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How to measure television exposure from a contents-received point of view? The use of different measures of television exposure in cultivation research.

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Abstract

In this paper different operationalizations of the television exposure measure in cultivation research are being studied. The background of using both the total viewing volume and the genre exposure as measure of exposure to images is studied. Based on the conclusion that both operationalizations have limits a new operationalization is constructed on two cultivation themes: medical characters on television and illness and death on television. These two new exposure measures are based on the respondents' individual exposure to types of television programming. Furthermore all types of programming are weighed with the proportion of specific images that is shown in this type of television programs. The proportions are the result of a large scale content analysis performed all television content. Structural equation models are used to compare the different operationalizations. Results show that the new operationalizations are the best measures for predicting cultivation variables of medical characters and illness and death.

Introduction

Despite of a long ongoing debate about the conceptual and methodological foundations the core idea of the cultivation theory still stands. The basic idea of the theory that television viewers tend to adopt images of the world similar to those presented in media content is still fully alive. Furthermore the last few years cultivation theory is even more than ever published in international journals (e.g. Shrum, 2004; Shrum 2007; Bilandzic & Rossler, 2004; Roskos-Ewoldsen et al. 2004; Goidel et al., 2006; Grabe & Drew, 2007).

Any test of the cultivation hypothesis requires at a minimum a measurement of two variables: a cultivation variable (a first or a second order cultivation variable) and a measure of exposure to television content. The first measures are possibly very thematically different: cultivation research has been done on various themes. Some examples of topics of cultivation research are: beliefs in and perceptions of a mean and violent world (e.g. Gerbner et al., 1977; Van den Bulck, 2004), beliefs about crime (e.g. Grabe & Drew, 2007), beliefs about older people (e.g. Gerbner, Gross & Signorielli, 1980), beliefs about health (e.g. Gerbner et al., 1981; Gerbner, Morgan & Signorielli, 1982; Van den Bulck & Damiaans, 2004), beliefs about scientists (e.g. Gerbner et al., 1980) and beliefs about relationships and romance (e.g. Segrin & Nabi, 2002; Eggermont, 2004).

Concerning the second variable needed in a cultivation analysis, the measure of television exposure, a discussion has been going on in the communication sciences for about twenty years on how to operationalize this variable in a correct and valid way. Although the basic version of Gerbner's theory used the individual's total television viewing volume as the measure of television exposure - Gerbner et al. argued that cultivation is an effect resulting from a person's total amount of exposure to television images - other operationalizations of the television viewing measure as for example exposure to specific types of TV programs are

also used in numerous cultivation studies (e.g. Hughes, 1980; Cohen & Weimann, 2000; Segrin & Nabi, 2002).

This study examines three different operationalizations of television exposure in term of their relative abilities to predict cultivation among adolescents. Gerbner uses two basic assumptions to justify the use of the total viewing volume as exposure measure in a cultivation analysis: the first assumption states that television content is homogeneous because the mass production of media products creates a consistent amount of images and messages that correlate with the norms and values of most people in the society (Shanahan & Morgan, 1999). This is done because TV producers want to make sure that viewers like the television programs that are produced. The second assumption states that watching television is ritualistic and non selective. Gerbner argues that viewers fit watching television into their daily schedule in stead of choosing to watch one program in particular out of their daily schedule merely because they find the content of this program interesting. According to Gerbner the result of this ritualistic way of watching television is that TV viewers can simply not avoid the most frequent and pertinent patterns in the constant flow of television images coming from television (Shanahan & Morgan, 1999).

Even though the data of Gerbner's own content analyses (cfr. The Cultural Indicators Study) indicates that there are differences in the amount of violence shown across networks and day parts Gerbner concludes that this only means that the television world is a very violent world and that every viewer sees a certain amount of violence whatever he or she watches (cfr. assumption 2). Other researchers have discussed this argument because of the possible large differences between content and in this case violent content or images between TV genres or program types. It is, given the changed media landscape and the differences between viewers, very likely that viewers do not see the same amount of violence or other

images even if they watch an equal daily amount of television (Potter & Chang, 1990; Potter, 1993).

Changes in the media landscape

Since the creation of the cultivation theory in the seventies, the media landscape has changed spectacularly. In the first years of television the number of TV channels was limited. In Flanders (Belgium) there were only two television channels available in 1975. As a result people watched the program that was broadcasted. Therefore every viewer saw almost the same images on television and consequently also the same cultural elements embedded in the same television programs. Thanks to the invention of cable and satellite television the number of channels has risen exponentially and as a result the viewers are now able to choose between a large number of very diverse and thematic channels from all over the world. Television viewers can nowadays see the program they want to see when they want to see it and this around the clock.

Another strong catalyst of the emerging freedom of choice has been the invention of the VCR and DVD recorders. If TV viewers cannot watch a particular program the device makes it possible to record the program and watch it on a later moment (Van den Bulck, 1995).

These changes in the media landscape logically have an impact on the cultivation theory. As some researchers pointed out, the freedom of choice created a number of different 'types' of television viewers (Van den Bulck, 1995; Weimann, Brosius & Wober, 1992). For example in Van den Bulck's research some viewers score higher on an action factor, some on an information or others on a human interest factor.

In analogy Weimann et al. combine measures of viewing time and devotion to certain genres to propose a typology of viewers (Weimann et al., 1992, Cohen & Weimann, 2000). They suggest four different types of viewers that differ in various aspects of their television consumption (types are: light mixers, heavy mixers, light devoted and heavy devoted). The suggestion of the existence of different viewing types has an implication for cultivation research. It means that if the television content differs over genres a certain type of television viewers sees different images than another type of viewer. If a viewer is a heavy devoted fan of detectives and police programs it is very likely that he sees more shootings and murders than a heavy mixer who watches mostly soaps and sports games.

The discussion between both operationalizations of the television exposure (total viewing volume vs. genre exposure) measure has been going on for a long time (e.g. Hawkins & Pingree, 1981; Potter & Chang; 1990, Grabe & Drew, 2007).

Total viewing volume vs. genre operationalization.

Potter and Chang made a theoretical comparison between several different operationalizations of the viewing measure (Potter & Chang, 1990). In their research they described five separate operationalizations of television exposure and subsequently they performed several regression analyses on a cultivation dataset. Potter and Chang concluded that from the five operationalizations they tested in their study the total television viewing volume of an individual was the least successful operationalization. Measures using a proportional equation were stronger than total viewing volume. The proportion measure was better than the type (or genre) measure alone, but when the total viewing volume was used as a control, the type measure equation was better than the proportional measure equation. They conclude with the statement that it seems to be less important to know whether television viewing dominates one's time than it is to know what program types dominate one's viewing, regardless of his or

her total viewing. They also state that as a result of this the cultivation scores are clearly related to the television content a person is exposed to. Their results challenged the assumptions of uniform television content and nonselective viewing from Gerbner's initial cultivation theory. Potter and Chang concluded that if all programs presented the same message, they should expect total viewing volume to be by far the strongest predictor of the studied cultivation measures. This leads to the following three hypotheses:

H1: The higher the exposure levels to television, the higher the first-order cultivation estimates concerning medical personnel and health and illness.

H2: The higher the exposure levels to medical or hospital programs, the higher the first-order cultivation estimates concerning medical personnel and health and illness.

H3: The exposure level to medical or hospital programs is a better predictor than the total television exposure level concerning the first-order cultivation estimates on medical personnel and illness and death.

Above we studied different ways to operationalize the viewing measure in cultivation research. The original point of view of cultivation starts with the total viewing volume, but others have argued that the exposure to different genres or types of programs is a stronger measure of exposure to certain images. But as shown above both ways of operationalizing the viewing variable (total TV volume and proportional viewing volume) have flaws. The first measure underestimates the freedom of choice of the viewers, the second measure of exposure assumes that certain images are only (or mostly) shown in certain types of programs or

genres. For both measures of exposure there is only a relatively imperfect and sometimes even weak relationship between television content and viewing behavior.

In the literature only few examples of better adaptation between content and viewing behavior can be found. In 1996 Shrum tried to adjust the viewing measure to the televised content (Shrum, 1996). Shrum conducted a content analysis on several soap series. He states that the sample size was limited because recordings were made of only three different soaps and this for two weeks and therefore the results of this study can not be generalized. But next to the limited quantitative content analysis, he also performed a content analysis of the short descriptions in the television booklets in order to detect the main themes in the soaps. The results of this qualitative content analysis are used in the study in order to adapt the exposure measure. Shrum suggests in his conclusion that this adapted genre measure is a better predictor than the total viewing volume, but that given his limited sample size these results are not problematic for the classic cultivation idea.

More recently Powell et al. examined the nutritional content of food advertising seen by American children and adolescents (Powel et al., 2007). They used television show ratings in order to 'weigh' every add given that some advertisements were viewed more than others. This is a first step to a better adjustment between viewing behavior and contents but this method does not take into account that individual television viewing behavior possibly strongly differs between children: the weight of the adds possibly differs for every child. And consequently the individual exposure to the adds and their nutritional value strongly varies between viewers.

In this study we want to present an operationalization of exposure that is constructed from a clear contents-received point of view. In this operationalization we take into account the total amount of TV viewing and we combine it with the presence of images in certain types of television programming. Consequently both total television viewing volume and

program dominance are merged in this new operationalization. The relationship of this new measure with the classic exposure measures will be further explored.

In order to construct this new measure, a content analysis on television content and a cross-sectional survey on television behavior were performed.

Methods

Content Analysis

For this study, we recorded a composed one week sample of television broadcasting for the five largest public (TV1 and Ketnet/Canvas) and commercial (VTM, Kanaal2 and VT4) Flemish television stations. These television stations are free and universally available and they do not focus on a specialized public. In total the television sample provided 430 hours of recorded programs.

Reliability

The instrument used for the content analysis was tested in a pilot study. During this pilot study the instrument was used simultaneously by two coders. The results of both coders were compared and were used to construct the final instrument.

The sample recordings were coded separately by two coders who both coded half the sample. The sample was randomly divided between both coders. From the total sample, a 40 hours sample was at random selected to be double-coded in order to compute Krippendorff's alpha (Krippendorff, 2004). We used Hayes SPSS macro for computing Krippendorff's alpha (Hayes, 2005). Although only variables with reliability above $\alpha = .80$ are used in our analysis, total reliability of all variables in the study averaged $\alpha = .87$.

Content Variables

The analysis was based on coding all health related images broadcast by television. In this paper only the Health-Related Content (HRC) of programs is studied. HRC of publicity, trailers and news was also coded but not used in this paper. In this study, only *the representation of medical characters* and *the representation of illness and death* is the subject of research. Content was coded on two different levels: the program level and the scene level. The program level included variables as the genre and type of the program, duration of the program, number of medical characters, the number of ill or death characters and the total number of characters in the program. On scene level the duration of the Health-Related (HR) scenes is coded. The definition of 'Health-Related Scene' that is used in this study is the following:

> *A Health Related scene is any scene that included visual or verbal information related to mental or physical health, medical treatments, substance use (i.e. tobacco, alcohol, drugs), food/nutrition, body image, fitness/exercise, promiscuous sex, or safety* (Gerbner et al., 1981; Wallack & Dorfman, 1992; Byrd-Bredbenner et al., 2003).

Only the HR scenes that deal with medical characters or illness and death are used in this study.

HR scenes are coded from the start till the end of the scene in which medical characters are shown or talked about. Scenes end when the camera moves to another place. HR scenes that include medical characters are either coded as '*act*', '*visual*' or '*verbal*'. This refers to the way medical characters are shown in the scene. '*Act*' refers to the medical character as an active player in the storyline (e.g. a physician who is treating a patient in the hospital) while '*visual*' refers to refers to a medical character that can be seen by the viewer even though it is not part of the storyline (e.g. a nurse that can be seen from the patient's room

walking through the hallway). '*Verbal*' points to a verbal reference of one of the characters concerning a medical person (e.g. two patients discussing the behavior of their physician). Byrd-Bredbenner uses a similar distinction in her content analysis of health behavior (Byrd-Bredbenner et al., 2003). For every HR scene four separate medical characters can be coded. If there are more than four medical characters in the scene that are shown in the same way they were coded as '*a large group*' (e.g. six nurses in an operation room assisting a physician but who are not a part of the plot and therefore are coded as *visual*).

Furthermore, for every medical character or ill or death characters in a HR scene demographic variables are coded (*gender, age* and *race*). Age was an estimate made by the coders. The type of the medical characters is also coded (*physician, nurse, ambulance driver/paramedic, psychiatrist, other health professional (e.g. homecare professional)* or *medical character unknown* (e.g. when there is a visual reference to a certain medical character but is not clear what the type of the character exactly is). For the ill characters the illness was coded and for the death characters the cause of death (if shown) was coded.

Program Characteristics

The 430 hours of DVD recordings resulted in 783 programs, 5078 commercials, 157 news programs and 1269 trailers. Three quarters of the broadcasting time is devoted to programs (329.57 hours), one-fourth to publicity, ten percent to news and news programs and two and a half percent to trailers. The mean length of programs was 25.25 ± 27.51 standard deviation (SD) minutes (range 0.42 to 230.50 minutes).

In all programs coded, 418 health-related scenes dealing with medical characters were coded and 656 medical characters were coded as *act*, 72 as *visual* and 20 as *verbal*. The mean length of HR scene concerning medical characters was 1.08 ± 1.18 minutes (range 0.02 to 10.93), total length of the medical characters scenes was 503.53 minutes (2.54% of the total

program time). The coding resulted in 116 unique doctors and 90 unique nurses (every character is only counted once even if it appears in more HR scenes).

In the sample 954 scenes dealing with illness and death are coded. 883 ill or death characters were coded as an act, 70 as visual and 161 as verbal. This resulted in 1114 unique death and ill characters of which 137 characters were coded as death. Of the 977 ill characters, only 276 are female.

The results of the content analysis will be used in the creation of the new operationalizations of television exposure. First the methods of the survey we used in order to weigh the new operationalizations are described.

Survey

In this study we looked at both prime-time and other television programming because Flemish television viewing behavior studies showed that adolescents watch a lot of television in the morning and at other moments of the day outside prime-time. In order to construct our sample for the content analysis from a '*content received*' point of view, we used recently collected data on media use gathered in a longitudinal 3 year cohort study in the SOMAH project (Study on Media and Adolescent Health; e.g. Van den Bulck, 2004). In phase three of that study a representative sample of 2326 Flemish adolescents aged 15 to 18 years were questioned on their media use and health perceptions, attitudes and behavior. 51.72% of the respondents were boys, 48.28% girls. For the further analysis in this paper only the respondents who participated in the three phases of the research will be used (three years in a row).

In the survey television behavior was measured using different scales. For the total viewing volume 7 timelines were used, one for each day of the week. These timelines each consisting of 38 checkboxes started at 7 a clock in the morning and ended at 2 a clock in the

morning. There was one check box for every half hour between those hours. For every day of the week respondents were asked to indicate which periods of time they watched television. This scale has already been successfully used in comparable research (e.g. Eggermont, 2005). Results concerning the amount of television viewed are almost equal on a similar sample of adolescents. Next to total viewing behavior respondents had to specify how much they watched different types of television programs. Respondents had to indicate how much they watched 23 types of television programs using a 5-point Likert scale (ranging from 'never' to 'almost every day'). Actual examples of every type of program were presented in order to facilitate the response.

Cultivation Measures

In the survey a number of cultivation variables were also included. The cultivation variables used here were first order cultivation measures. First order cultivation measures deal with assessments of certain aspects of the social reality that are empirically observable and verifiable in reality. For this study respondents had to assess four variables concerning medical characters and four concerning illness and death. For the first category the respondents had to asses the number of physicians, the number of nurses and the number of psychiatrists on 100 working Belgians. Furthermore they had to assess the number of doctors that is married to a nurse. For the second theme, also four cultivation variables were implemented in the survey. Respondents had to assess the proportion of the number of people that die of murder, a heart attack or a traffic accident in Belgium. Moreover they had to assess the proportion of ill people.

These cultivation variables were constructed using the data of the content analysis that is described above. Data showed that all eight elements were overrepresented on television and thus that the variables can be studied using the cultivation theory. This first phase in the

cultivation analysis is often forgotten or not studied because of the expensive content analysis that proceeds this phase. If the theme that is studied is not new in cultivation research, researchers often refer to the past studies in order to validate their cultivation measures.

Figure 1 gives a visual overview of the mean total viewing behavior of the respondents on a Tuesday and a Saturday. Results of the television use questions show that almost ten percent of the adolescents watched television on weekdays before going to school. Furthermore nearly five percent also watched television at noon during lunch break on weekdays. Subsequently adolescents started watching again after school at 3 p.m. In the weekends, 13% of the adolescents watched in the morning and even more than 8% watched television at noon. At 8 pm 65% of the adolescents watched television on Sunday evening almost 70% op the adolescents watches television. Using these data, a specific recording schedule for the content analysis was constructed that included not only prime-time television broadcasting, but also other moments of the day on which adolescents appeared to watch television.

Figure 1 about here

Viewing behavior

Respondents watched on average weekly 20.42 hours of television (SD=11.83). Male respondents watch approximately 22.83 hours of television (SD=12.92), female respondents on average watch 17.94 hours every week (SD=10.04).

Results

In order to construct a new operationalization of television exposure that takes both the individual exposure to specific types of television programs and the content of these programs into account the data of the content analysis described in this study are used.

For this study two new operationalizations of exposure were constructed: one for the exposure to medical characters on television and one for the exposure to ill and death characters. For both measures the individual exposure to specific types of television is weighted for the proportion of images in every type of program. For this study the program type and not the genre of the program are used. As Newhagen and Lewenstein already discussed, television genres are in general harder to classify (Newhagen & Lewenstein, 1992). As a result respondents experience more difficulties assessing their viewing time of genres than of types of television programs. Below both weighing factors of the themes used in the construction of the new operationalizations are discussed.

Table 1 gives an overview of the number, the duration and the proportion of the medical character scenes in the different types of television programming. The table shows the number and the duration of scenes with medical characters in the different types of television programs. In total 418 scenes (503.53 minutes) are coded. Almost 10% of all programs contain 1 or more scenes with at least one medical character. Especially medical programs show medical characters. But also Dutch spoken police series score highly: three out of four of these programs include medical characters. Furthermore, the storyline of approximately 30% of all films contains medical characters. 31% of all soaps show health professionals. In Dutch and English spoken series, docusoaps and reality-TV a great deal of medical characters are shown. For the two last types of programs it has to be noted that there was only a small number of programs in the sample.

Table 1 also shows the relationship between the total duration of the different program types and the duration of the scenes showing medical characters. The presence of medical

characters is naturally very outspoken in medical series. In 43% and 71% respectively of the total time of Dutch spoken and English spoken medical series medical characters are shown or talked about. Other Dutch spoken (non-medical) series also score strong. 22% of the broadcasting time is spend on scenes with medical characters. In total, in more than 2.5% of all broadcasting time of fiction and non-fiction programs medical characters are shown or talked about.

Table 1 about here

Table 2 shows the same numbers as table 1 but this time for the illness and death scenes in different types of television programs. In 21.58% of all programs illness or death is a part of the storyline. In total 977.97 minutes of scenes in which ill or death characters are shown or talked about are coded. Especially medical and hospital programs show ill or death characters. In 59.90% of the total time of English spoken medical series these characters are shown. For Dutch spoken medical of hospital series this in 34.31% of the total time of this type of program ill or death characters are shown or talked about. But also in films, soaps, police series, horror and action series and Dutch and English spoken series illness and death are frequent themes of the storyline. In total data shows that in almost 5% of the total time of television broadcasting illness and death are shown or talked about.

In the next paragraph the construction of the new measures of exposure will be explained. The weigh factors discussed above will be linked at the respondent's individual television viewing menu. Consequently the specific exposure to television images will be measured in a more

correct way than when the total viewing volume or the exposure to specific program types is used as operationalization.

Table 2 about here

Next to the total viewing volume the respondents of the survey had to answer questions on their specific viewing behavior. For every type of TV program the viewers had to answer on a five point Likert scale to what degree they watched it. These 23 measures were combined with the weighing factors (proportions) from the content analysis in order to construct the new operationalizations. Since this type viewing scale is an exponential scale, the variable was recoded. 'Never' was coded as 0, 'a few time a year' was coded as 5, 'a few times a month' as 36, 'a few times a week' as 156 and 'almost every day' as 260. Afterwards every type of program was multiplied by the respective factor (cfr. the proportion in the last columns in table 1 and table 2). The new measure for the exposure to medical characters ranges from 0 to 4326.40. Mean was 882.45, standard deviation 753.88. Illness and death are shown in more types of television programming and consequently the average of the new measure of exposure to ill or death characters was higher: 1062.29 (SD=774.57). The minimum was 0, the maximum 5207.80.

Table 3 gives an overview of the correlates between the different operationalizations studied in this paper. Results show a clear relation between both new measures of television exposure. Exposure to ill or death characters is often associated with exposure to medical characters: if characters on television are ill, doctors come into play (or vice versa). The relation between viewing medical or hospital series (type exposure) and the exposure to images of medical characters is logically also very strong. Results show that this type of programs shows by far the most medical characters and the most ill or death characters. The

fact that the correlation is not perfect points to the ongoing discussion addressed before. The relation could only be perfect if these types of (medical) images were only shown in specific types of programs. And this is not the case, especially for illness and health scenes(r=.86)

Noticeably is the relatively low correlation between total television exposure and the other measures. The correlation between total TV volume and the exposure to medical or hospital series is only .29. The correlations between the new exposure measures and the total television volume are higher, .35 and .44.

Again this clearly points to the discussion. Correlations suggest that total television volume is not strongly related to exposure to the images studied in this paper. The correlation between the measure of exposure to ill or death characters is stronger related to the total viewing volume than the measure of exposure to medical characters. Ill and death characters are shown in more different program types than medical characters are.

Table 3 about here

This leads to the following hypotheses:

H4a: The higher the level of exposure to specific images concerning medical characters, the higher the first-order cultivates estimates concerning medical personnel.

H4b: The higher the level of exposure to specific images concerning illness and death, the higher the first-order cultivates estimates concerning illness and death.

H5: The operationalizations constructed of the individual viewing menu and the proportion of specific images are better predictors of cultivation than the total viewing volume.

H6: The operationalizations constructed of the individual viewing menu and the proportion of specific images are better predictors of cultivation than the exposure levels to medical or hospital programs.

Data Analysis

For the comparison of the three operationalizations of the television exposure measure and for testing the hypotheses we constructed three structural equations models (SEM) using AMOS®. Structural equation models test the extend to which a causal model consisting of latent variables fits the data. While latent variables generally require more than one observed variable, it is customary to turn single observed variables such as gender and age into latent variables with only one observed variable and a fixed error variance.

Data description

The dataset consisted of 1296 respondents (who participated in the three phases of the SOMAH study). 51.7% of the adolescents in the study are male, 48.3% are female. Means and standard deviations are reported in table 4.

Table 4 about here

Model comparison

The SEM models compared in this study have the following structure: included are the exposure measures of the three years of the cohort study, the cultivation variables separately for both themes (measured in year three of the SOMAH study) and the demographic variables gender, age and educational level. The four cultivation variables are used to construct a latent cultivation variable. The following table gives an overview of the models' fit.

Table 5 about here

All six SEM models offer a comparable fit (see table 5). The chi-square statistic is not significant and the RMSEA of the models is below the 0.05 cut-off point (Browne & Cudeck, 1993). The lambda's of the path going from the exposure measures to the latent cultivation variable show that the three measures have a significant influence on the cultivation measures in this study. The higher the exposure, the higher the cultivation estimates. This suggests that H1, H2 and H4a and H4b are supported by the SEM models. The three SEM models and accordingly the different operationalizations of exposure are compared using the Akaike Information Criterion (AIC; a measure of fit which takes both the number of degrees of freedom and the sample size into account (and thus the parsimonity of the model)). According to the AIC measure the model with the smallest value is the best model (Akaike, 1987). Table 5 shows that for both themes – medical characters and illness and death - the models using the new specific operationalizations have the best AIC value. These models also predict the variance of the cultivation variables the best (R^2). This means that also hypotheses h3, H4 and H5 are supported by the data.

Discussion

The results discussed above suggest that the exposure to specific images concerning medical characters and illness and death is the best predictor for cultivation influences of watching television. But the differences between the three SEM models in which the different operationalizations are used are rather small. Furthermore, the newly constructed exposure variables have only a minor influence on the total explained variance of the SEM models. The influence of the demographic variables is stronger than the television influence. What does

the use of the new operationalizations add to the discussion on the use of the different exposure measures? First, as a meta-analysis of Morgan and Shanahan points out the overall mean cultivation effect that can be expected is only r=0.09 (Morgan & Shanahan, 1997). Although some still dispute the validity of the study, this is a rather small but reliable influence (Shrum, 2007). Is it in this light realistic to expect enormous influences of the new operationalizations? Furthermore the question on what the new operationalizations mean can possibly be answered by merging different exposure measures into a single SEM model. In table 6 the results of these models are reported. The chi-squared values of both models are significant on the $p<0.001$ level, but this is not unusual in SEM models with a large number of respondents. These two models suggest that the cultivation impact of watching television is for the greatest part explained by the specific exposure to images. Only the total television volume measure from year two has a significant influence on the latent cultivation measure whereas all three measures of specific exposure have a significant influence on the assessment of the cultivation variables concerning medical characters. For the model of illness and death the results are even more solid: total TV volume does no longer have a significant impact on the cultivation variables. The total viewing volume of the three years do influence the specific exposure through the specific exposure – the more you watch, the more likely it is that you are confronted with specific images – which has an influence on the cultivation variables. The higher your exposure to specific images, the higher your cultivation assessments.

We can conclude with stating that it is not the total viewing volume but the exposure to images that causes the cultivation influence.

Table 6 about here

Above we mentioned that there is a strong relationship between the new operationalizations of exposure and the exposure to specific program types (in this case medical and hospital series). The correlations in Table 3 and the SEM models (table 5) support this claim. One could argue why it is useful to do a content analysis if both variables correlate this strongly. It seems far more obvious to use the exposure to different types of television programs as the exposure variable. But as a media researcher you cannot know for sure what is being shown in different types of television programming if you do not measure it. In this study both themes (medical characters and illness and death) are logically strongly related to one type of TV programming. But what with other important (cultivation) variables? When we for example look at the number of murders on television, one of the most used cultivation variables and also studied in the content analysis described above, we see that the correlation between the total television viewing volume and an operationalization as described above but for which the proportion of murder scenes is used is rather low. Depending on the year of measurement (1 to 3), the correlation ranges from r=.37 to r=.42. For another important variable also studied in the content analysis, smoking, the relationship between the new operationalization and the total viewing volume ranges between r=.40 and r=.46. Both clusters of images can not be linked to a particular type of television program, consequently the use of the type exposure, in this study shown stronger than the total TV volume, can not be used for these themes.

One could clearly argue to what extend the claim of some cultivation researchers that the total television viewing volume is the best measure of exposure still stands (cfr. Gerbner's assumptions). In the introduction we discussed the changing media landscape and its possible influence on the selectivity of viewers. Maybe it is, next to the use of new cultivation themes and research on the psychological processes behind cultivation, time to give some more

attention to one of the two main variables in cultivation research, namely the exposure variable.

Of course television content changes over time. Therefore it seems advisable to study the content on a regular basis as Gerbner did with the Cultural Indicators Project. And even though this is a very labour-intensive and high cost project cultivation researcher should realise that both exposure and the cultivation variables in their research should be based on television content and not on a research tradition.

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Tables

Table 1: Number and duration of the scenes with medical characters and the type of programs.

Number and duration of the medical character scene and the type of program	All television stations				
	Number of programs in which MC appear (%)	Percentage of total number of programs of this type	Number of MC scenes	Total duration of the MC scenes (in minutes)	Proportion MC scene of the total duration of this program type
Films	8 (10.5%)	27.59%	43 (10.3%)	27.98	1.11%
Dutch spoken police series	3 (3.9%)	75.00%	3 (0.7%)	3.73	1.85%
English spoken police series	2 (2.6%)	16.67%	3 (0.7%)	4.15	0.86%
Soaps	14 (18.4%)	31.11%	37 (8.9%)	37.83	3.51%
Action series	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Horror series	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Dutch spoken series	7 (9.2%)	58.33%	47 (11.2%)	103.40	22.40%
English spoken series	8 (10.5%)	24.24%	28 (6.7%)	90.98	6.89%
Dutch spoken hospital /medical series	2 (2.6%)	66.66%	87 (20.8%)	66.78	43.41%
English spoken hospital /medical series	2 (2.6%)	100.00%	70 (16.5%)	76.50	70.80%
Cartoons	8 (10.5%)	4.32%	16 (3.8%)	8.65	0.28%
Talk shows	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Erotic series	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Dutch spoken humoristic programs	2 (2.6%)	20.00%	8 (1.9%)	8.28	2.92%
English spoken humoristic programs	6 (7.9%)	14.29%	9 (2.2%)	13.42	1.34%
Music programs	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Documentary	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
TV series for youngsters	2 (2.6%)	2.50%	13 (3.1%)	16.43	1.40%
Docusoaps[1]	1 (1.3%)	33.33%	18 (4.3%)	10.33	10.81%
Reality TV	1 (1.3%)	33.33%	2 (0.5%)	0.53	0.49%
Quizzes	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Information programs	6 (7.9%)	10.91%	28 (6.7%	23.37	1.81%
Sport programs	1 (1.3%)	10.00%	1 (0.2%)	0.97	0.22%
Tele shopping	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Music videos	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Sms games	0 (0.0%)	0.00%	0 (0.0%)	0	0.00%
Other	3 (3.9%)	3.95%	5 (1.2%)	10.2	0.38%
Total	76	9.71%	418 (100.0%)	503.53	2.54%

Table 2: Number and duration of the scenes with ill or death characters and the type of programs.

Number and duration of the Ill or death character scene and the type of program	All television stations				
	Number of programs in which IDC appear (%)	Percentage of total number of programs of this type	Number of IDC scenes	Total duration of the IDC scenes (in minutes)	Proportion IDC scene of the total duration of this program type
Films	22 (13.0%)	75.86%	281 (29.7%)	297.7	11.76%
Dutch spoken police series	4 (2.4%)	100.00%	50 (5.2%)	39.25	19.43%
English spoken police series	9 (5.3%)	75.00%	90 (9.4%)	83.6	17.77%
Soaps	25 (14.8%)	55.56%	80 (8.4%)	88.07	8.16%
Action series	1 (0.6%)	100.00%	3 (0.3%)	4.75	9.31%
Horror series	1 (0.6%)	100.00%	7 (0.7%)	7.82	16.94%
Dutch spoken series	9 (5.3%)	75.00%	51 (5.3%)	71.28	15.44%
English spoken series	16 (9.5%)	48.48%	66 (6.9%)	68.37	5.17%
Dutch spoken hospital /medical series	3 (1.8%)	100.00%	72 (7.6%)	52.78	34.31%
English spoken hospital /medical series	2 (1.2%)	100.00%	50 (5.2%)	64.72	59.90%
Cartoons	39 (23.1%)	21.08%	81 (8.5%)	50.28	1.63%
Talk shows	1 (0.6%)	7.69%	1 (0.1%)	1.00	0.20%
Erotic series	0 (0.0%)	0.00%	0 (0.0%)	0.00	0.00%
Dutch spoken humoristic programs	2 (1.2%)	20.00%	3 (0.3%)	1.48	0.52%
English spoken humoristic programs	11 (6.5%)	26.19%	25 (2.6%)	30.98	3.10%
Music programs	1 (0.6%)	11.11%	11 (1.2%)	4.63	0.97%
Documentary	0 (0.0%)	0.00%	0 (0.0%)	0.00	0.00%
TV series for youngsters	9 (5.3%)	11.25%	30 (3.1%)	27.77	2.37%
Docusoaps[1]	1 (0.6%)	33.33%	1 (0.1%)	1.07	1.12%
Reality TV	1 (0.6%)	33.33%	1 (0.1%)	2.48	2.32%
Quizzes	0 (0.0%)	0.00%	0 (0.0%)	0.00	0.00%
Information programs	8 (4.7%)	14.55%	39 (4.1%)	33.47	2.59%
Sport programs	1 (0.6%)	10%	1 (0.1%)	0.97	0.22%
Tele shopping	0 (0.0%)	0.00%	0 (0.0%)	0.00	0.00%
Music videos	1 (0.6%)	1.20%	1 (0.1%)	0.12	0.04%
Sms games	0 (0.0%)	0.00%	0 (0.0%)	0.00	0.00%
Other	2 (1.2%)	2.63%	10 (1.0%)	45.38	1.81%
Total	169 (100.0%)	21.58%	954 (100.0%)	977.97	4.95%

Table 3: Correlates between different operationalizations of the television exposure measure.

	Total TV volume	Medical programs	Measure medical characters	Measure Ill and Death characters
Total TV volume	1			
Medical programs	.285 *	1		
Measure medical characters	.364 *	.914 *	1	
Measure Ill & Death characters	.438 *	.861 *	.921 *	1

* : Correlation is significant at the 0.001 level (2-tailed).

Table 4: Mean and standard deviation of the variables used in the analyses

Variable	*Mean*	*SD*
Education	1.48	.73
Age	16.73	1.66
Cultivation variables		
Medical characters		
Number of doctors	14.87	17.17
Number of nurses	18.85	18.26
Number of psychiatrists	11.62	15.24
Number of doctors married to a nurse	17.56	18.81
Illness and death		
Dying of murder	13.78	16.40
Dying of an heart attack	26.32	19.96
Dying of a traffic accident	38.12	23.89
Number of ill people	32.29	21.61

Table 5: Goodness-of-fit indices of the three models and size of lambda and significance of exposure variables for both cultivation themes.

	Lambda Exposure Wave 1	Lambda Exposure Wave 2	Lambda Exposure Wave 3	χ^2	RMSEA	AIC	R^2
Models medical characters							
Total TV model	NS	.10 ***	.08 **	32.899 ns	.018	116.899	.23
Program exposure model	NS	.09 ***	.10 ***	30.431 ns	.015	114.242	.25
Specific exposure model	.08 ***	.10 ***	.10 ***	28.242 ns	.014	113.123	.26
Models Illness and death							
Total TV model	NS	NS	.20 ***	84.253 ns	.043	164.253	.23
Program exposure model	.10 **	NS	.16 ***	79.975 ns	.042	169.255	.26
Specific exposure model	.09 *	.08 *	.16 ***	75.469 ns	.041	159.67	.28

Notes: RMSEA = root-mean-square error of approximation; AIC = Akaike Information Criterion.
NS = not significant; *p<.05; **p<.01; ***p<.001

Table 6: Goodness-of-fit indices of the combined models and size of lambda and significance of exposure variables for both cultivation themes.

	Lambda Total TV Wave 1	Lambda Total TV Wave 2	Lambda Total TV Wave 3	Lambda specific exposure Wave 1	Lambda specific exposure Wave 2	Lambda specific exposure Wave 3	χ^2	RMSEA	AIC	R^2
Model medical characters	NS	.16 ***	NS	.13 ***	.11 ***	.09 *	57.79 ***	.031	135.77	.12
Model Illness and death	NS	NS	NS	.21 ***	.12 ***	.14 ***	95.21 ***	.045	171.205	.15

Notes: RMSEA = root-mean-square error of approximation; AIC = Akaike Information Criterion. NS = not significant; *p<.05; **p<.01; ***p<.001

Figures

Figure 1: Proportion of adolescents watching television on the different moments of the day (7 am to 1 am).