked to the reception of stereoscopic movies and how communication research in this area should be conducted.

Stereoscopic production of movies is on the rise and some of the movies which are produced with conventional technology are converted in to stereoscopic depictions using computer technology. More and more movie theaters have the possibility to present stereoscopic movies and even the home entertainment industry is beginning to produce TV sets which can reproduce stereoscopic pictures. It remains unclear whether this is just yet another wave of stereoscopic movies or whether this is the dawn of a new era in cinemas comparable to the introduction of color and sound. It is clear though that at the present time stereoscopic presentations result in an intensive reception experience, because viewers watch a more realistic depiction of the plot they watch on the screen.

In this context, we would like to raise an old question: How do recipients react to media violence in stereoscopic environments? Does the third dimension add to effects on the audience of a horror-movie? As the stereoscopic depiction of violence might be perceived as more realistic than conventional depictions, this particular type of presentation might increase aggression in the recipients. Aspects that contribute to these assumptions are (a) technical improvement in the production of entertainment such as horror-movies, (b) the feeling of presence and involvement during reception leading to a higher identification with the protagonist and his aggressive action or the victim's suffering, (c) the general aggression-potential of horror-movies.

Technical improvement in the production and presentation of entertainment such as horror-movies allow stereoscopic content to give an even better illusion of depth of the presented movie to the recipients. The basic principle of a stereoscopic presentation is to deliver two slightly different pictures for each eye of the recipient. The difference is a small horizontal shift of the cameras recording these pictures. Individuals can decode the depth information in these two pictures if presented with the left picture on the left eye and the right picture on the right eye. With this additional information available an impression of a three-dimensional motive is given to the recipient.

If one wants to transport stereoscopic pictures to a recipient, three different methods are conceivable: (1) the recipient's eyes look directly at each of the two pictures e.g. through oculars; (2) the recipients wear glasses which decode the two pictures which are coded with space, time or properties of the light (wave length, polarization); (3) the separated pictures are projected directly to the two eyes of the recipient. At the present state of technology methods using glasses prevail. In modern cinemas the two different pictures are coded with two different polarizations of the light. In home entertainment shutter glasses are used which allow each eye with a certain frequency while the other eye is obscured and the other way round. In this case the different pictures are coded into time. Both methods keep the color-information of the picture correct unlike older methods where each eye was presented with a picture of a certain color, which lead to an impression with realistic depth information and unrealistic colors.

The current wave of cinemas introducing stereoscopic presentation is supported by the trend of digital production, distribution and projection of movies. With installing a digital projector stereoscopic presentations are easily possible for theaters. Thus both innovations

support each other. On the other hand both innovations have effects on the artistic and technical production of movies, which might lead to changes in the reception of this content.

Concerns about the harmful effects of media violence date back to philosophical discussions between Aristotle and Plato. Communication research has often dealt with the effects of media violence: “Over a period spanning more than 50 years, research evidence has accumulated about media violence with leading scholars, principally in the United States, reaching the conclusion that exposure to media violence, especially that occurring on film and television, facilitates aggressive and antisocial behavior among those who watch it. Furthermore, each exposure has a developmental effect that cultivates traits that increase the likelihood of overt expression of violence in later life (C. A. Anderson et al., 2003; Johnson, Cohen, Smailles, Kasen, & Brooks, 2002)” (Gunter, 2008, p. 1062). The question about the effects of media violence is not only a philosophical one but also a political one: “A combination of rising crime rates, acts of civil disturbance, and occurrence of high-profile acts of aggression on prominent public figures in the United States during the 1960s led the government of the day to ask searching questions about the causes of violent behavior (Comstock, Chaffee, Katzman, McCombs, & Roberts, 1978)” (Gunter, 2008, p. 1062). Even though meta-analyses of studies focusing on the effects of media violence (e.g. Paik & Comstock, 1994; Bushman & Anderson, 2001) revealed minor statistical effects (Sherry, 2004), the harmful effects of media violence are still discussed from political, sociological, juridical and economical viewpoints. And as high-school massacres and other media-inspired violent acts show, even minor statistical effects can have major consequences.

We propose a study which analyzes the effects of a stereoscopic presentation compared to a conventional presentation of a horror-movie. After discussing stereoscopic content as treatment in further detail we look at involvement, activation, and aggression as

relevant psychological concepts during the reception process of a horror-movie. After this we discuss possible methods for such a study.

### **Stereoscopic Content as Treatment**

We are proposing to use stereoscopic content as treatment in an experiment. It is clear that the fact of one seeing a stereoscopic version of a movie has more than one consequence on the reception-process. In the following section we want to discuss which aspects of the reception-process are affected by differences between stereoscopic and conventional content. We will focus on three aspects: (1) Differences in the context of the reception for individuals. (2) Differences in the magnitude and complexity of information the individual has to process. (3) Differences in the perceived realism of the material.

Differences in the context of the reception for individuals can be relevant during the reception process. Although these differences have been diminished with current technology an individual watching a stereoscopic presentation of a movie will still have to wear special glasses which decode the different pictures projected on the screen into the two pictures for the left and right eye of the recipient. There is also another yet unresolved aspect: Since part of the light on the screen has to be filtered out for each eye, there is less light reaching both eyes resulting in a less bright image compared to conventional presentations. Past conditions for the reception of stereoscopic content involved glasses with different colors or glasses with a determined posture of the head. Compared with those past issues the current differences in the reception context are minor.

The magnitude and complexity of information the individual has to process in a stereoscopic presentation and a conventional presentation are larger even though the differences are not as large as the notion of “3D” is suggesting. On the most basic level one

could argue, that in a stereoscopic presentation the recipient has to process two different images while in a conventional presentation he or she would only have to process one image. But this is not true, since most of the information in both pictures is the same. There are only slight differences between those two images which carry the information of the distance between the recipient and the represented objects. This additional information certainly has to be processed by the recipients. On the other hand even in a conventional presentation, there is information about the depth of the image, which is available for the recipient and helps to reconstruct a three-dimensional view of the representation. This includes textures, shadows, movement, overlap, saturation and color of the objects. Therefore the additional information conveyed in a stereoscopic presentation compared to a conventional presentation is substantial but not enormous.

The most important factor resulting from a stereoscopic presentation is the perceived realism of the material. Even though the conventional presentation conveys almost as much information as the stereoscopic one, the recipients will probably perceive the latter as more realistic than the former, because they can use the more involuntary mechanisms in their perception of depth. It has to be added that not all these involuntary mechanisms in depth-perception can be used by the recipient in the context of the current technology of stereoscopic presentations. These include movement of the recipient or bending of the lens in the recipient's eye. Nevertheless the additional possibilities to estimate distances of the represented objects will contribute to the perceived realism of the content. This does not mean that recipients actually believe that the represented objects are at the position they perceive them, but compared to a conventional presentation they will perceive the representation to be more consistent with perceptions of the same kind of objects in the real world.

The differences between stereoscopic content as opposed to conventional content are multidimensional. The most important factors have been discussed above. In an experiment there is always a tradeoff between internal validity (treatment group and control group differ only in one dimension) and external validity (situation of the experiment and real-life situation do not differ too much). It is possible to make people who get to watch the conventional presentation wear glasses or dim the light of the projector for the presentation. This would lead to more internal validity, but to less external validity. For this reasons we accept the different aspects of stereoscopic presentations which we discussed and propose to test a stereoscopic and a conventional presentation of the same content against each other.

Other aspects of real-world differences between stereoscopic presentations and conventional presentations cannot be tested within one experiment. The first major difference is the whole movie itself: Not all movies on the market are available in a stereoscopic version. This difference is not random but systematic. Some genres are more probable to have a stereoscopic presentation available than others. Romantic comedies or low-budget-productions are less likely to be available in stereoscopic versions than action movies or computer generated animated features. Also, some movies are shot or produced as stereoscopic presentations from the start, while others have to be reworked into such a presentation in an elaborate process. The fact whether a movie is shot as a stereoscopic picture or has been turned into one might influence the quality of the stereoscopic effects. Additionally it is probable that the film-makers who are aware of their movie being released as a stereoscopic presentation will take this fact into account when taking any aesthetic, dramaturgic, or other creative decision. We propose to just test the stereoscopic presentation opposed to the conventional presentation of the same movie which was produced in stereoscopic mode from the start, because we can be sure that any discovered differences in

the reception of the two modes is the effect of the stereoscopic presentation and not poor conversion.

### **Involvement, Activation, and Aggression**

In our research project, we would like to focus on three aspects in the context of the effects of media violence and its underlying mechanisms: involvement respectively presence, activation respectively excitement and violence respectively aggression.

#### **Involvement, Presence**

Involvement is often defined as the motivation to engage in a specific activity (Kim & Biocca, 1997; Lessiter Freeman, Keogh, & Davidoff, 2001; Lombard & Ditton, 1997; Schubert, Friedmann, & Regenbrecht, 2001; Wirth, 2006). Some researchers argue that involvement is a dimension of presence (e.g. Kim & Biocca, 1997). The feeling of involvement is defined as a psychological process whereas the feeling of presence describes the feeling of being “there”. The feeling of involvement and presence should contribute to the memorability and persuasiveness of media messages (e.g. Kim & Biocca, 1997). According to Williams, Rice und Rogers, we define involvement as referring “[...] to the degree to which an individual actively participates in an information-exchange process“ (Williams, Rice & Rogers, 1988, S. 169). It more or less describes the interaction of recipients with media. As mentioned already, presence moves the focus towards the mediated environment describing the feeling of „being in a place“ (Steuer, 1992). In communication research, the concept of presence has often been investigated in the context of computer-games and virtual reality (e.g. Wirth, 2007). We are integrating this construct into our concept because it describes how recipients feel and behave in virtual environments. We would argue that these

are comparable to stereoscopic environments: Similar to a computer-game-environment, the viewer of a stereoscopic movie gets the illusion of being in a place and of taking part in the action around him – even though he has no chance to intervene. Compared to conventional depictions, stereoscopic ones are more vivid. The viewer is under the illusion that protagonists leave the screen and move towards him. Conventional movies can involve viewers, too. But missing the depth perception, the viewers have to use their imagination a lot more in order to hold up their suspense of disbelief (Boecking, 2008) than in stereoscopic depictions. This makes it easier for them to get involved in the plot and to (cognitively) take part in the action. As a consequence, their reaction might be more intense than in conventional settings.

### **Effects of Media Violence**

As already mentioned, the diverse effects of media violence have been discussed for a long time (e.g. Gunter, 1994). For example Aristotle argued that media violence might have cathartic effects while Plato stated that media violence was harmful. Whereas earlier studies advocated direct media effects, present research outlines mediating and moderating effects of violent depictions. Until now there is a substantial research interest in determining mediating and moderating effects on real violence and aggression.

The huge body of research on media violence produces many different definitions of the term *violence*. There are definitions differentiating intentional and non-intentional violence, physical and psychological violence, real, fictional and virtual violence. We would like to use an integrative term of violence. Violence is the intentional or approved – but not necessarily planned – impairment of other people, animals or things (Frueh, 2001). Especially in horror-movies, violence is an important component of the plot.

There are many different definitions of violence. At the same time there also exist diverse theses on the effects of media violence (e.g. Gunter, 1994; Paik & Comstock, 1994). We would like to focus on two theories respectively models that are highly important in the context of horror movies: Excitation Transfer Theory (Zillmann, 1983) and the General Aggression Model (Anderson & Bushman, 2002).

The Theory of Excitation Transfer (e.g. Tannenbaum und Zillmann, 1975; Zillmann, 1983; 1991; 2004) can be seen as a specification of the hypothesis of stimulation (e.g. Berkowitz, 1969). This theory argues along with two factor-theories of emotion (e.g. Schachter & Singer, 1964) that physical activation exciting the Central Nervous System is quite unspecific. Only the appraisal – specifically the cognition – of bodily activation decides whether someone is feeling a positive or a negative emotion; especially negative emotions are made responsible for aggressive behavior. Therefore activation resulting from arousing media content might be misattributed and be transferred to social situations after media reception. Thus all kinds of exciting and arousing content (e.g. pornography, sports, or violence) might motivate aggressive behavior by causing unspecific activation.

The General Aggression Model by Anderson and Bushman (e.g. 2002) refers to these thoughts and integrates them into a model combining different explanations for aggressive thoughts or behavior as media effects. It alludes to cognitive psychology, social psychology (specifically theories of social learning), and the concept of excitation transfer to predict aggressive thoughts and behavior (Anderson & Bushman, 2002, pp. 29).

Basic modules of the model are: (a) *Input* (person and situation), (b) motivation (*Routes*) and (c) appraisals or spontaneous behavior (*Outcomes*). The model is not limited to short-term effects. Supposing that dysfunctional effects of violent media content can accumulate over time, the model explains how violent personalities can develop (e.g.

Huesmann & Miller, 1994). Therefore, the model stresses the negative effects of violent media content on society.

Research conducted over several decades has shown that violent media content produced diverse results. Meta-analyses are qualified to systematize and therefore to quantify effects (e.g. Sherry, 2001). One often cited meta-analysis was conducted by Paik and Comstock (1994). They compared the effects of 217 studies to find out whether violence in television increases aggression. In contrast to other meta-analyses (e.g. Hearold, 1986), they revealed a moderate relationship in laboratory-experiments as well as in field-experiments. Anderson and Bushman (2001) revealed short-term as well as long-term effects in their meta-analysis on the effects of violence in computer-games: Playing violent video-games increases aggression and aggressive thoughts in players. These results are mainly confirmed by a meta-analysis of Sherry (2001), although he found stronger effects for fantasy-games or sport-games, especially for long playing.

Real aggressive thoughts and behavior are to be apprehended not only in the context of television or (realistic) video-games; the reception of violence in stereoscopic movies marking the transition of regular movies to video-games itself also might increase aggressive thoughts and behavior. This thesis is based on two assumptions: (a) Through stereoscopic techniques, presented violence appears more realistic, protagonists step out from the screen giving the viewer the impression of being part of the action. Recipients probably identify with the figurative protagonists more easily than in conventional movies. (b) From a cognitive-psychological view focusing on the basic principles of information processing, stereoscopic depictions are more complex than conventional stimuli; previous research has shown that there is a relationship between complexity and physical arousal (e.g. Detenber, 1998); arousal in turn is connected to aggressive behavior under specific circumstances (e.g.

Zillmann, 1983; Anderson & Bushman, 2002). The model below combines our assumptions:  
See figure 1.

In addition to the assumptions outlined in the model, we differentiate between the process of watching a movie and its outcome (e.g. Frueh & Fahr, 2007). We assume that the reception-process itself cannot be measured afterwards since it is volatile and mainly unconscious. Nevertheless we suppose, that even unconscious processing effects cognitions and behavior. As a consequence, we distinguish between involvement as a process and as a judgment (static perspective; post-reception) and between activation (as a process) and excitement (remembered or consciously perceived activation after reception). As an intervening variable, we examine perceived realism while supposing that stereoscopic depictions appear more realistic than conventional depictions. It influences activation (supposing that realistic depictions are more arousing than more abstract depictions) and involvement (including the sense of presence) with the protagonist.

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INSERT FIGURE 1 HERE

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In hypotheses:

*H1: Stereoscopic depictions are perceived as more realistic than conventional depictions.*

*H2: Stereoscopic depictions are more involving than conventional depictions.*

*H3: Stereoscopic depictions are more arousing than conventional depictions.*

*H4: Stereoscopic depictions of violence have more aggressive effects than conventional depictions of violence.*

## Possible Methods

We suggest an experimental research design to test for the influence of the presentation-mode on the recipients' involvement, activation, and aggression. We propose a simple design with one treatment group and one control group. Both groups should watch the same movie in the natural context of a cinema to ensure external validity. Additionally, there should be commercials and movie trailers before the main film to ensure the usual context of a presentation in a cinema and to add the possibility to test differences in reactions to this kind of content. The treatment group should watch the stereoscopic presentation, the control group the conventional presentation. There are different movies on the market, which have been produced as stereoscopic presentations from the start (as mentioned above). Out of this group of movies we would suggest using a horror-movie, namely *Resident Evil: Afterlife*, because it is probable that its violent content will contribute to general rise activation of the viewers, so that differences between the groups can be analyzed more easily.

The dependent variables of our experiment should be (a) recalled perceived realism of the material, (b) perceived activation after the reception, (c) involvement during the reception, (d) recalled involvement, and (e) degree of aggression. These variables would be surveyed using two methods: On the one hand standardized questionnaires right after the reception of the movie and on the other hand continuous response measurement during the first half hour of the movie, where recipients can rate their experience of involvement on a control they hold in their hand (see Biocca et al., 1994). Table 1 shows the different measured constructs, in which way they are dependent of the mode of presentation offered, and how they are measured.

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INSERT TABLE 1 HERE

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According to excitation-transfer-theory (Zillmann, 1983), activation leads to willingness to act even after the reception of a stimulus. Therefore we need to know the level of activation the recipients perceive after the reception. This is based on the following Assumptions, which we take to be plausible but do not investigate further: (1) Stereoscopic depictions lead to a higher level of activation of the recipient even during the reception. (2) Individuals can perceive their own physiological activation correctly. The first assumption has a strong fundament in the research about complex stimuli leading to higher activation (e.g. Bradley, 2007). It is necessary because we would not measure activation during the process of reception. The second assumption is due to the fact that we would try to measure the post-reception activation in a questionnaire, which means that the respondents would need to be able to correctly perceive and reproduce their own psychological state. It is based on research about perception and interpretation of physiological activation from psychological field of emotion (e.g. Schachter & Singer, 1964).

The involvement of an individual during the reception is a proxy for the degree to which he or she follows the plot more as a viewer (low involvement) or as a participant (high involvement). Involvement during the reception is a non-permanent state of mind, which integrates many different cognitive evaluations. Because of the non-permanent nature of involvement, we think it is important to measure it continuously throughout the movie. Unlike the evaluation of the involvement after the reception, the involvement during the reception is important in the way how different elements of the stimulus are processed by the recipient.

Because we assume that the degree of involvement increases with a higher degree of perceived realism, we expect the involvement during the reception to be higher within those recipients who are watching a stereoscopic presentation than within those who are watching a

conventional presentation. Additionally we assume that the evaluation of involvement during the reception and the evaluation of involvement after the reception differ. The latter concept refers to an ex-post-evaluation which is given in a greater context (e.g. experience with other movies, the story as a whole, awareness of the fictional nature of the content), where respondents have to sum up their experience and interpret it. It is clear that both concepts are connected but the remaining differences are meaningful additional information. For this reason we would measure them both.

The central dependent variable is the degree of aggression of the test subjects. It should be measured after the reception using a standardized questionnaire. This kind of measurement is limited, as it refers only to self-evaluation of aggression and not to real aggressive behavior. The expression of a certain degree of aggression does not necessarily lead to aggressive behavior. Additionally effects of social desirability are probable to play a role in such a question. For this reason even very small effects should be interpreted in a meaningful way.

A second part of the study looks at another effect of the differences in activation with different modes of presentation. The fundament of this is the concept of unspecific excitation-transfer (Zillmann, 1983). The question is, whether physiological activation leads to a cognitive state in which individuals generally have a greater willingness to act. If this willingness to act is combined with a specific context where a certain behavior is made possible, the likelihood of this behavior to occur is increased.

This second part of the study fits well into the design of the study so far. The only thing additionally needed is a context for a certain behavior. This context should be given with two elements. (1) A commercial for a non-profit organization before the movie, asking for donations. (2) After the movie the recipients get the possibility to donate for said non-

profit organization. If the hypothesis is correct, that physiological activation can lead to behavior unrelated to the source of activation, those individuals who watched the stereoscopic presentation of the movie would donate more than the other recipients.

Unlike a question in a standardized questionnaire asking for willingness to donate, this operationalization of actual behavior is not distorted by effects of social desirability or sponsorship-effects. Since real behavior is being measured, the results can inform our understanding of the way real behavior is connected to real presentation modes in a more valid way.

### **Conclusion**

Many studies have already been done on the effects of media violence – violence in theatrical plays, books, television, video-games, cinema, etc. Statistical effects tend to be quite small or moderate – yet the real consequences can be disastrous even if only one school-shooting or murder is inspired by the media. We suppose that raising this specific question again is still promising: Due to sophisticated presentation techniques, the viewer of a movie increasingly feels to be part of the action. The most important factor resulting from a stereoscopic presentation is the perceived realism of the material: Pictures are no longer limited to two dimensions. As a consequence, the viewers' feelings might intensify: The sensation of presence and involvement in stereoscopic environments might increase activation, excitement and intensify or multiply emotions. These effects might not only result in elevated levels of entertainment or suspense; from an evolutionary point of view, activation and emotions are connected to behavior. Hence it is plausible, that only due to stereoscopic presentation mode, harmful effects of movies compared to conventional presentations might increase.

Our approach is only one possibility to examine these effects. Further research needs to focus even more on the information processing during the reception of stereoscopic movies and its interplay with long-term effects. Furthermore, concepts dealing with gratifications can help to further the understanding of such content. Gratifications could include entertainment and suspense, resulting from intense emotions during the reception of horror movies or similar genres that basically consist of violence as main plot.

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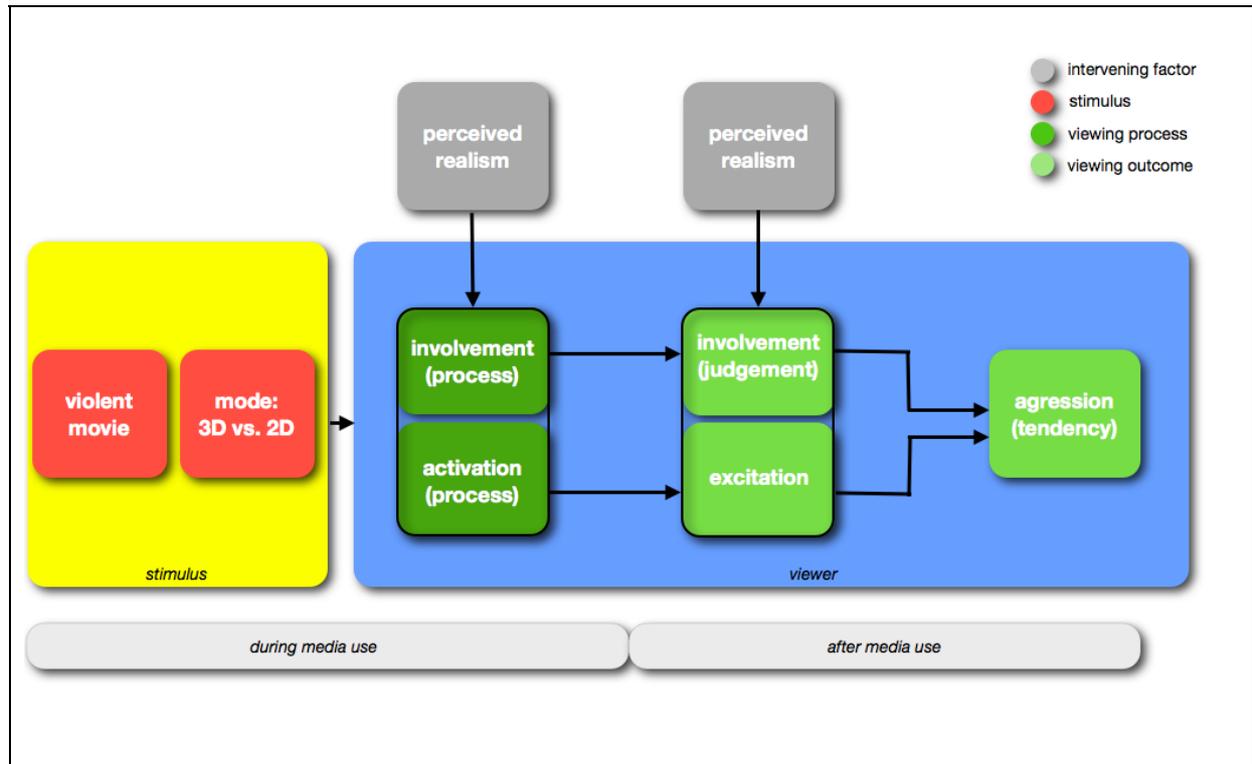
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**Figure 1: Model of stereoscopic violence and its effects**



**Table 1: Measured Constructs and Their Interconnectedness**

<b>Construct</b>	<b>Expected Mode of the Effect</b>	<b>Measurement</b>
recalled perceived realism	perceived realism mediates the effect of stereoscopic depiction on activation and involvement	standardized questionnaire after the reception
perceived activation after the reception	higher physical activation because of the perceived realism, which persists after the reception	
involvement during the reception	perception in the context of the reception situation independent of prior experience with movies	standardized continuous response measurement during reception
recalled involvement	evaluation in the context of other movies and the real situation	standardized questionnaire after the reception
degree of aggression	after the presentation of the movie: willingness to act accordingly	