

Effects of Successive Cutting on Comprehension and Retention of Film

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Abstract: In this paper, we examined the effects of successive cutting on the understanding of film of adults and analyzed the relationship between the quantity of essential information contained in the film and comprehension. In the experiment, subjects were randomized into three groups: the control that watched original films without modification, the compression that watch films slightly cut for length, and the extraction that watch films from which nonessential information was cut and information retained. Subjects viewed two live-action films and two animation films, evaluated these films, and performed a free recall task in which they described what happened in each film. In the results of experiment, we found that (1) cutting hardly influences recall accuracy, (2) types of cutting and film genres hardly influence the recall of films.

Key-Words: Film comprehension, successive cutting, essential information, free recall task

1 Introduction

The movies and TV programs that we watch in our daily lives incorporate a variety of film techniques, such as cutting, zooming, and panning, which are used to enhance various scenes.

Recently, with the development of Information and Communication Technologies (ICT), it has become easier to create or edit movies and stream movies via Internet. For instance, movies can be utilized as a tool to facilitate learning in the development of audio-visual materials and streaming movie contents. Since film techniques are also very important when making movies for educational purposes, we have to investigate how to use them to facilitate learner understanding by focusing on the technique of cutting and explore effective methods.

A cut, which is one of the most frequently used film techniques, is simply the transition between two separate pieces of film (Kraft, 1986). One role of cutting is to divide the film into scenes, and the other is to splice together two temporally and spatially different pieces of film (Monaco, 1983). Smith, Anderson, and Fisher (1985) reported that most prime-time family American TV programs incorporate a remarkable amount of cuts. Yamamoto (1993) also reported that cuts are notably used in TV programs for kids in Japan.

Concerning the cutting technique, many re-

searches of young children's comprehension of film and television have been done (Bryant & Anderson, 1983; Collins, 1983; Smith, Anderson and Fisher, 1985; Anderson & Collins, 1988; Yamamoto, 1991; Morita, 1997). Anderson & Collins (1988) suggested that children at about eight years old can completely understand the concepts related to the cutting technique. Additionally, Collins (1983) argued that the difficulty of understanding the cutting technique is one reason that young children's comprehension of film and television is poor.

As mentioned above, there have been many studies about film comprehension. In contrast, because adults automatically and unconsciously process cutting techniques (Huston & Wright, 1983), there have been few studies of the effect of cutting techniques on adults (Yamamoto, 1993). But, in research on adults, Kraft (1986) suggested that cutting influenced the evaluation of film. Kraft found that films with cutting were preferred over uncut films and judged more interesting, more active, stronger, and quicker than films without cutting. Further, the recall of cuts was quite poor, also suggesting that adults process such techniques quite automatically. Although the number of cuts is not really remembered, cutting profoundly affected the evaluations of the film sequences. Such findings illustrate that cutting techniques influence the film comprehension of adults.

Table 1: Length of films in each condition

| Films | Control | Compression | Extraction |
|--------------------|-----------|-------------|------------|
| Live-action film A | 316(sec.) | 293 | 276 |
| Live-action film B | 348 | 327 | 310 |
| Animation film A | 306 | 295 | 257 |
| Animation film B | 306 | 286 | 257 |

Table 2: Plots of each film

| Films | Story |
|--------------------|--|
| Live-action film A | Mr. Bean missed one bus. He waited a long time for the next bus. However, it drove past without stopping. |
| Live-action film B | Mr. Bean was reading an old book at the library. After carelessly damaging the book, he secretly exchanged books with another person and fled the library. |
| Animation film A | Pingu found a letter at home that he concealed from his family. He learned that it was addressed to him. It was an invitation to a party. |
| Animation film B | Pingu bought a lottery ticket, won the lottery, and got a lot of fish. He gave the clerk the fish in exchange for a toy. |

Furthermore, Morita (1999) classified cutting into two types: "successive" and "simultaneously". The former splices a shot to another shot with a time difference, and the latter splices a shot to another shot without a time difference (e.g., switching shots from a different viewpoint). Few studies have investigated the effects of successive cutting.

In this study, we explore the effects of successive cutting on the understanding of film on adults. In our experiment, we compare subjects' comprehension of films edited with and without successive cutting.

We also focus on the relationship between the quantity of essential information contained in the film and comprehension. Murata (1993) investigated the effect of comic strips as a teaching strategy. In the experiments, three types of text with different formats were compared: a comic strip with pictures showing the essential points of the target knowledge; a comic strip with pictures of the effectual points replaced with pictures of nonessential points; and a printed scenario without pictures. She reported that the comic strip with specific pictures of the target knowledge facilitated comprehension by summarizing and emphasizing the essential points of the text. In our study, we examine the comprehension differences between

films that included only essential story information and films that included both essential and nonessential elements.

The purpose of this study is to examine the effects of successive cutting on the understanding of film of adults and to analyze the relationship between the quantity of essential information contained in the film and comprehension.

2 Method

2.1 Experimental Design

The experiment had a mixed factorial design conducted with two genres of film (Live-Action and Animation) x three types of cutting (Control, Compression, and Extraction). Film genres were the within-subject variable, and types of cutting were the between-subject variable.

We arranged two film genres (live-action and animation) because in the previous studies, experiments with children used animations and puppet shows, and experiments with adults used live-action films.

We arranged the following three cutting conditions:

Table 3: Twenty pairs of adjectives

| | | | | | |
|------------|---|--------------|----------|---|----------|
| consistent | - | inconsistent | lively | - | lonely |
| complete | - | incomplete | sharp | - | blunt |
| good | - | bad | clear | - | faint |
| pleasant | - | unpleasant | positive | - | negative |
| happy | - | sad | quick | - | slow |
| cheerful | - | gloomy | strong | - | weak |
| bright | - | dark | light | - | heavy |
| easy | - | difficult | shallow | - | deep |
| soft | - | hard | silent | - | noisy |
| active | - | passive | simple | - | complex |

- (a) Control: original films without modification.
- (b) Compression: films slightly cut for length. But the amount of information was nearly identical to the original films.
- (c) Extraction: films from which nonessential information was cut and information retained.

2.2 Subjects

Subjects were thirty graduate students randomized into three groups (10 per group): Control, Compression, and Extraction.

2.3 Materials

”Mr. Bean” was chosen as the live-action film and ”Pingu” as the animation film. Four stories comprised of two stories selected from each film genre were used in the experiments. Twelve films were generated according to the three cutting definitions using an Adobe Premiere Pro 1.5. Time differences between control and compression and between compression and extraction were within 20 to 30 seconds. Table 1 shows the length of films in each condition. Table 2 shows the plots of each film.

2.4 Experimental Tasks

Subjects performed two tasks with each film. One task rated the films on a 5-point rating scale with the twenty pairs of adjectives shown in Table 3. The other is a free recall task in which they described what happened in each film and assigned numbers in sequential order.

2.5 Procedures

Before being informed of the two tasks described above, subjects in each group watched the four films on a Windows Media Player 10. The films were presented in random order. After watching every film, they performed the two tasks without time restrictions.

3 Results and discussion

We explore the effects of the differences of film genres and cutting types on subjects’ performance of the free recall task.

3.1 Methods of analysis

Subjects’ performance of free recall tasks in each film were evaluated by error rate and recall rate. The stories of each film were divided into one unit per action. Table 5 shows the number of units in each film.

Error rate was used to evaluate the precision of subject’s descriptions. Each subject’s error rate was calculated as incorrect descriptions by descriptions. Errors were defined as statements in which the contents and the sequential order of events were different from the film.

Recall rate was defined as the number of correct units compared with the total number of units. Each subject’s recall rate was calculated as correct units recalled divided by film units. Subject’s statements that corresponded with film units were counted. In contrast with error rate, the order of descriptions was not considered. Recall rate with essential and nonessential information and recall rate that only included essential information were analyzed to compare the ex-

Table 4: Units in each film

| Films | Control & Compression | Extraction |
|--------------------|-----------------------|------------|
| Live-action film A | 55 | 53 |
| Live-action film B | 61 | 56 |
| Animation film A | 46 | 38 |
| Animation film B | 48 | 41 |

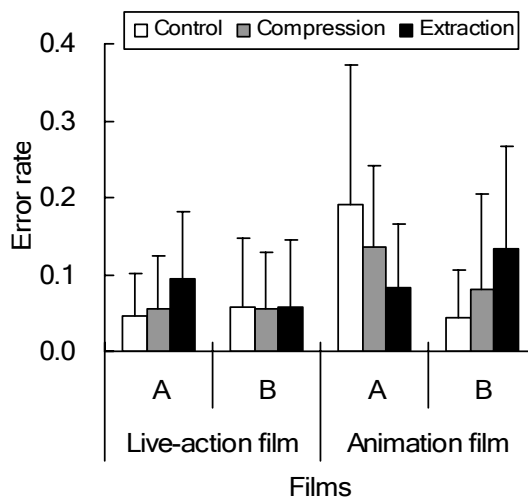


Figure 1: Average error rate for three groups in each film

traction condition that only included essential information with other conditions.

3.2 Error rate

The average error rates for three groups in each film are summarized in Figure 1. They were analyzed in a two-way mixed ANOVA with conditions (control, compression, and extraction) as between-subject factors and film genres (live-action and animation) as within-subject variables. There was a significant main effect of film genres ($F(3,81) = 3.49, p < .05$), which shows that subjects correctly answered the live-action films more than animation.

These results indicate that cutting hardly influences recall accuracy. Perhaps live-action films were more correctly recalled than animation films due to the differences in the number of scene changes. In the experiment, there were a number of scene changes in the stories of the animation films. In contrast, there were few scene changes in the stories of the live-action films. It is thought that these differences caused

the difficulty of understanding and were related to the differences of error rate.

3.3 Recall rate

Average recall rates, which included the essential and nonessential information for the three groups in each film, are summarized in Figure 2, and average recall rates, which included the essential information for the three groups in each film, are summarized in Figure 3. These figures show that the recall rate average of the extraction condition is higher than the other conditions. Recall rates were analyzed in a two-way mixed ANOVA with the conditions (control, compression, and extraction) as between-subject factors and film genres (live-action and animation) as within-subject variables. Analysis results showed no significant differences among the three conditions.

These results indicate that types of cutting and film genres hardly influence the recall of films. However, for the following reasons, further investigation is needed to clarify the effect of cutting on film recall.

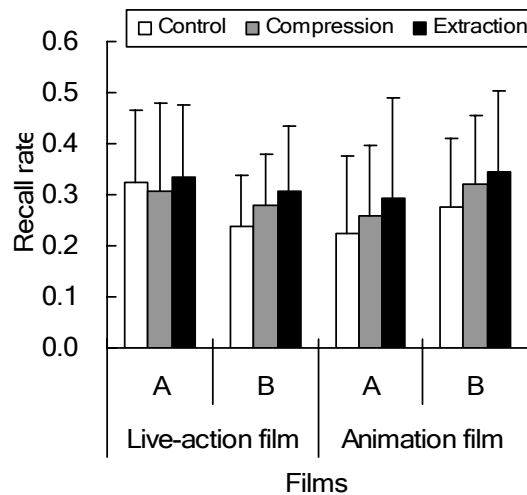


Figure 2: Total average recall rates for three groups in each film

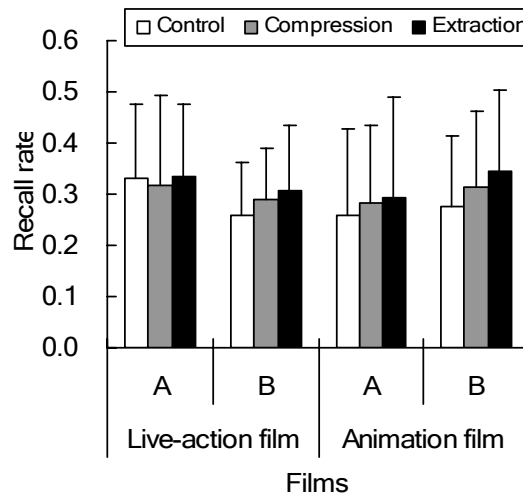


Figure 3: Average recall rates included essential information for three groups in each film

First, the individual differences of recall rates were larger than the differences of the recall rates among the three conditions. Second, the proportion of essential information in the total number of units in each film is very low compared to non essential information.

4 Conclusion

In this paper, we examined the effects of successive cutting on the understanding of film of adults and analyzed the relationship between the quantity of essential information contained in the film and comprehension.

In the experiment, subjects were randomized into three groups: the control that watched original films

without modification, the compression that watch films slightly cut for length, and the extraction that watch films from which nonessential information was cut and information retained. Subjects viewed two live-action films and two animation films, evaluated these films, and performed a free recall task in which they described what happened in each film.

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Acknowledgements: This research was partially supported by the Ministry of Education, Science, Sports and Culture, Grant-in-Aid for Scientific Research of Young Scientists (B), 2005, 17700604.

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