Analysis of movie genres experiencing when changing post-production stylistic elements of the media

Rok Kompare and Helena Gabrijelčič Tomc

University of Ljubljana, Faculty of Natural Sciences and Engineering,   helena.gabrijelcic@ntf.uni-lj.si
Department of Textiles, Graphic Arts and Design

Abstract

In this paper, we have analyzed the changes in four stylistic elements that are present in almost every film and their influence on movie genres experiencing. In the theoretical part a review of studies that proposed different approaches for movie genres categorisation is presented. This is followed by the definition of film genres and investigation of the possibilities of set stylistic parameters and their impact on the film form. The experimental part includes the study how the stylistic elements influence the viewer's assessment, whether it is possible to determine the genre of the movie based on just one stylistic element and at least how many elements are necessary to determine the correct movie genre. Five movie genres that were analyzed are: action, drama, horror, comedy and science fiction, and the impact of stylistic elements as color correction, camera movement (added in post-production), visual effects and music/sound effects were studied. The observers' experience about movie genre produced with different stylistic forms was tested with the questionnaire. The results in terms of the number of observers' correct answers in relation with the recognition of proposed genres and influence of stylistic elements and their combination were statistically analyzed. Based on the statistical analysis it was found out that adding visual effects and music/sound can be sufficient for the correct genre determination. In addition, the research has proved that a combination of two stylistic elements, but only if at least one of them is a visual effect or music/sound, is also sufficient for the correct genre determination. The analysis of the test results revealed that more than half of the respondents correctly identified the genre if at least three parameters were included.

Keywords: color correction, camera movement, visual effects, music and sound, audience testing

1. Introduction

The whole concept of the movie production is very complex. Film form is built up with many stylistic and narrative elements and movie production captures everything from performance, scene setting, direction, shooting, light, computer processing, and sound as well as the setting, costumes, colors, etc. Each subcategory requires its own ordered system, i.e. form. If this system is not regulated, it can drastically influence the experiencing of movies. Viewers are also very demanding, which leaves directors, cameramen, actors and other members of the film project very little room for errors. The most basic division of films is the division by genres. The information about the movie genre is one of the most important characteristic to be found with a movie title (Kompare, 2017; Selbo, 2015). Automatic movie classification is required due to the huge amount of films downloaded online. It gives viewers

filtered and systematically classified results. Rasheed and Shah (2002) have therefore studied what is the easiest way to automatically sort films without human interaction. They noticed that directors often choose to insert the most important and interesting elements of the entire movie into the movie preview (trailer), so they focused on trailers in their research. Their study showed that a careful analysis of the trailers can lead to an appropriate classification. First, they divided trailers into action and non-action films (drama, horror, comedy, etc.) based on length and motion picture. With the help of calculations, they paid attention to individual pixels. They made two categories, in the first one there were static frames or those who moved "globally" (full frame). The second category included frames where the pixel points were moved "locally" (only at one end of the frame). They noticed that action films had more local movements compared to drama or horror. They also found that the transitions in the

action movies is changing significantly faster than in any other genre. Later on, they analyzed the brightness and therefore classified also non-action trailers. Their research showed that among the nineteen selected trailers, everything was well sorted out, except for one that displayed as a comedy, but was in fact a drama-genre trailer.

Huang, Shih and Hsu (2008) wanted to find a best way to automatically sort films by genres. They also got the idea that with the help of special sorting application, children could watch violent movies with the violent content being automatically eliminated. They decided to try to sort the film trailers into three main genres: action, drama (subgenres: comedy and romance) and thriller. Trailers were classified with the help of four parameters: the length of the shots, colors, light and the transitions between the frames. Movie trailers have been transformed into thumbnails. They thus received a long "film tape" of frames that was suitable for analysis. If the changes of frames were slow, the genre was determined as drama. But if the changes were quick (if they were made in less than 0.2 seconds), the movie genre was not determined as drama. In the next step, the non-dramas movies were analyzed based on a light. Forty-four films were analyzed: nine thrillers, ten actions and twenty-five dramas. With the help of the graphs, they noticed that actions had the fastest pace of changing frames as well as the light and colors were the most active in this genre. The results of the experiment showed that these parameters reached 73 % accuracy. They learned that including the analysis of sound or text in the movie could also improve the accuracy.

Austin, et al. (2010) wanted to characterize the differences of film genres with respect to two parameters: the influence of the tone quality (the performance of support vector machines) and the rhythm (rhythm features) of film score. Eighteen films were selected for the survey (twenty-five romantic films, twenty-five dramas, twenty-three horror films and twenty-five actions). All the films were instrumental, i.e. without vocals. For reference, they featured descriptions of film genres on the Internet Movie Database (IMDb) website, which is a data-base for all existing films. Each song was isolated and then analyzed using various computer programs and tools. They found that the tone quality was better parameter for sorting than rhythm. The authors have proved the differences in musical cues between more dynamic genres as action and horror and more emotional ones, drama and romance. Romantic films were the easiest to distinguish from action movies, while with film score it was the hardest to distinguish between drama and romantic films.

Nowadays, new movie genres are being developed that adapt to viewers and spread their horizons. The film archives also feature many works that cannot be marked with a specific genre or can also cover more genres together. However, there are criteria that allow the classification of films into basic film genres (Žitnik, 2015).

Jain and Jadon (2008; 2009) applied neural network in the process of classification of movie genres. The foundation of their methodology is based on audio-visual features that were computationally extracted from different samples. In the experiment, Windows platform and Java, C# and Matlab were used. Movie clips were spitted in audio and video signals and sampling of audio and shot segmentations were performed. They defined shot length, motion, color dominance and lighting key for visual features and time domain, pitch, frequency domain, coefficients for sound modelling (Mel-frequency cepstrum coefficient) and energy for audio features. The results have shown that their classifier was able to successfully recognize different film genres.

Authors Wang and Cheong (2006) discussed the challenges in the categorization of film genres in Hollywood movies and applied systematic approach combining Darwinian psychology (cognitive science, recognition of observers' emotions) and cinematographic (film grammar) aspects and complementary approach that links emotion categories and low-level input features. Their methodology included probabilistic audio inference scheme, movie genre classification and movie affective vector analysis and defined audio-visual cues and effectively identified movie categories.

For prediction of film genre also likability rating or content-based features can be used. Olney (2013) performed a research including six studies, i.e. likability-based topic model, the use of likability-based topics that were defined with the model and the prediction of human annotated film genres, predictions with content-based features, application of synopsis-based topic model and predicting with synopsis-based topics and the analysis of user-viewed topics (topics created without frequency information). The results presented that the likability rating is a valuable method for prediction of film genres, but only when the user has actually seen film (a significance of post-viewing method) and that the accuracy of the likability-based topics can predict human annotated genres with the percentage of 41 %. The third result was that the intuitive content-based features that were tested during the research have lower predictive value as likability-based models.

Shon, Kim and Yim (2012) presented a new method for classification of the movies with the employment of quantitative approaches. The authors implemented a distinct movie characteristic as perceived by the

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audience that allow the researchers to define different movie types. The movie type indicators, as the authors introduce them, allow to define eight categories: eye-catching, commonplace, fun, feel-good, touching, serious, discomfort and different. The cluster analysis enabled the definition of nine movie types that share similar indicators. Considering the results of the comparison of their model and other established methodologies, the authors suggested that the application of their model could perform more accurate prediction, however, according Redfern (2014), the more valuable use in the film theory and practice remain questionable due to the context of the performance of the study.

The most recognizable film genres according to Dirks (2018) are: action, drama, musical film / musical, horror, comedy, crime, adventure, western, historical film and science fiction. The genre determines the sum and the simultaneous action of narrative and stylistic elements that together create a film form. The main stylistic parameters that create the film are: production design and photography, lighting, make up and costume design, performance and montage. In technical terms, the style of film is also shaped by the basic elements of film grammar: type and combination of plans, the type, length and frame content, and the transitions between frames (Munitić, 1977). Primary and secondary color correction and color grading strongly influence the feelings of viewers, according to the research of Hullfish (2008) and Pompe (2015). The movement of the camera, which is divided into the movement of the camera in production (twisting, tilting, zooming in and out, etc.) and the movement of the camera in post-production (which is not an actual phenomenon but an optical illusion) activates viewers and maintains their interest (Figgis, 2007). Effects that can be implemented in production and/or post-production are visual and special. Visual effects are imagery created, altered or enhanced for a moving media that cannot be accomplished during live-action shooting. They are often produced and added to the media in post-production. Special effects can be done while the scene has been shot and are in nowadays media production often intertwined used with visual effects (Fink and Ford Morie, 2010).

A review of the researches has shown that the field of categorization and evaluation of film genres is quite well researched. Different models (calculative and algorithmic) as well as categorical descriptive models based on the perception of the viewer, involvement and overall experience are used. However, the area of stylistic elements influencing the definition of the genre of the film remains a rather unexplored area. Genre contains a multitude of stylistic and narrative elements and therefore the isolation of the element and its separate analysis is risky. But this is the only way to study

selected combinations of stylistic elements integrated, which can bring new insights into this field and consequently helps us to understand the influence of stylistic elements. The purpose of this study was to explore and determine how many and which stylistic elements are necessary for the correct determination of the film genre. With this focus, one content-neutral frame was shot, where individual changes of the four stylistic elements were introduced. The aim of the research was to determine whether one stylistic element is enough to determine the genre. And if it is not, how many are necessary to determine the genre. Stylistic parameters that were analyzed were: color correction, camera motion, visual effects and sound or music. Based on the reviewed literature, the study suggested that from all four parameters, music and sound would provide the best results. Consequently, our research question was whether music and sound are the most effective stylistic elements in genre determination.

2. Materials and methods

In the research five genres of the film were analyzed: comedy, drama, action, science fiction and horror. We tested the communication-visualization aspect of the one frame and the experience of spectators. One frame included different settings and variations of selected stylistic elements. With the questionnaire we tested how many and which parameters were necessary for the correct genre determination. We also checked statistically significant differences between the analyzed genres with analysis of variance (ANOVA) to confirm or reject the importance of the differences between the groups of results. In Figure 1 experimental procedure is presented, including pre-production, production (shooting), post-production (definition of movie genres and implementation of stylistic parameters) and analysis in two phases that enabled the study and statistical evaluation of the influence of one parameter and the combination of two, three and four parameters on participants' experience.

In the experimental work we used the professional programs – Adobe Premiere Pro and Adobe After Effects. The hardware used was the iMac Computer (Processor: 4 GHz Intel Core i7, RAM: 16 GB 1867 MHz DDR3, Graphics: AMD Radeon R9 M395 2048 MB), and camera recording equipment used was: Canon 70D, lens: Samyang 35mm T1.5 Canon VDSLR, stand: standalone tripod Manfrotto 055 + 501HDV, microphone: Rode VideoMic Pro R Rycote suspension.

In the pre-production, we determined that the analysis of participants' experience would be done on one neutral shot (therefore the content would not affect the results). The shot was: (i) short – approximately
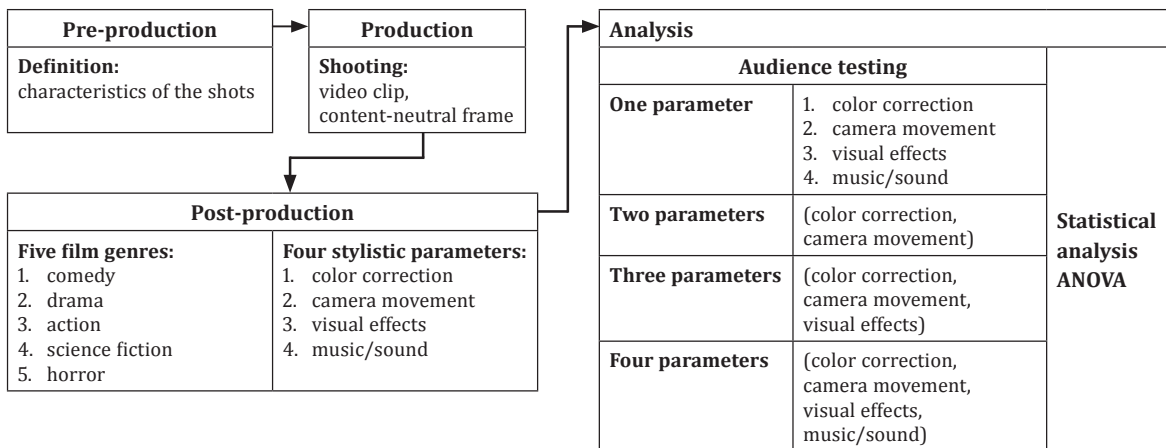
Pre-production	Production	Analysis		
Definition: characteristics of the shots	**Shooting:** video clip, content-neutral frame	**Audience testing**		**Statistical analysis ANOVA**
		One parameter	1. color correction 2. camera movement 3. visual effects 4. music/sound	
Post-production		**Two parameters**	(color correction, camera movement)	
Five film genres: 1. comedy 2. drama 3. action 4. science fiction 5. horror	**Four stylistic parameters:** 1. color correction 2. camera movement 3. visual effects 4. music/sound	**Three parameters**	(color correction, camera movement, visual effects)	
		Four parameters	(color correction, camera movement, visual effects, music/sound)	

Figure 1: Experimental procedure for the analysis of the influence of stylistic parameters on film genre

ten seconds long (since it was necessary to watch it 35 times during testing), (ii) static – since it is easier to add visual effects and change the movement of the camera to the static frame without any special additional tracking tools, (iii) interesting for the viewer, and (iv) shot in cloudy weather (since it affects the colors and color correction the least).

In production, we shoot a bicycle rider who drove through the avenue and moved towards the camera. We got a neutral and moving frame where we had the opportunity to process five film genres we were researching, i.e. action, drama, horror, comedy and science fiction. In post-production, we changed four parameters in the shot and thus influenced the style of display: (i) color correction, (ii) camera movement, (iii) visual effects, and (iv) sound or music. By doing this, we created five different genres: action, drama, horror, comedy and science fiction, as presented. We used the settings that are used in video production as software recommendations and personal authors' experience to achieve certain effects.

2.1 Production

We shot the basic frame with a color profile "Technicolor CineStyle". This color profile provides a better dynamic range of captured content which allows greater artistic freedom in the color processing (Laforet, 2011). The color profile settings were: sharpness: 0, contrast: −4,

saturation: −2, and color tone: 0. The color correction settings for individual genres, including cinematic color grading preset based on Lookup Table (LUT), are presented in Table 1. We recorded the shot on a tripod, so there was no camera movement present in the production phase; it was added later in post-production as a movement of virtual camera. The virtual camera movement settings used for individual genres are presented in Table 2. The specific effects of the individual genres presented in Table 2 were determined according to the typical use in the film production. In the action frame we inserted the effect of fire and two explosions. We inserted rain into the drama frame to show the feeling of drama. In the case of a horror, a smoke effect was used, which mysteriously hides the contents of the frame itself. In a comedy frame we made a speech bubble and wrote: "Še daleč je do Portoroža …" (in English: "It is still far to Portorož…" – Portorož is a Slovenian seaside resort). The mentioned quote can be found in a popular Slovenian song. In the genre of science fiction, we created the effect of something that is impossible in the real world. We decided that the character on the bike would disappear due to some kind of laser hit. For the sound and music analysis we used already recorded musical and audio contents, also presented in Table 2.

Total of 35 shots (Figure 1) were prepared, comprising the shots for five different genres (action, comedy, drama, horror and science fiction) in variations of one of the four tested parameters, combination of two stylistic

Table 1: Color correction settings for definition of different film genres

Movie genre	Exposure	Contrast	Whites	Blacks	Saturation	LUT
Action	0	10	80	−10	100	Earthy
Comedy	0	5	80	−10	120	Hilutite
Drama	0	10	40	−20	100	Heulandite
Horror	−1	5	10	−30	60	IWLTBAP Aspen
Science fiction	−0.5	5	80	−5	80	IWLTBAP Aspen

Table 2: Color correction settings, camera movement settings and visual effects settings
for definition of different film genres

Movie genre	Camera movement	Visual effects	Music/sound effects
Action	Shaking	Explosions, fire and smoke	Intense music and explosion sounds
Comedy	Reverse	Speech bubble	Funny music
Drama	Zoom out	Rain	Gentle, neutral music and the sound of rain and birds
Horror	Zoom in	Smoke	Intense music with high-pitched tones and whisper sound
Science fiction	Up and down	Green laser and disappearance	Space music

Table 3: The original shot and the shots with color correction and visual effects

parameters (color correction and camera movement), combination of three stylistic parameters (color correction, camera movement and visual effects) and combination of all four stylistic parameters (color correction, camera movement, visual effects and music/sound).

In Table 3 the original shot and the shots with color correction and visual effects are presented.

2.2 Audience testing

Testing the influence of stylistic elements (added in the post-production) on the perception of the film genre took place in test room under controlled viewing conditions (isolated dark room), where the test videos with various stylistic elements and their combinations were consecutively displayed on the calibrated projector BenqRC02. Distance from the participants to the projection was 4 m. Seventy participants, 21 to 26 years old took part in the testing (49 female and 21 male). The participants were students and the representatives of the so-called transition to adulthood, i.e. persons aged from 18 to 29 years (Arnett, 2013). In this life period most of the youth complete their education and training, which is the basis for their career and earnings. This is also a period when individuals overcome adolescent dependence, but do not yet take on responsibilities that are normative for adulthood and explore different possible paths in the field of relationships, careers, social and cultural interactions and views of the world (Kodrič, 2014, pp. 10–12). After viewing each short video, they had to define which film genre was – in their opinion – best suited to the presented parameters set. The video-clips with variations of the stylistic elements were shown in two phases. In the first phase the clips included only one element (color correction, camera movement, visual effect or sound and music) that defined the style; while in the second phase the clips including the combinations of selected two (color correction, camera move-

ment), three (color correction, camera movement, visual effect) and four (color correction, camera movement, visual effect and music/sound) elements were shown. The clips presenting selected film genres were randomly shown to the participants.

2.3 Statistical analysis

In the final phase of the research, the statistical analysis was performed to prove or decline the statistically significant differences between the results of the number of correct answers of the observers for the proposed genres. The analysis was carried out with ANOVA single factor for the different genres and different parameters and/or their combinations. In the analysis, only the number of the answers presenting the participants' experience that matched defined movie genres were statistically evaluated.

3. Results and discussion

The results are presented in Figures 2 to 8. In Figures from 2 to 5 test results for the individual elements (Figure 2: color correction, Figure 3: camera motion, Figure 4: visual effects and Figure 5: music/sound) are shown. In Figure 6 we can see the results for connecting two stylistic elements (color corrections and camera motion), in Figure 7 combination of three elements (color correction, camera motion and visual effects), and in Figure 8 the connection of all analyzed parameters (i.e. color correction, camera motion, visual effects and music/sound).

The comments and assessment of the results of the participants in the test are based on the assumption that the authors have selected proper stylistic elements (based on the references presented in Sections 1 and 2) regarding the classification of the film genre.
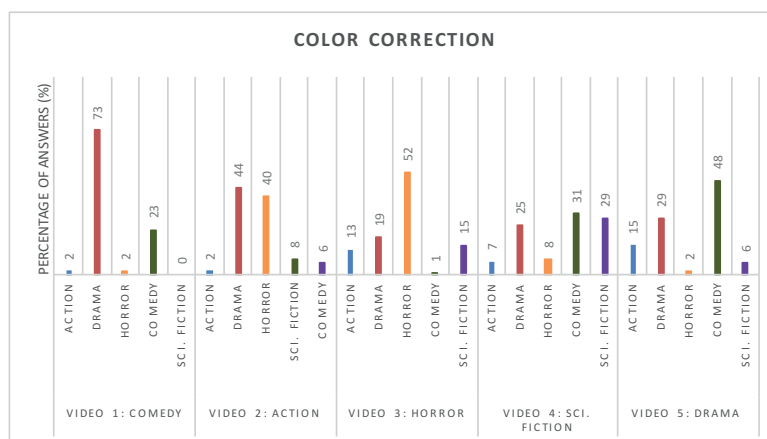

Figure 2: Percentage of answers from participants for a defined genre: Video 1 – comedy, Video 2 – action, Video 3 – horror, Video 4 – science fiction, and Video 5 – drama, all post-processed with different color correction
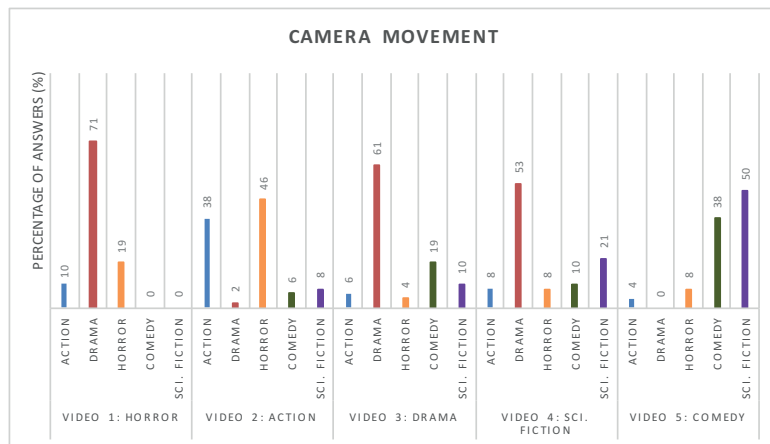
Figure 3: Percentage of answers from participants for a defined genre: Video 1 – horror, Video 2 – action,
Video 3 – drama, Video 4 – science fiction, and Video 5 – comedy, all post-processed with different camera movement
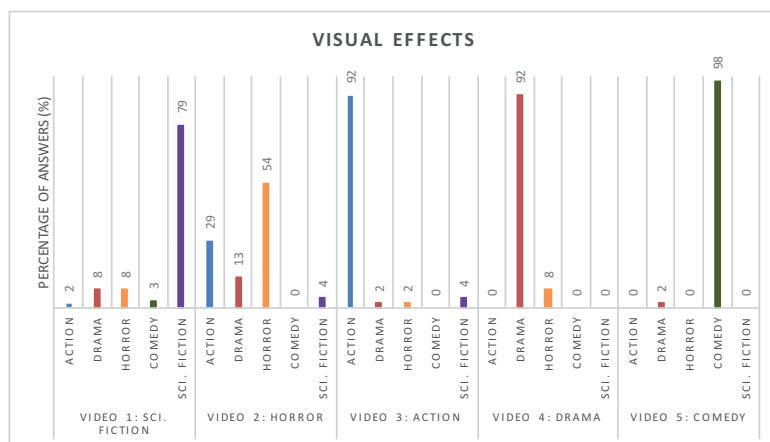

Figure 4: Percentage of answers from participants for a defined genre: Video 1 – science fiction, Video 2 – horror,
Video 3 – action, Video 4 – drama, and Video 5 – comedy, all post-processed with different visual effects
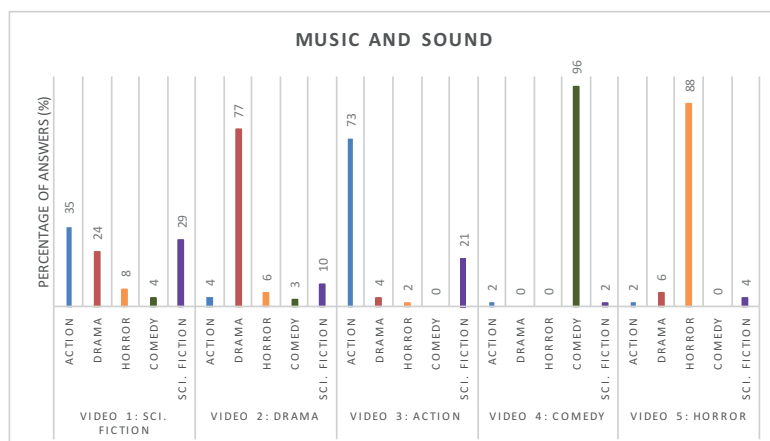

Figure 5: Percentage of answers from participants for a defined genre: Video 1 – science fiction, Video 2 – drama,
Video 3 – action, Video 4 – comedy, and Video 5 – horror, all post-processed with different music/sound

From Figure 2 we can see that the most viewers (73 %) after watching Video 1 decided that the film genre was drama, but the correct answer (comedy) was given only by 23 %. Only 2 % of participants guessed the correct genre in Video 2 (action), while most of them opted for a genre of drama (44 %) and horror (40 %). After

watching Video 3 the slight majority of viewers chose the correct genre – horror (52 %). Green shades were therefore essential for the correct determination. In Video 4 we can see that blue color shades made viewers uncertain. They mainly decided between drama, comedy and science fiction, only 29 % of the viewers correctly determined the genre (science fiction), while comedy received the highest number (31 %). In Video 5, the correct answer was drama but the majority of viewers chose comedy (48 %). Based on these results we found out that it is almost impossible to determine the correct genre of the film just by using color correction. The majority of respondents correctly answered only for the horror film genre (52 %). This may be due to the similarity of the colors used in all videos.

In Figure 3 Video 1 shows the movement of the camera in the horror frame. We used the zoom-in effect but for most viewers (71 %) this was association for a drama. One possible explanation could be that zoom-in is also often used in drama genre and participants tended to correlate zoom-in and drama due to their previous experience. For Video 2, 38 % of viewers decided on the correct answer (action). However, 46 % of them opted for the wrong film genre – horror. It is interesting that a shaking camera presents a horror for most test subjects and not an action. In Video 3, we can see that most (61 %) viewers correctly determined drama by the zoom-out effect of the camera. For Video 4, more than half of the viewers opted for the wrong film genre – drama (53 %). The movement of the camera on the vertical correctly convinced only 21 % of viewers. For Video 5, half of the viewers decided on science fiction with the inverse movement of the camera. Only 38 % opted for the correct comedy genre. Therefore, less than half of people thought that inverse movement was funny and the other half thought it was supernatural.

We found that only Video 3 (zoom-out camera movement) convinced most of the participants, 61 %. For other videos, there were more correct answers in comparison to color correction, but it's still not enough to determine the correct film genre just by camera movement.

In Figure 4, Video 1, we presented a genre of science fiction with visual effects (disappearance of the character with the green laser hit); 79 % of viewers decided correctly. For Video 2, 54 % of people were convinced with the horror shot, 29 % opted for action, 13 % for drama and 4 % for science fiction. In Video 3, 92 % of viewers decided on the right answer (action genre with effects of explosion, shooting and fire). Due to the visual effect of rain, 92 % of viewers correctly decided that Video 4 was drama, but 8 % of the people chose a horror genre. For Video 5, we received the highest percentage in the correct answer (98 %), only 2% of people thought that

the text in the bubble could also appear in the drama. All other film genres did not receive any response.

In this part of the survey we discovered that viewers in all five videos voted correctly in more than 50 %. This shows that visual effects can already determine the genre of the movie, but not yet in full as we can see in the Video 2 where a third of the participants decided that they were watching an action instead of horror.

Figure 5 shows the results of the analysis of music and sound. The music in Video 1 was intended for the genre of science fiction with low-frequency tones. The audience decided for this correct genre with only 29 %. The majority of viewers (35 %) thought that this kind of music can also be used in action (35 %) and drama (24 %). In Video 2, which represents a drama, the audience listened to dramatic melody. Afterward, 77 % of them correctly identified the film genre, but all other genres also received some votes. In Video 3 we tried to show some tension by using the sound and rhythm of dynamic drums and create the action genre. Here 73 % of viewers correctly decided, but 21 % of responses was given to the science fiction. The most correct answers were for the Video 4, where we presented a comedy genre with light and fun music – 96 % of people voted correctly. For Video 5, 88 % of viewers correctly answered that high tones present a horror genre.

Therefore, in our experiment the audio parameter could not determine the film genre. The four videos received over 70 % correct answers, but the viewers were somewhat uncertain in Video 1.

In Figure 6, we tested the combination of two stylistic elements: color correction and camera motion. In the Video 1 we presented drama genre with natural colors and zoom-out effect of the camera. The genre was correctly determined by 65 % of people. All other film genres also received some answers. The blue shades and camera moving down in the Video 2 represented a genre of science fiction. However, most people voted for horror (38 %) and drama (35 %), the correct answer had only 19 %. For Video 3 we can see that the most people (60 %) correctly defined the genre.

The increased saturation of colors and inverse movement were enough to choose a comedy. However, science fiction again got some votes (34 %) probably due to the inverse movement. Green-blue color shades and zoom-in effect represented Video 4 as a horror genre. The correct genre was determined by 77 % of viewers. In Video 5, however, we can see that the stylistic elements that we used for the action (red shades and trembling movements) convinced only 41 % of people. As many as 33 % of them thought that such a color correction and the movement of the camera were in fact horror.
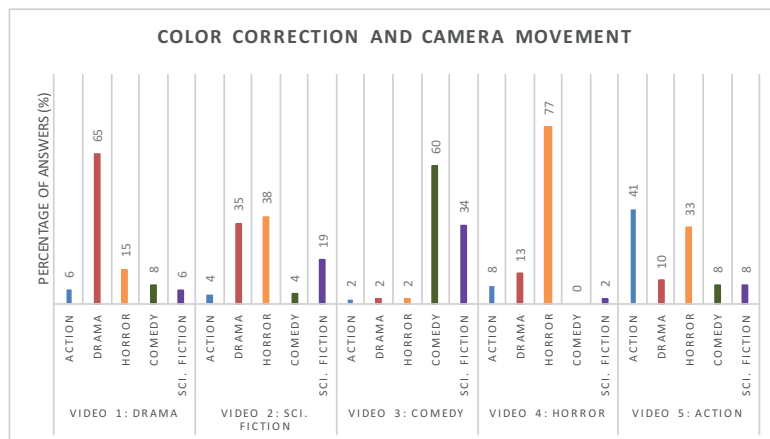
Figure 6: Percentage of answers from participants for a defined genre: Video 1 – drama, Video 2 – science fiction, Video 3 – comedy, Video 4 – horror, and Video 5 – action, all post-processed with different settings of color correction and camera movement
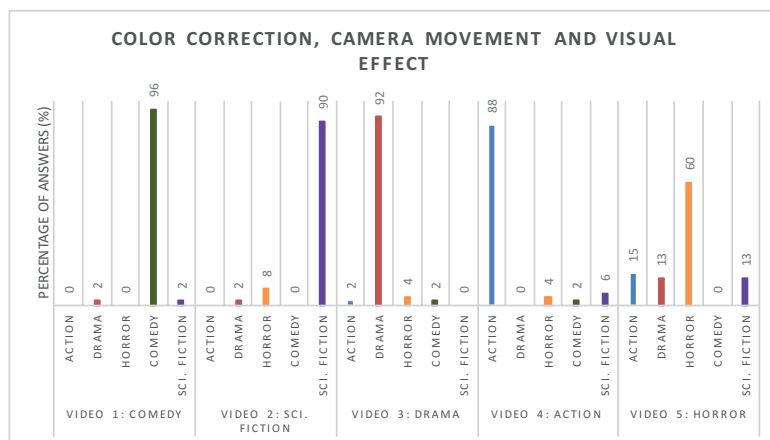

Figure 7: Percentage of answers from participants for a defined genre: Video 1 – comedy, Video 2 – science fiction, Video 3 – drama, Video 4 – action, and Video 5 – horror, all post-processed with different settings of color correction, camera movement and visual effects
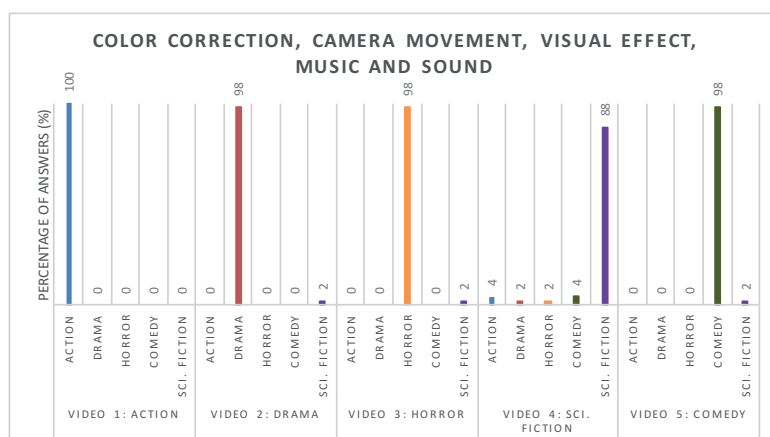

Figure 8: Percentage of answers from participants for a defined genre: Video 1 – action, Video 2 – drama, Video 3 – horror, Video 4 – science fiction, and Video 5 – comedy, all post-processed with different settings of color correction, camera movement, visual effects and music/sound

The combination of color correction and camera movement therefore produced mixed results. For three videos the correct answers exceeded 60 %, while in the Video 2 viewers were unable to determine the correct genre. Similarly, we found out that the correct answers for Video 5 did not exceed 50 %.

In Figure 7 we presented the results of the analysis of the combination of three parameters: color correction, camera movement and visual effects. For Video 1 comedy was presented with increased saturation of colors, inverse motion and a speech bubble. The genre was correctly determined by 96 % of viewers. Drama and science fiction have received 2 % each. Video 2 was a science fiction shot in which we added blue shades, camera moving down, green light and the disappearance of the biker. All these parameters convinced 90 % of the viewers. The horror received 8 % and the drama only 2 % of the votes. In Video 3, we can see that 92 % of viewers correctly chose the genre. The natural colors, zoom-out effect of the camera and the rain were enough to decide on the drama. The horror received 4 % votes, action and comedy 2 % each. For Video 4 the correct film genre – action was chosen by 88 % of people. They were convinced by red color shades and shaking camera with various explosions; 6 % gave their votes to science fiction, 4 % to horror and 2 % to comedy. In Video 5 we presented a horror shot. We added green-blue color shades, the zoom-in camera movement and a mist. All of these parameters convinced only 60 % of viewers. The action reached 15 %, drama and science fiction each 13 %.

Drama, comedy and science fiction have been correctly defined by more than 90 % of viewers using just three parameters. In Video 5 a visual effect – mist – was used which could have left some possibilities for other film genres than horror.

Figure 8 shows the results of the combination of four parameters: color correction, camera movement, visual effects, music/sound. For Video 1, we reached the maximum value. Red shades, the trembling movement of the camera, the explosions, the fire, and the tense melody, these are all parameters which helped the participants to determine the correct film genre – action. For Video 2, the drama reached 98 %. We used natural colors, camera distances, rain and soft melody; 2 % of the participants voted for science fiction. For the horror genre in Video 3 we got 98 % of the correct answers. We used green-blue shades, zoom-in effect of the camera and high tones; 2 % of the viewers voted for science fiction. In Video 4 we can see that 88 % of spectators decided for the correct answer – science fiction. Other film genres also received some votes here: action and comedy 4 %, drama and horror 2 %. In Video 5, with the increased saturation of colors, inverse movement,

speech bubble and cheerful music, 98 % of spectators correctly defined the comedy genre. Again, science fiction got 2 % of the votes, probably due to the inverse movement which could also be supernatural.

The results have shown that a combination of all four parameters enable the participants to experience a predefined movie genre with more than 88 % accuracy.

3.1 Statistical analysis

The results of ANOVA statistical analysis revealed that there is no statistically significant difference between mean values and variances of the results of percentage of correct answers according to different genres when one stylistic parameter is analyzed. The F-value was 0.639, P-value was 0.638 (α-value 0.05) and F_{crit} was 2.689. That explains us that the observers have chosen very similarly the right (and wrong) answers for all the proposed clips including different genres and that the genres were very similarly definable when the tasks with different post-production stylistic effects and their combinations were tested.

On the contrary, the null hypothesis was rejected when the ANOVA was performed according to two or more analyzed parameters that were simultaneously introduced in the clips in post-production and their combinations. This showed that there were statistically significant deviations between the results of the correct genre's choice according to the introduced post-production parameters, so that the F-value was 10.608, P-value was 3.787×10^{-6} (α-value 0.05) and F_{crit} was 2.445.

Additional t-test calculations between the results presenting different pairs of parameters proved that the null hypothesis could be not rejected when the clips with single setting of color correction and camera movement were compared, as well as setting of visual effects and music/sound. That means that the results of correct answers have equal mean value, so that visual effect and music/sound gave to the viewers equal conditions for genre recognition and so did the color correction and camera movement. However, the observers have mainly answered correctly when they observed the videos with added visual effect or music/sound, meanwhile the results in our experiments demonstrated that when color correction and camera movement were tested alone (not in combination), they hardly represented the film genre (the numbers of correct answers for all the genres were low).

When the results presenting single stylistic parameters were statistically compared using t-test with the results presenting the combinations of two, three or four parameters it was discovered that the null hypoth-

esis can be rejected for all the tests, but not for the results of color corrections and camera movement (as a single or in combinations). Besides, the mean values of the results of visual effects and music/sound, when they were tested as single parameter in comparison with the combinations including one or both parameters were demonstrated to be statistically equal. These results additionally proved that, in our research, the parameters of visual effect and music/sound as single elements and also in all the combinations gave statistically the same stylistic imprint to the video clip for the successful definition of the genre.

4. Conclusions

The results of the analysis have shown that participants interpret various stylistic contents differently, namely, in our opinion a viewer decides based on his/her previous experiences, which were not tested in the research. In our study, only four parameters were studied, but in any case, the findings of film art add insight into the design of film genres and how individual parameters affect the viewer.

Movie genres are not of a static nature but an organic web of stylistic and narrative elements. The applied methodology for definition of the correlation of the stylistic elements is one possible solution of analysis, which was not performed before in the field.

The uniqueness of the research is that the selected parameters (color correction, camera motion, visual effects, music and sound) were displayed on the same frame. The viewer's interpretation was affected only by the stylistic elements. Here it has to be mentioned that the same testing condition could also result in bias results, due to the possible influence on the decisions of the participants that were exposed to the repetition of the same basic content and the possible conditioning of the experience with the previously seen material.

The audience that participated in the experience testing were the representatives of the specific life period, i.e. transition to adulthood. Consequently, it can be concluded that the results are representative only for the participants from 18 to 29 years. To understand the movie genres experiencing of different audience groups, the methodology should be applied on a wider age range. Besides, the analysis of the movie watching background could reveal interesting correlations between experiencing of movie genres and participants habits about movie consumption.

The research shows that the testers were correctly identified and that the participants experienced a defined movie genre (with at least 80 % of the value)

with all the four parameters of all five genres that were presented. It was also found that there are no statistically significant differences between the results of correctly determining different genres depending on introduced stylistic parameter when these are implemented separately.

Since the combination of color correction and movement of the camera yields mixed results, among which there are no statistically significant differences also in comparison with the results when these two parameters are considered individually, one cannot claim that the combination of only these two elements makes it possible to define a genre. In our opinion the reason for these results could be found in the fact that each viewer has his own perception and experience, what colors are suitable for which film genre, and how the camera should move to achieve a certain atmosphere.

The findings also revealed that the stylistic elements influence differently the participants' experience. Visual effects were found to be strongly influential and the participants could experience from 79 % to 98 % the determined movie genre of horror, drama, science fiction and comedy when only this element was set in the clip. According to the presented results it was discovered also that music and sound are not the most effective stylistic elements in genre determination. In our research it was found that visual effects can already determine the genre of the movie, yet not with so high percentage of participants experiencing the movie genre as when there is a combination of more stylistic elements. The research has proved that a combination of two stylistic elements, but only if at least one of them is a visual effect or music/sound, is also sufficient for the correct genre determination.

In the following analysis, it was found that there are no statistically proven differences between the results of the correct responses of analyzed images with the inclusion of visual effects and music/sound as independent parameters and/or all their combinations. Therefore, we can claim that in the case of our investigations these two parameters are independent and both individually and in combination they can determine the genre.

When we included three parameters in one frame: color correction, camera movement and visual effects, the results of the answers to determine the corresponding genre were already very high. This was possible in our case due to the presence of at least one of the parameters: a visual effect and/or music and sound. For all five videos, the values exceeded 60 %. In comedy, the value of the correct decisions reached up to 96 %. The spectators were no longer in the dilemma when all four parameters were included. For all five short clips, the value exceeded 88 %.

Practical use of the presented results is possible as recommendations for teaching and learning about the importance of stylistic elements in film production. The presented results can ease learning process and accelerate the exploration of the film's language to move to a more advanced level. In addition, it has been shown in the study that for automatic classifications it is necessary to consider the correlation of more stylistic elements, and not only individual ones. The findings of the research can therefore also be used to upgrade the systems for automatic categorization of film genres.

In the future, the research could be extended by testing all four parameters set on different frames, with differ-ent events, in a mixed version of the shots applied. Due to the controllability of the process in the presented research the choice of the parameters and their values for the definition of the genres were limited and were defined considering authors' experiences and software recommendations. In further researches there is also a potential for the study of different parameters for each stylistic element, the combination of different stylistic elements in the collaboration with narrative elements and their settings. Moreover, the analysis of the clips produced by different authors and the inclusion of story line in the shots could reveal wider observations on experiencing the stylistic elements in correlation with different authors' style and narrative.

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