

The Role of Post-Production Formal Features in the Prediction of Presence

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Abstract

The concept of presence has been included in numerous studies of popular media in recent years (Bracken & Skalski, 2010). Most experiments investigating these presence effects have manipulated exhibition formal features such as screen size or resolution. Fewer studies have examined how production or post-production factors influence presence. This research investigates presence-related responses to three post-production decisions for video stimuli— editing, music choice, and color. It reports the results of experiments manipulating these understudied characteristics of popular media, in an effort to gain a more thorough understanding of variables influencing presence.

1. Presence Defined

Presence may be broadly defined as the “perceptual illusion of non-mediation” (Lombard & Ditton, 1997). Conceptualizations of presence have broken down the experience into distinct sub-dimensions. Lee (2004) identifies spatial presence, social presence, and self presence as the primary types. Lombard and Ditton (1997) conceptualize presence as including social richness, realism, transportation, immersion, social actor within medium, and medium as social actor. In their Temple Presence Inventory (TPI), Lombard and Ditton (2009) also include measures of more specific types of presence like engagement, social realism, and perceptual realism. There are clearly many sub-dimensions of presence, and a full consideration of them is beyond the scope of a single study. In this investigation, we focus on a variety of presence experiences likely to be influenced by the viewing of video stimuli—spatial presence, immersion, engagement, realism, social richness, and social presence (passive interpersonal).

The definitions of these dimensions are as follows: *Spatial presence* is the sense of being physically located in a virtual environment (Ijsselsteijn, de Ridder, Freeman, & Avons, 2000).

This subdimension of presence has probably received the most attention from researchers, and Wirth et al. (2007) argue that spatial presence happens as a

result of media users constructing a situational spatial model of a virtual environment. Immersion occurs when a person feels perceptually surrounded during media use (Blascovich, Loomis, Beall, Swinth, Hoyt, & Bailenson, 2002). Engagement refers to involvement with a medium as a result of sensory stimulation (Author, 2010b). Realism is the extent to which people perceive that a medium is producing accurate representations of objects, events, and people (Lombard & Ditton, 1997). Social richness is the extent to which a medium is perceived as socially intimate and immediate, by more accurately communicating the visual and verbal features of other social beings (Lombard & Ditton, 1997). Social presence, finally, refers to the extent to which media users feel “with” others (Biocca, Harms, & Burgoon, 2003). Since this study examines the effects of video messages, we specifically are interested in a social presence type called “social presence— passive interpersonal” (Lombard & Ditton, 2009).

2. Causes of Presence Responses to Moving Images

Presence scholars argue that presence responses are influenced by a combination of media form, media content, and individual difference variables (Lombard & Ditton, 1997; Bracken & Skalski, 2010). We take this notion further and propose that presence responses to a video stimulus are influenced by specific aspects of content, formal features, and individual differences. From content, *particular cues* (Author, 1988) or *general substance* (e.g., genre such as horror, comedy) can generate more or less presence in audiences.

Formal features (as laid out by Author, 2010a) may include (a) *acquisition characteristics* (e.g., film vs. video, shot types, lighting), (b) *post-production factors* (e.g., editing features, inserting of music score), and/or (c) *exhibition factors* (e.g., screen size, surround sound). Individual differences, finally, include psychographic factors, demographic characteristics, media habits, and other relatively stable traits and characteristics of the receiver.

Much of presence research to date has examined exhibition factors. In a typical presence study, researchers will take existing content and vary the way it

is presented to audiences, such as by having it presented on different screen sizes (e.g., Lombard, Reich, Grabe, Bracken, & Ditton, 2000) or having users interact with it in different ways (e.g., Author, 2011). Individual difference variables have also begun to be considered, as in the Wirth et al.'s (2007) process model of spatial presence, which accounts for a variety of user characteristics potentially affecting spatial presence. But the other realms have been largely ignored by researchers, despite being acknowledged as potentially important in seminal work on presence (Steuer, 1992; Lombard & Ditton, 1997). A primary focus of this investigation is on three post-production formal features—color, music, and the editing process. These are distinct from exhibition factors in that they involve content manipulation through editing software instead of just variation via technological presentation. A large amount of post-production typically happens after film and video are shot for the motion picture and television industries, and decisions made in postproduction may influence presence reactions.

3. Study Overview and Research Questions

This paper presents exploratory analyses of data from four experiments. These experiments manipulated post-production formal features of the moving image (color vs. B&W manipulated in editing; use of editing/montage; presence and type of music score) and in one case the content (footage of various people, objects, and combinations thereof). Three of the four utilized original footage shot specifically for the experiments. The experiments included posttest measures of various presence scales, and individual difference variables. Our research questions are as follows:

RQ1: How does color (vs. black and white) influence presence responses?

RQ2: How does the type of music score in a film influence presence responses?

RQ3: How does the editing of a sequence of shots influence presence responses?

RQ4: How does the content of a moving image segment influence presence responses?

RQ5: What role do individual differences play in presence responses?

4. Methods—Study 1

Our first experiment involved a manipulation of color. Participants were randomly assigned to watch a film segment in either color or black and white. They then completed presence and individual difference measures.

4.1. Participants

The participants who made up the two groups (N = 109) averaged 21.7 years of age, and were from the introductory communication course at an urban, Midwestern college. The students were offered extra credit for their participation in the experiment, which took about 30 minutes to complete.

4.2. Stimulus and Procedure

The two groups each viewed the same 12-minute segment of the documentary *The Perilous Fight: America's World War II In Color*, shown in DVD via a digital projector. The segment began in Episode 3 with the chapter entitled “Raising Morale” and ended with the chapter entitled “Dachau.” The segment chosen did not mention the fact that the footage is in color, and how rare this is. The first group, consisting of 48 students, watched the presentation in its original color, while the second group, which consisted of 61 students, watched the segment in black-and-white. The color was stripped away for the second group by disconnecting the 2 color-difference signals from the video scaler, which fed the video images to the projector. This allowed for a true black-and-white presentation of this color material to be seen by the second group. Thus, the independent variables utilized in this study were the presentation of the documentary segment in color, or the presentation of the documentary segment in black-andwhite.

Following each group's viewing session, the same questionnaire was distributed and completed by the participants. The questionnaire contained items intended to measure the level of presence that was experienced by viewers in both the color and black-and-white condition, and it also included items designed to better understand whether or not the participants' expectancies were violated in any direction.

4.3. Measures

4.3.1. Presence. Three scales were included to measure the presence dimensions of immersion,

engagement, and realness, adapted and developed from Lombard and Ditton (2001), Lassiter, Freeman, Keogh, and Davidoff (2001), and Witmer and Singer (1998), respectively. The items were in either semantic differential or Likert format.

In the measurement of immersion, items such as “How involving was the film?,” and “How completely were your senses engaged?” utilized the semantic differential scale with responses ranging from 1 to 7 equaling “Not at all” to “Very involving” or “Very much” respectively. Likert scale items included “I felt as though I was participating in the film’s environment,” or “I felt I was visiting the places in the film.” The 14-item scale had a Cronbach's alpha of .91 in terms of internal consistency reliability.

To measure engagement, semantic differential scale items such as “How engaging was the film footage?,” and “To what extent do you think the film footage you just saw influenced your thoughts?” were used, with 1 being equal to “Not at all” and 7 being equal to “Very much.” Likert scale items such as “I would have liked the experience to continue,” “I felt myself being drawn in,” and “I lost track of time” were also used in an effort to measure the presence concept of engagement. The 12-item engagement scale had a Cronbach's alpha of .86 in terms of reliability.

To measure the realness or naturalness component of presence, a third scale including semantic differential scale items such as “To what extent did you experience a sensation of reality?” were used, with 1 equaling “Not at all” while 7 was equal to “Very much.” Other semantic differential items included “How well were you able to observe the body language of the people you saw in the film?,” where 1 equaled “Not well” and 7 equaled “Very well,” and “Please circle the number that best describes the film,” where 1 was equal to “Dead” and 7 was equal to “Lively.” Likert scale items used to measure realness included items such as “It felt like the content was live,” and “I had a strong sense that the characters and objects were solid.” The 11-item realness scale had a Cronbach's alpha of .79 in terms of reliability.

The scales for immersion, engagement, and realness were all tested statistically on their own, but were also combined together as a three-item scale representing overall presence. When combined to make up the presence scale, the immersion, engagement, and realness scales had a Cronbach's alpha of .86 in terms of overall reliability.

4.3.2. Individual Difference Variables. Individual difference variables measured in this experiment included expectancy, personal acquaintance with veterans of foreign wars, prior exposure to WWII films, age, and gender.

Expectancy was included based on the assumption that expectations about World War II footage (which has historically been shown in black and white) would influence responses (Denny, 2004). To measure expectancy violation, level of agreement items were adapted and developed from a pilot test. Items such as “The film was more relevant to me than I would have anticipated” and “The film footage seemed more recent than I would have expected” were employed. Responses for these items ranged from “1” equaling “Strongly Disagree” to “7” equaling “Strongly Agree.” The five-item expectancy violations scale had a Cronbach's alpha of .82 in terms of reliability.

As for the remaining individual difference variables, personal acquaintance with veterans of foreign wars was measured by asking respondents if anyone significant in their life fought in each of a list of wars from the past 100 years. An index was then created using this information. Exposure to WWII films was measured by asking respondents if they had seen each of a series of popular films (both color and black and white) on the subject. An index of overall exposure was then created using these items. Respondents were also asked to indicate their age, gender, and other demographic characteristics. Responses to the gender item were dummy coded into femaleness.

5. Results—Study 1

In order to examine which individual differences related to the three presence scales, we first examined zero-order correlations. The following individual-differences variables were available in this study: Gender (dummy coded as female), age, the expectancy violation scale, an index of personal acquaintance with veterans of foreign wars, and past exposure to WWII films (both generally and specifically in black and white). So as to discern potential interactions between the individual differences and the color/B&W manipulation, we conducted split correlations on the twogroup manipulation. The significant correlations (using a liberal criterion of $p < .10$ because of the exploratory nature of these investigations) between these individual differences and the three presence scales are presented in Table 1.

Table 1. Significant Correlations with Presence Scales—Color Experiment

		Immersion	Engagement	Realism	Total Presence
All conditions (n=109)					
	Expectancy violation	.67***	.65***	.53***	.70***
Condition 1: Color (n=48)					
	Expectancy violation	.74***	.74***	.60***	.78***
Condition 2: Black & white (n=61)					
	Past exposure to WWII films		.22a		
	Expectancy violation	.62***	.56***	.44***	.62***

NOTE: Potential correlates with presence scales included: Gender (female), age, expectancy violation scale, index of personal acquaintance with veterans of foreign wars, and past exposure to WWII films (both general and specifically in black and white). a – $.05 < p < .10$; * $-p < .05$; ** $-p < .01$; *** $-p < .001$.

As shown in the Table, the only variable consistently related to the presence scales is the expectancy violation scale. Past exposure to WWII films generally is correlated with the engagement presence scale.

Using the expectancy violation scale as a covariate, a MANCOVA was conducted predicting the set of three presence scales from the Color/B&W manipulation, as

shown in Table 2. The main effect of the manipulation is not significant, while the expectancy violation scale remains a significant predictor.

In sum, we found the manipulation of Color/B&W not to be related to presence responses. A single individual-differences indicator, that of expectancy violation, was found to be a robust predictor of presence.

Table 2. MANCOVA Results for Color Experiment

Again, this contribution was significant regardless of whether the stimulus was in color or black and white.

6. Methods—Study 2

Our second experiment involved a manipulation of music. Participants were randomly assigned to watch a short film that included either a rock soundtrack, an orchestral soundtrack, or no music soundtrack. They then completed presence and individual difference measures.

6.1. Participants

The participants who made up the three groups ($N = 88$) averaged 25.0 years of age, were 48.9% female, and were from an introductory communication course at an urban, Midwestern college. The students were offered extra credit for their participation in the experiment, which took about 30 minutes to complete.

6.2. Stimulus and Procedure

An original, narrative film shot on digital video was used in its entirety. The entire film was about seven minutes in length. It consisted of five scenes. The film had two music conditions and a no-music condition. The music consisted of either existing alternative rock music or existing string orchestral music. The soundtrack was edited into the film, as is typical for any film. This was to ensure the ecological validity of the experiment.

A background questionnaire was administered via Media Lab prior to the experimental manipulation. Participants then viewed the film in a laboratory setting using Media Lab software. The film was displayed on standard computer screens, and the subjects used headphones for the audio. Random assignment was used to determine which condition subjects would receive. The post-test only questionnaire was hosted on via Survey Monkey. Students responded to the questions while still in the lab setting, at the same computers on which they viewed the film.

6.3. Measures

6.3.1. Presence. Selected items from Lombard and Ditton's (2007) Temple Presence Inventory (TPI) and Vorderer et al.'s (2003) MEC Spatial Presence Questionnaire (MEC-SPQ) were included to measure presence dimensions, specifically social richness, social presence-passive interpersonal, and engagement (mental immersion) from the TPI, and situational spatial model and spatial presence-self location from the MEC-SPQ. The items were in either semantic differential or Likert format.

Social richness was measured using seven semantic differential items from the TPI that asked respondents to evaluate their media experience. Bi-polar adjectives included "remote-immediate" and "impersonal-personal." This scale had a Cronbach's alpha reliability of .93. Social presence-passive interpersonal was measured using two semantic differential items from the TPI that had "Not well" and "Very well" as endpoints, including "During the media experience, how well were you able to observe the body language of the people you saw?" Cronbach's alpha for these two items was .90. Engagement (or mental immersion) was measured using six items from the TPI that also had "Not well" and "Very well" as endpoints. Specific items included "To what extent did you feel mentally immersed in the experience?" and "How involving was the experience?" Alpha reliability of this scale was .91.

The extent to which respondents constructed a situational spatial model (SSM) during their experience was measured using four items from the MEC-SPQ, including "I had a precise idea of the spatial surroundings presented in the film." Spatial presence-self location was measured using two items from the MEC-SPQ, including "I felt like I was actually there in the environment of the film." Both sub-scales were measured on a 0-10 scale, with 0 indicating "strongly disagree" and 10 indicating "strongly agree." Alpha reliability was .91 for the SSM index and .96 for the spatial presence index.

6.3.2. Individual Difference Variables. The pre-experiment questionnaire included measures of standard demographics, exposure to various forms of relevant media (including hours of television viewed yesterday, number of days reading the newspaper in the past week, number of movies seen in a theater in the past month, estimate of percentage of television viewing done alone, minutes spent yesterday playing video games alone and with friends, and minutes spent on the Internet and social networking yesterday), and several psychometric

indicators – scales for the measurement of psychoticism, extraversion, and neuroticism (Eysenck, Eysenck, & Barrett, 1985). The background questionnaire included the four-part Senses of Humor scale (Author, 2004), and John, Donahue, and Kentle’s (1991) scale for the measurement of openness to experience. Cacioppo, Petty, and Kao’s (1984) Need for Cognition Scale was the final social individual differences measure.

Table 3. Significant Correlations with Presence Scales—Music Experiment, Part 1.

	TPI-SR	TPI-SPPI	TPI-EMI
All conditions (n=101)			
Female		.23*	
Gaming alone			-.22*
Percentage of TV viewing alone	.26*		.19a
Sense of humor-Social currency		.27*	.23*
Sense of humor-Dark	-.23*	-.18a	-.31**
Extraversion		.27**	
Openness to experience		.29**	
Condition 1: Rock music (n=34)			
Liberal orientation	-.34a		
TV viewing yesterday	-.30a		
Social networking			-.35*
Internet use	.46**		
Extraversion		.32a	
Neuroticism			-.52**
Openness to experience		.61***	
Condition 2: Orchestral music (n=33)			
Female	.41*	.57**	.56**
Liberal orientation		-.44*	
Social networking		-.63***	
Gaming alone			-.43*
Percentage of TV viewing alone	.37a		.35a
Sense of humor-Dark	-.37a		-.40*
Sense of humor-Disparagement	-.32a		-.41*
Condition 3: No music (n=34)			
Newspaper readership			-.33a
Sense of humor-Social currency		.33a	
Sense of humor-Dark		-.43*	-.32a
Extraversion		.38*	
Openness to experience	.34a		

NOTE: Potential correlates with presence scales included: Gender (female), age, political orientation (liberal), TV viewing yesterday, newspaper reading in past week, movie attendance at theaters in past month, Internet use yesterday, social networking online yesterday, video gaming alone daily, video gaming with friends daily, percentage of TV viewing done alone, sense of humor-social currency, sense of humor-dark, sense of humor-disparagement, sense of humor-incongruity, psychoticism, extraversion, neuroticism, openness to experience, need for cognition. ^a $-.05 < p < .10$; * $-p < .05$; ** $-p < .01$; *** $-p < .001$.

Table 4. Significant Correlations with Presence Scales—Music Experiment, Part 2.

	MEC-SSM	MEC-SPSL
All conditions (n=101)		
Sense of humor-Social currency	.23*	.23*
Sense of humor-Incongruity	.19a	
Openness to experience		.29**
Condition 1: Rock music (n=32)		
TV viewing yesterday		.34a
Openness to experience	.31a	.40*
Condition 2: Orchestral music (n=28)		
Female	.48*	.33a
Age	.39*	
Newspaper readership		.33a
Condition 3: No music (n=28)		
TV viewing yesterday	-.38*	
Newspaper readership	-.48**	-.35a
Percentage of TV viewing alone		.36a
Sense of humor-Social currency	.35a	
Sense of humor-Disparagement	.46*	

NOTE: Potential correlates with presence scales included: Gender (female), age, political orientation (liberal), TV viewing yesterday, newspaper reading in past week, movie attendance at theaters in past month, Internet use yesterday, social networking online yesterday, video gaming alone daily, video gaming with friends daily, percentage of TV viewing done alone, sense of humor-social currency, sense of humor-dark, sense of humor-disparagement, sense of humor-incongruity, psychoticism, extraversion, neuroticism, openness to experience, need for cognition. ^a $-.05 < p < .10$; * $-p < .05$; ** $-p < .01$; *** $-p < .001$.

7. Results—Study 2

As with Study 1, we first examined zero-order correlations. The following individual-differences variables were available in this study: Gender (female), age, political orientation (liberal), TV viewing yesterday, newspaper reading in past week, movie attendance at theaters in past month, Internet use yesterday, social networking online yesterday, video gaming alone daily, video gaming with friends daily, percentage of TV viewing done alone, sense of humor-social currency, sense of humor-dark, sense of humor-disparagement, sense of humor-incongruity, psychoticism, extraversion, neuroticism, openness to experience, and need for cognition. So as to discern potential interactions between the individual differences and the music manipulation, we conducted split correlations on the three-group manipulation (i.e., rock music, orchestral music, no music). The significant correlations (using $p < .10$) between these individual differences and the five presence scales are presented in Tables 3 and 4.

As shown in the Tables, numerous individual-differences variables are related to the various presence indicators, and the patterns of correlations vary among the three conditions of the manipulation. Specifically, differences are as follows: With a rock music score, presence outcomes are related to some individual differences in a fashion similar to the orchestral music condition (i.e., a liberal political orientation (-) and social networking activity (-)); presence outcomes are related to some individual differences in a fashion similar to the no music condition (i.e., TV viewing (-), extraversion (+), and openness to experience (+)); but additionally, some correlates are unique to the rock music condition (i.e., Internet use (+) and neuroticism (-)). With an orchestral score, presence scales are related to certain individual differences in ways similar to the no music condition (i.e., solitary TV viewing (+) and sense of humor-dark (-)); however, some correlates switch direction of relationship between the two conditions (i.e., newspaper readership (+ for orchestral, - for no music) and sense of humor-disparagement (- for orchestral, + for no music)); and again, some correlates are unique to the orchestral

Table 5. MANCOVA Results for Music Experiment

Effect	Statistic	Value	F	Hypothesis df	Error df	Sig.	Observed Power(a)
Covariates							
Female	Pillai's Trace	.031	.464(b)	5.000	73.000	.802	.167
	Wilks' Lambda	.969	.464(b)	5.000	73.000	.802	.167
	Hotelling's Trace	.032	.464(b)	5.000	73.000	.802	.167
	Roy's Largest Root	.032	.464(b)	5.000	73.000	.802	.167
Gaming alone	Pillai's Trace	.110	1.802(b)	5.000	73.000	.123	.586
	Wilks' Lambda	.890	1.802(b)	5.000	73.000	.123	.586
	Hotelling's Trace	.123	1.802(b)	5.000	73.000	.123	.586
	Roy's Largest Root	.123	1.802(b)	5.000	73.000	.123	.586
Percent TV viewing alone	Pillai's Trace	.125	2.089(b)	5.000	73.000	.076	.661
	Wilks' Lambda	.875	2.089(b)	5.000	73.000	.076	.661
	Hotelling's Trace	.143	2.089(b)	5.000	73.000	.076	.661
	Roy's Largest Root	.143	2.089(b)	5.000	73.000	.076	.661
Sense of humor-Social currency	Pillai's Trace	.073	1.158(b)	5.000	73.000	.338	.389
	Wilks' Lambda	.927	1.158(b)	5.000	73.000	.338	.389
	Hotelling's Trace	.079	1.158(b)	5.000	73.000	.338	.389
	Roy's Largest Root	.079	1.158(b)	5.000	73.000	.338	.389
Sense of humor-Dark	Pillai's Trace	.152	2.621(b)	5.000	73.000	.031	.775
	Wilks' Lambda	.848	2.621(b)	5.000	73.000	.031	.775
	Hotelling's Trace	.180	2.621(b)	5.000	73.000	.031	.775
	Roy's Largest Root	.180	2.621(b)	5.000	73.000	.031	.775
Sense of humor-Incongruity	Pillai's Trace	.048	.730(b)	5.000	73.000	.603	.249
	Wilks' Lambda	.952	.730(b)	5.000	73.000	.603	.249
	Hotelling's Trace	.050	.730(b)	5.000	73.000	.603	.249
	Roy's Largest Root	.050	.730(b)	5.000	73.000	.603	.249
Extraversion	Pillai's Trace	.040	.606(b)	5.000	73.000	.695	.210
	Wilks' Lambda	.960	.606(b)	5.000	73.000	.695	.210
	Hotelling's Trace	.042	.606(b)	5.000	73.000	.695	.210
	Roy's Largest Root	.042	.606(b)	5.000	73.000	.695	.210
Openness to experience	Pillai's Trace	.135	2.276(b)	5.000	73.000	.056	.705
	Wilks' Lambda	.865	2.276(b)	5.000	73.000	.056	.705
	Hotelling's Trace	.156	2.276(b)	5.000	73.000	.056	.705
	Roy's Largest Root	.156	2.276(b)	5.000	73.000	.056	.705
Main Effect							
Music manipulation	Pillai's Trace	.057	.435	10.000	148.000	.927	.220
	Wilks' Lambda	.943	.432(b)	10.000	146.000	.929	.218
	Hotelling's Trace	.059	.428	10.000	144.000	.931	.216
	Roy's Largest Root	.048	.707(c)	5.000	74.000	.620	.242

music condition (i.e., femaleness (+), age (+), and gaming alone (-).

Using as covariates those variables that were significantly correlated with at least one presence scale in

the total sample, a MANCOVA was conducted predicting the set of five presence scales from the Music manipulation, as shown in Table 5. The covariates are: Gender (female), gaming alone, percent TV viewing alone, sense of humor-social currency, sense of humor-dark, sense of humor-incongruity, extraversion, and openness to experience. The main effect of the manipulation is not significant, while three of the covariates—percent TV viewing alone, sense of humor-dark, and openness to experience—hold as significant or near-significant covariates.

In sum, we found the manipulation of Music not to be related to presence responses. Rather, several individual-differences measures were important in the prediction of presence.

8. Methods—Study 3

Our third experiment involved a manipulation of editing. Participants were randomly assigned to watch one of 10 different versions of a film sequence containing variations in shots and shot orders. They then completed presence and individual difference measures.

8.1. Participants

The participants who made up the groups ($N = 101$) averaged 25.3 years of age, were 47.5% female, and were from the introductory communication course at an urban, Midwestern college. The students were offered extra credit for their participation in the experiment, which took about 30 minutes to complete.

8.2. Stimulus and Procedure

The experimental phase of this study involved exposing participants to 10 conditions representing different combinations of images described in the literature on the Kuleshov effect, a term from the film literature that refers to viewers' ability to understand the context of a sequence of juxtaposed shots (Thompson & Bordwell, 2003). The name comes from a supposed experiment performed by Soviet Montage filmmaker and scholar Lev Kuleshov and his early workshop students in 1919. In the experiment, a man's face (that of actor Ivan Mozzhukhin) was shown with no emotion at all, the next shot was of some object, followed by the same neutral face shown before. The objects were a child, a plate of soup, or a coffin (Fairservice, 2001). The intention of the experiment was to see if the simple act of editing of the film would have an effect upon the viewers.

The stimulus shots for this study were selected from a 16mm color student short film, "BENeath," (2008) which was originally designed and shot to be used for this purpose, but also to be a stand-alone film to preserve validity. Given that this was an actual short film, the director and crew were attempting to fulfill the rules of continuity throughout the film, allowing the eventual editing of these shots to be executed without unnecessary manipulation to the subject eyelines or position of objects. Though this film is in color and on a much more advanced and stable film stock than Kuleshov would have had available, it seemed an appropriate corollary rather than SD/HD video. In place of Mozzhukhin himself is a contemporary actor directed to have, "as neutral of an expression as possible," in an effort to mitigate any actor-based affective depictions. As with accounts of the original experiment, the man was shot in a close-up shot scale, which intensifies emotional impact as naturally intensity increases as proximity increases. The shot sequences used for the 10 conditions were as follows (by condition):

- (1) Man alone
- (2) Man→Soup
- (3) Man→Soup→Man
- (4) Soup→Man
- (5) Man→Coffin
- (6) Man→Coffin→Man
- (7) Coffin→Man
- (8) Man→Girl
- (9) Man→Girl→Man
- (10) Girl→Man

Then, in a second portion of the experiment, the "objects" (i.e., soup, coffin, and girl) were viewed individually and assessed by participants independently of the initial viewing. Each participant viewed and evaluated only one object shot, with random assignment. The "Object Only" stimulus presented to each participant was not one they had seen in the main Kuleshov experiment.

Each shot used for the stimulus was exactly 3 seconds and 10 frames long, with the intention of keeping in line with the literature on the length of the original experiments (which were claimed to be 7 seconds long, containing three shots) and all were completely silent.

A background questionnaire was administered via Media Lab prior to the experimental manipulation. Participants then viewed the stimuli in a laboratory setting using Media Lab software. The moving image material was displayed on standard computer screens, and the subjects used headphones for the audio. Random

Table 6. Significant Correlations with Presence Scales—Editing Experiment, Sequence Manipulation.

	TPI-SR	TPI-SPPI	TPI-EMI
All conditions (n=101)			
Age			-.17a
Movies in theater	.18a		.22*
Extraversion		.19a	
Condition 1: Man alone (n=10)			
Age			-.71*
Liberal orientation	-.61a		
Newspaper readership	.63*		
Movies in theater	-.58a		
Social networking			.71*
Gaming alone	.59a		.72*
Percentage of TV viewing alone	.55a		
Psychoticism		.76*	
Neuroticism		-.62a	
Need for cognition			-.57a
Condition 2: Man □ Object (n=31)			
Age	-.46**	-.56**	-.52**
Movies in theater	.57**	.44*	.53**
Internet use		.31a	
Condition 3: Man □ Object □ Man (n=31)			
Social Networking			.33a
Sense of humor-Dark	.39*		
Condition 4: Object □ Man (n=29)			
Age	.39*		.39*
Sense of humor-Disparagement	-.34a		
Psychoticism		-.38*	
Extraversion		.34a	

NOTE: Potential correlates with presence scales included: Gender (female), age, political orientation (liberal), TV viewing yesterday, newspaper reading in past week, movie attendance at theaters in past month, Internet use yesterday, social networking online yesterday, video gaming alone daily, video gaming with friends daily, percentage of TV viewing done alone, sense of humor-social currency, sense of humor-dark, sense of humor-disparagement, sense of humor-incongruity, psychoticism, extraversion, neuroticism, openness to experience, need for cognition. ^a $-.05 < p < .10$; * $-p < .05$; ** $-p < .01$; *** $-p < .001$.

assignment was used to determine which condition subjects would receive. As this was a post-test only design, subjects responded to a series of questions after viewing. The instrument was hosted on the Survey Monkey website. Students responded to the questions while still in the lab setting, at the same computers on which they viewed the film segments.

8.3. Measures

8.3.1. Presence. Similar items from Lombard and Ditton's (2007) Temple Presence Inventory (TPI) described in the second experiment were included to

measure presence dimensions, specifically social richness, social presence-passive interpersonal, and engagement (mental immersion).

Social richness was measured using the seven semantic differential items from the TPI that asked respondents to evaluate their media experience. The scale had a Cronbach's alpha reliability of .87 this time. Social presence-passive interpersonal was measured using the same two items as in experiment two. Cronbach's alpha for these two items was .69. Engagement (or mental immersion) was measured using similar items as in the second experiment, only four items were used this time. Alpha reliability of this scale was .90. For the "Object

Table 7. Significant Correlations with Presence Scales—Editing Experiment, Man + Object Manipulation.

	TPI-SR	TPI-SPPI	TPI-EMI
All conditions (n=101)			
Age			-.17a
Movies in theater	.18a		.22*
Extraversion		.19a	
Condition 1: Man alone (n=10)			
Age			-.71*
Liberal orientation	-.61a		
Newspaper readership	.63*		
Movies in theater	-.58a		
Social networking			.71*
Gaming alone	.59a		.72*
Percentage of TV viewing alone	.55a		
Psychoticism		.76*	
Neuroticism		-.62a	
Need for cognition			-.57a
Condition 2: Soup + Man (n=31)			
Age	.34a		
Gaming alone		-.35a	
Psychoticism		-.51**	-.34a
Condition 3: Coffin + Man (n=32)			
Age	-.34a		-.32a
Movies in theater	.32a		
Condition 4: Girl + Man (n=28)			
Female		-.35a	
Age	-.34a		
Movies in theater	.32a	.51**	.34a
Internet use		.33a	

NOTE: Potential correlates with presence scales included: Gender (female), age, political orientation (liberal), TV viewing yesterday, newspaper reading in past week, movie attendance at theaters in past month, Internet use yesterday, social networking online yesterday, video gaming alone daily, video gaming with friends daily, percentage of TV viewing done alone, sense of humor-social currency, sense of humor-dark, sense of humor-disparagement, sense of humor-incongruity, psychoticism, extraversion, neuroticism, openness to experience, need for cognition.

^a $-.05 < p < .10$; * $-p < .05$; ** $-p < .01$; *** $-p < .001$.

Only” adjunct data collection, the seven-item TPI social richness scale obtained an alpha of .85, and the four-item TPI engagement/mental immersion scale obtained an alpha of .89. (The TPI social presence-passive interpersonal scale was not used, since the object-only footage did not consistently include human beings.)

8.3.2. Individual Difference Variables. Included in the background questionnaire were the four-part Senses of Humor scale (Author, 2004), Eysenck, Eysenck, and

Barrett’s (1985) Psychoticism, Extraversion, and Neuroticism scales, and the Openness to Experience scale (John, Donohue, & Kentle, 1991). Additionally, the 18-item Need for Cognition scale was included (Cacioppo, Petty, & Kao, 1984). As with Study 2, a variety of demographic and media exposure measures were also included.

9. Results—Study 3

Again, the first step was to examine zero-order correlations. As with Study 2, the following individual-differences variables were available in this study: Gender (female), age, political orientation (liberal), TV

viewing yesterday, newspaper reading in past week, movie attendance at theaters in past month, Internet use yesterday, social networking online yesterday, video gaming alone daily, video gaming with friends daily, percentage of TV viewing done alone, sense of humor-social currency, sense of humor-dark, sense of humor-

Table 8. MANCOVA Results for Editing Experiment, Sequence and Man + Object Manipulations

Effect	Statistic	Value	F	Hypothesis df	Error df	Sig.	Observed Power(a)
Covariates							
Age	Pillai's Trace	.024	.693(b)	3.000	86.000	.559	.191
	Wilks' Lambda	.976	.693(b)	3.000	86.000	.559	.191
	Hotelling's Trace	.024	.693(b)	3.000	86.000	.559	.191
	Roy's Largest Root	.024	.693(b)	3.000	86.000	.559	.191
Movies in theater	Pillai's Trace	.044	1.315(b)	3.000	86.000	.275	.339
	Wilks' Lambda	.956	1.315(b)	3.000	86.000	.275	.339
	Hotelling's Trace	.046	1.315(b)	3.000	86.000	.275	.339
	Roy's Largest Root	.046	1.315(b)	3.000	86.000	.275	.339
Extraversion	Pillai's Trace	.065	1.977(b)	3.000	86.000	.123	.493
	Wilks' Lambda	.935	1.977(b)	3.000	86.000	.123	.493
	Hotelling's Trace	.069	1.977(b)	3.000	86.000	.123	.493
	Roy's Largest Root	.069	1.977(b)	3.000	86.000	.123	.493
Main Effects							
Sequence manipulation	Pillai's Trace	.073	1.092	6.000	174.000	.369	.424
	Wilks' Lambda	.928	1.089(b)	6.000	172.000	.371	.423
	Hotelling's Trace	.077	1.086	6.000	170.000	.373	.422
	Roy's Largest Root	.065	1.877(c)	3.000	87.000	.139	.471
Man + Object manipulation	Pillai's Trace	.113	1.738	6.000	174.000	.115	.647
	Wilks' Lambda	.889	1.729(b)	6.000	172.000	.117	.644
	Hotelling's Trace	.121	1.719	6.000	170.000	.119	.641
	Roy's Largest Root	.089	2.569(c)	3.000	87.000	.060	.614
Interaction							
Sequence by Man + Object	Pillai's Trace	.117	.891	12.000	264.000	.556	.519
	Wilks' Lambda	.884	.902	12.000	227.826	.546	.459
	Hotelling's Trace	.129	.912	12.000	254.000	.535	.530
	Roy's Largest Root	.117	2.580(c)	4.000	88.000	.043	.705

a Computed using alpha = .05

b Exact statistic

c The statistic is an upper bound on F that yields a lower bound on the significance level.

NOTE: Dependent variables are the three presence scales: TPI-SR, TPI-SPPI, and TPI-EMI.

NOTE: Although the Roy's Largest Root statistic for the interaction term was statistically significant ($p = .043$), none of the ANCOVA tests for the individual dependent terms were significant, and therefore means are not reported. The near-significant Roy's test for the main effect of Man + Object manipulation did result in one significant ANCOVA, for the TPI-SPPI scale: $F = 3.55$, $p = .03$; Man alone mean = 8.6, Man + Soup mean = 10.0, Man + Coffin mean = 11.1, Man + Girl mean = 10.7.

disparagement, sense of humor-incongruity, psychoticism, extraversion, neuroticism, openness to experience, and need for cognition.

This study involved two main effects manipulations—Sequence (i.e., order of shots in the edited sequence) and Type of Object (juxtaposed with the man in the edited sequence). So as to discern potential interactions between the individual differences and the two editing manipulations, we conducted split correlations on the four-group Sequence manipulation (i.e., Man alone, man→object, man→object→man, and object→man) and separately on the four-group Man + Object manipulation (i.e., Man alone, soup + man, coffin + man, and girl + man). The significant correlations (using $p < .10$) between the individual differences measures and the three presence scales used in this Study are presented in Tables 6 and 7.

As shown in the Tables, numerous individual-differences variables are related to the various presence scales, and the patterns of correlations vary among the conditions of the two manipulations. Of note are such findings as: The “man alone” condition generated some intriguing and unique correlates of presence outcomes (although these relationships should be viewed with caution due to the small n for this condition). In particular, the TPI-SR (social richness) scale is strongly related to measures of solitary activity (i.e., gaming alone, watching TV alone, not attending movies at the theater, reading newspapers) and having a conservative political orientation. This set of relationships begins to paint a picture of a distinct type of individual, and this type is more likely to experience a sense of presence when confronted with a simple piece of footage of an expressionless man.

Other differences across the experimental conditions are apparent. But more important than the specifics of these differences is a recognition of the tendency for each stimulus type to have some unique correlates of presence. It seems that what might predict a presence response is rather unique to the specific stimulus material—the content *and* the form in which the content has been presented.

Using as covariates those variables that were significantly correlated with at least one presence scale in the total sample, a MANCOVA was conducted predicting the set of three presence scales from the Editing manipulations, as shown in Table 8. The covariates are: Age, movies in theater, and extraversion. The main effect of the Sequence manipulation is not significant, while the manipulation of Man + Object is near-significant for the first canonical root (i.e., tested via

the Roy’s largest root coefficient). The interaction term, representing the interaction of Sequence and Man + Object, is significant for the first root ($p = .043$). None of the covariates retained significance as predictors in this multivariate test.

In sum, we found the manipulation of Man + Object to be near-significant as related to presence responses, with a partially significant interaction with Sequence. No individual-differences measures were uniquely important in the prediction of presence.

10. Results—Study 3b

Examining the adjunct to Study 3, the “Object Only” manipulation, we once again looked at zero-order correlations first. The same individual-differences variables were available in this analysis: Gender (female), age, political orientation (liberal), TV viewing yesterday, newspaper reading in past week, movie attendance at theaters in past month, Internet use yesterday, social networking online yesterday, video gaming alone daily, video gaming with friends daily, percentage of TV viewing done alone, sense of humor-social currency, sense of humor-dark, sense of humor-disparagement, sense of humor-incongruity, psychoticism, extraversion, neuroticism, openness to experience, and need for cognition.

The manipulation for this study was simply which of three “objects” was shown to the subject. These “objects” were the same as those combined with the “man” footage in Study 3. Lacking any variations in editing, the three Object Only stimuli thus serve as a simple test of *content* rather than formal features. So as to discern potential interactions between the individual differences and the three content conditions, we conducted split correlations on the Object Only manipulation (i.e., Soup alone, coffin alone, girl alone). The significant correlations (using $p < .10$) between the individual differences measures and the two presence scales used in this Study are presented in Table 9.

As shown in the Table, once again a number of individual-differences variables are related to the various presence scales, and the patterns of correlations vary among the conditions. For example, in examining this “object only” adjunct experiment, we see that those who experience more presence when viewing footage of a coffin alone tend to be a bit more social—for them, the TPI-SR scale is related to more solitary TV viewing, but with greater appreciation of social currency humor and incongruity humor. And for them, the TPI-EMI (engagement/mental immersion) scale is related to

Table 9. Significant Correlations with Presence Scales—Editing Experiment, Object Alone Manipulation.

	TPI-SR	TPI-EMI
All conditions (n=101)		
Gaming alone		-.19 ^a
Sense of humor-Dark		-.17 ^a
Condition 1: Soup alone (n=29)		
Newspaper readership	.38*	
Condition 2: Coffin alone (n=31)		
Social networking		.39*
Gaming alone		-.32 ^a
Percentage of TV viewing alone	.40*	.44*
Sense of humor-Social currency	.30 ^a	
Sense of humor-Incongruity	.36*	
Condition 3: Girl Alone (n=41)		
Sense of humor-Disparagement	-.28 ^a	
Neuroticism		.35*

NOTE: Potential correlates with presence scales included: Gender (female), age, political orientation (liberal), TV viewing yesterday, newspaper reading in past week, movie attendance at theaters in past month, Internet use yesterday, social networking online yesterday, video gaming alone daily, video gaming with friends daily, percentage of TV viewing done alone, sense of humor-social currency, sense of humor-dark, sense of humor-disparagement, sense of humor-incongruity, psychoticism, extraversion, neuroticism, openness to experience, need for cognition.

^a $-.05 < p < .10$; * $-p < .05$; ** $-p < .01$; *** $-p < .001$.

greater solitary TV viewing as well as online social networking activity and less gaming alone.

Using those variables that were significantly correlated with at least one presence scale in the total sample as covariates, a MANCOVA was conducted predicting the pair of two presence scales from the Object Only manipulation, as shown in Table 10. The covariates are: Gaming alone and sense of humor-dark. The main effect of the Object Only manipulation is highly significant, while the covariates did not retain significance as predictors.

In sum, we found the manipulation of Object Only (a purely *content* indicator) to be significant as related to presence responses, with no individual-differences measures uniquely important in the prediction of presence.

11. Discussion

Five research questions guided this series of exploratory analyses of data from four moving image experiments. RQ1 was: How does color (vs. black and white) influence presence responses? We found that color

was not a predictor of any presence responses. A sole individual-differences indicator, that of expectancy violation, was strongly related to presence outcomes. It is also important to note that other potential predictors such as age, gender, and real-world connections relevant to the stimulus content (i.e., war footage) also did not correspond to presence responses.

The second RQ was: How does the type of music score in a film influence presence responses? Here, while the post-production factor of music (and type of music) did not relate directly to presence outcomes, there was evidence of complex interactions between music condition and individual differences. The patterns of differences in correlations between individual differences measures and presence scales across the music conditions were too various to detect a consistent theme, yet they point to the distinct conclusion that music/music type *does* matter when considering which individual differences will predict presence. For example, with a rock score, various presence outcomes were positively related to openness to experience and extraversion, and negatively related to neuroticism. With an orchestral score, presence scales were positively related to

femaleness and solitary TV viewing, and negatively related to enjoyment of dark humor and disparagement humor.

The third RQ asked: How does the editing of a sequence of shots influence presence responses? In the main Kuleshov-based editing experiment, we found that while the sequence in which shots were edited did not make a difference in presence responses, the type of “object” with which the actor (man) was juxtaposed did make a difference. This was further reinforced by the “Object Only” adjunct experiment, which showed strong differences among the three object stimuli in presence outcomes. (Thus addressing the fourth RQ, How does the content of a moving image segment influence presence responses?) And for both the Kuleshov experiment and the object only experiment, there were key differences in correlations between individual differences measures and presence measures across the experimental conditions,

once again indicating important interactions between individual differences and post-production factors.

The fifth RQ, What role do individual differences play in presence responses?, has been addressed in this research by (a) examining direct relationships between individual differences measures and presence scales, and (b) identifying interactions between individual differences and post-production factors. For the former, we see several interesting relationships. As mentioned, expectancy related strongly and positively to presence dimensions, suggesting that positive expectancy violations facilitate presence. This is consistent with recent work by Pettey, Bracken, Rubenking, Buncher, and Gress (2010), who found that expectation related positively to presence when it was exceeded. In the music experiment, we see that a more complex pattern of relationships, with variables like femaleness consistently relating positively to presence factors, but inconsistencies

Table 10. MANCOVA Results for Editing Experiment, Object Only Manipulation

	TPI-SR	TPI-EMI
All conditions (n=101)		
Gaming alone		-.19 ^a
Sense of humor-Dark		-.17 ^a
Condition 1: Soup alone (n=29)		
Newspaper readership	.38*	
Condition 2: Coffin alone (n=31)		
Social networking		.39*
Gaming alone		-.32 ^a
Percentage of TV viewing alone	.40*	.44*
Sense of humor-Social currency	.30 ^a	
Sense of humor-Incongruity	.36*	
Condition 3: Girl Alone (n=41)		
Sense of humor-Disparagement	-.28 ^a	
Neuroticism		.35*

a Computed using alpha = .05

b Exact statistic

c The statistic is an upper bound on F that yields a lower bound on the significance level.

NOTE: Dependent variables are the two presence scales: TPI-SR and TPI-EMI.

NOTE: The significant main effect for Object only manipulation resulted in significant ANCOVA findings for both dependent measures, TPI-SR and TPI-EMI. The corresponding means for these scales are reported below:

	TPI-SR	TPI-EMI
Soup alone	18.6	13.9
Coffin alone	37.5	23.9
Girl alone	32.6	15.8
TOTAL	30.1	17.7
	F = 13.73	F = 8.20
	p < .001	p = .001

in how the presence sub-dimensions relate to individual difference variables overall. This supports Bracken and Skalski's (2010) call to treat presence sub-dimensions separately rather than combining them into a single, overall presence measure.

Regarding the latter, a surprising number of differences were found via split correlation analyses, examining relationships between individual differences variables and presence scales separately by experimental condition. This points to an important conclusion—that the precise nature of the content, and of the post-production treatment of that content, can make a big difference in how an individual's predispositions are translated into presence outcomes (or not).

11.1. Limitations and Conclusion

Obviously, a limitation of this set of findings is the omnibus nature of the four experiments reported on, each with at least slightly different measures of presence employed. Although there are some benefits to this approach, such as minimizing mono-method bias and incorporating a broad array of presence measures, future work would benefit from employing more consistent measures to better compare across studies. A second limitation is that our “broad brush” findings and interpretations in the discussion section do not fully draw distinctions among the multiple presence scales and pinpoint exactly how and why certain individual differences variables relate to particular presence scales. Future work would additionally benefit from investigating some of our topics in finer detail—we took a more exploratory approach to provide a foundation for further research.

Overall, the findings of this study suggest that individual differences and content may be more important for presence than formal features as direct predictors of presence outcomes. However, some post-production techniques, like music choice, had a pattern of results that bears further exploration when considered in conjunction with (i.e., in interaction with) individual differences. Our work fruitfully shows the value of considering a combination of form, content, and individual differences variables in presence scholarship, to help advance understandings of the perception of non-mediation in moving image experiences.

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