Effects of personality, communication, and cross-training on virtual team performance

Jennifer L. Morgan

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EFFECTS OF PERSONALITY, COMMUNICATION, AND CROSS-TRAINING
ON VIRTUAL TEAM PERFORMANCE

By

JENNIFER L. MORGAN

A THESIS

Submitted in partial fulfillment of the requirements for the degree of a Masters of Art
in
The Department of Psychology
to
The School of Graduate Studies
of
The University of Alabama in Huntsville

HUNTSVILLE, ALABAMA

2014
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We, the undersigned members of the Graduate Faculty of The University of Alabama in Huntsville, certify that we have advised and/or supervised the candidate on the work described in this thesis. We further certify that we have reviewed this thesis manuscript and approve it in partial fulfillment of the requirements for the degree of Masters of Arts in Psychology.

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ABSTRACT
The School of Graduate Studies
The University of Alabama in Huntsville

Degree Master of Arts College/Dept. Liberal Arts/ Psychology

Name of Candidate Jennifer L. Morgan

Title Effects of Personality, Communication, and Cross-Training on Virtual Team Performance

As use of virtual teams continues to grow, it is important to the success of businesses that the most effective individuals are selected for these teams. The present study explored which personality traits influenced the formality of communication and language use in virtual team communication. Additionally, the effects of virtual communication characteristics and cross-training styles on virtual team performance were also examined. Participants (N = 210) worked in teams of three as a team of Vice Presidents at a fictional Hollywood movie studio in the business simulation Tinsel Town to maximize profit for a simulated business year. The results of the current study conflicted with prior research and suggest additional research be conducted to confirm there were no underlying causes that altered the outcomes.

Keywords: virtual teams, personality, communication, cross-training, performance

Abstract Approval: Committee Chair

Department Chair

Graduate Dean
ACKNOWLEDGEMENTS

I would not have been able to finish this thesis project without the guidance of my committee members, help from fellow graduate students, and support from my family and husband.

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LIST OF SYMBOLS

$\beta$: Beta coefficient

$F$: ANOVA

$M$: Mean

$N$: Total sample size

$\eta_p^2$: Partial eta squared

$p$: Significance

$r$: Pearson’s correlation

$R^2$: R-squared

$SD$: Standard deviation

$t$: t-test
CHAPTER I

INTRODUCTION

The use of teams in the workplace has become standard practice in almost every industry. Teams bring together individuals with different backgrounds, different skill sets, and different ideas. The use of teams can often lead to unique and efficient ideas. As technology becomes cheaper and more widely available many businesses have begun to utilize virtual teams (Lipnack, 1997). Virtual teams allow individuals to work interdependently while working across time, space, and organization boundaries by using technology (Lipnack & Stamps, 2000).

As the use of virtual teams continues to grow, it is important to the success of businesses that the most effective individuals are selected for these teams. Currently the selection criteria used to select face-to-face team members are also being used to select virtual team members. The research investigating whether or not the same individual characteristics that have been indicated to work for face-to-face teams still apply for virtual teams is somewhat lacking. This experiment investigated both personality’s influence on communication and the impact that communication had on performance in virtual teams. In addition to personality and communication, this study also explored the effects that different levels of cross-training had on virtual team performance. In this experiment the independent variable, cross-training, had three levels. In the control
condition, participants received training only on their individual roles. In the clarification cross-training condition, participants received training on their individual roles as well as a description of the other roles in the team. Finally in the rotation cross-training condition, participants received training on their individual roles, a description of the other roles on the team, and the information that is necessary to perform that role. A study by Kanawattanachai and Yoo (2007) found that through task-oriented communication, defined as interactions that request or provide information, virtual teams develop expertise location. Expertise location, also known as transactive memory, is the extent to which team members know who on the team knows what. By providing more role-related information, cross-training could potentially lessen the amount of time needed for virtual teams to develop transactive memory, thereby increasing team effectiveness. Cross-training, however, is not the only type of training that could influence virtual team performance. Training individuals to use different writing styles could also influence performance.

The ability to communicate effectively could be something that can be trained. If personality is found to influence communication and communication found to influence performance, managers might consider training employees on effective writing styles instead of solely training job tasks. This could influence selection procedures in that hiring managers could focus on the job-related skills of the potential employee instead of their level of expertise in virtual communication. Furthermore, because self-report personality tests can be subjective, having a second way of analyzing personality could also be of use when selecting individuals for virtual teams. If it was found through chat analysis that writing style is indicative of personality, it would offer hiring managers a
more objective alternative to the usual personality test. Additionally, virtual teams rely
heavily on written communication and therefore providing a writing sample might be
more practical.

In summation, the business world is transitioning into the virtual world. As such,
the selection of individuals, as well as the training and the effectiveness of those virtual
teams are crucial. Understanding the impact that individual personality has on
communication would help managers recognize if written communication skills instead
of task-related skills need training. Training employees to communicate more effectively
could positively influence turnover costs and increase the pool of potential job
candidates. Identifying effective cross-training procedures could also increase
communication effectiveness and shorten the length of time it takes virtual teams to
develop transactive memory. Overall, identifying effective selection and training
procedures could save valuable resources (e.g., time and money) for businesses. The first
step is to investigate personality.

**Personality**

The five personality factors that are widely accepted among personality
researchers are extraversion, conscientiousness, openness to experience, neuroticism
(emotional stability), and agreeableness (e.g., Bell, 2007; John, Naumann, & Soto, 2008;
Luse, McElroy, Townsend, DeMarie, 2013; MacDonnell, O’Neill, Kline, & Hambley,
2009; Mairesse & Walker, 2006). Previous research has found that all five factors are
valid predictors for different occupations (Barrick & Mount, 1991). More specifically,
extraversion, conscientiousness, and openness to experience are the most prevalent in
research on performance and training (e.g., Bauer, Brusso, & Orvis, 2012; LePine,
Hollenbeck, Ilgen, & Hedlund, 1997; MacDonnell et al., 2009; Mohammed & Angell, 2004; Turel & Zhang, 2010). For this reason, the scope of this experiment was limited to extraversion, conscientiousness, and openness to experience.

A meta-analysis by Barrick and Mount (1991) established that conscientiousness is associated with high performance across all job types. Luse et al. (2013) describe conscientious individuals as forward-thinking, organized, and task-oriented. Moreover, Bell (2007) found a positive correlation between team level conscientiousness and team performance. As the team level of conscientiousness increased, the team was expected to become more organized and more focused on goal attainment. Therefore, we hypothesized that:

H1: a) Teams that were high in conscientiousness would have better performance than teams that were low in conscientiousness

Individuals who are high in openness to experience are described as curious, broadminded, and open to new learning experiences. Openness to experience may be related to team performance to the extent that team members high on this trait are more adaptable and willing to consider alternative ideas (LePine, 2003). Thus, we hypothesized that:

H1: b) Teams that were higher in openness to experience would have better performance than teams that were low in openness to experience.
Cross-training

Two types of cross-training were utilized in this study. The first was rotational cross-training, also known as full cross-training. This type of cross-training has been empirically demonstrated to be effective and includes a substantial portion of hands-on practice on the tasks of other team members (Cooke et al., 2003). Rotational style cross-training is more task-oriented as team members spend time learning the specific tasks associated with other roles in the team. For example, if team member number two were responsible for compiling the data then the remaining team members would learn how to compile the data. The second type of cross-training, clarification, is a more abbreviated style of cross-training. This style is more teamwork-oriented and focuses more on training what each role is responsible for rather than how to perform the actual tasks necessary for the other roles on the team (Cooke et al., 2003). Keeping with the previous example, when using clarification cross-training the remaining team members would only learn that team member number two is responsible for compiling the data.

Because conscientious individuals are very task- and achievement-oriented, they should also be highly receptive of cross-training in order to perform well (Bell, 2007). As a result, cross-training was expected to moderate the relationship between team level conscientiousness and performance. That is:

H2: a) Teams that were high in conscientiousness and receive clarification or rotation cross-training would have better performance than the control group teams who were high in conscientiousness.
Additionally, individuals who are high in openness to experience have also been shown to be more receptive of training (Barrick & Mount, 1991). Thus, cross-training was expected to moderate the relationship between openness to experience and performance.

H2: b) Teams that were high in openness and receive clarification or rotation cross-training would have better performance than the control group teams that were high in openness to experience.

Formal Communication

Formal communication is more explicit and states facts in great detail. At the opposite end of the communication spectrum is contextual communication. Contextual communication is more implicit than formal communication and usually occurs when the communicator assumes the recipient shares knowledge of the context. Explicitly stating the context in written communication leaves less room for misinterpretation. A study by Heylighen and Dewaele (2002) found that extraverts are less formal and prefer more social involvement in their communications. Introverts were found to be more calculating, accurate, and formal in their communications and thus tend to be more formal in their communications. For these reasons, we hypothesized that in virtual teams:

H3: a) Participants who were higher in extraversion would have less formal communications than participants who were lower in extraversion.
Volpe, Cannon-Bowers, Salas, and Spector (1996) conducted a study to empirically test the efficacy of cross-training in team environments. The results of the study indicated that cross-training generated more efficient team processes, such as communication, compared to teams who received no cross-training. Clarification and rotation cross-training provide individuals with more information about other team members’ roles. As a result, when individuals share information they were expected to be more implicit when providing information because they would expect other members to know about role-related information. Conversely, when participants request information they were expected to be more explicit because they would have more role-related information. Therefore we hypothesized:

H3: b) Participants who received clarification or rotation cross-training would have less formal communication than control group participants when providing information.

H3: c) Participants who received clarification or rotation cross-training would have more formal communication than control group participants when requesting information.

Research on virtual teams has found that teams with a large number of extraverted individuals have less productive interactions (Luse et al., 2013). Mohammed and Angell (2004) believed teams with high levels of extraversion communicated less effectively because extraverts tend to pursue social interactions at the expense of task demands. In addition, extraverts, at the individual level, have more implicit conversations (Heylighen & Dewaele, 2002). Highly extraverted teams were expected to have more implicit
communication because they are inclined to be more social than task-oriented. Thus we hypothesized that the more extraverted the team, the less formal the team communications would be.

H4: a) Teams that were high in extraversion would exhibit lower levels of formal communication than groups who were low in extraversion.

A study on cross-training performed by Volpe et al. (1996) found that cross-trained teams volunteered information more frequently than teams that were not cross-trained. It was suggested that members of cross-trained teams were able to communicate more efficiently by anticipating and predicting the information that their teammates needed. Cross-trained individuals were expected to become less formal in communication, because they would be communicating more efficiently. This differs from the less formal communication of highly extraverted teams in that the communication of cross-trained teams would remain task-oriented instead of social-oriented. Accordingly, it was expected that:

H4: b) Teams that exhibited less formal communications would have better performance than teams that exhibited more formal communications.

Consequently, combined with H4a, team communication style would mediate the relationship between team level personality and team performance.

Number of Chat Messages

Extraverts are often characterized as outgoing, sociable and fun-loving, while introverts are typically described as unobtrusive, reserved and thoughtful (Barrick & Mount, 1991; Heylighen & Dewaele, 2002). Previous personality research has indicated
that extraverts are effective in face-to-face teams. In a literature review performed by Barrick and Mount (1991), it was concluded that extraversion is most effective in jobs where social interactions are prominent. For example, extraverts might thrive in face-to-face teams that meet frequently to work on projects. Virtual team members, however, usually only interact intermittently, and are unable to utilize non-verbal communication cues, instead relying mostly on written communications (Turel & Zhang, 2010). Introverts also tend to spend a longer amount of time reflecting before they speak, whereas extraverts are more likely to respond quickly, avoiding breaks in the conversation. Gill and Oberlander (2002) found that in personal emails extraverts produce more texts with more words. These findings, along with the extravert’s need for constant socialization, led us to hypothesize:

H5: a) Participants who were higher in extraversion would generate more chat messages than participants who were lower in extraversion.

Although introverts are usually unobtrusive and reserved, in a task-oriented environment some introverts may appear more extraverted if they are also high in conscientiousness. The conscientious participant’s goal-orientated nature may encourage them to communicate more if it is necessary to complete the task. Therefore:

H5: b) Participants who were lower in extraversion and high in conscientiousness would have more chat messages than participants who were lower in extraversion and low in conscientiousness.
If the above hypotheses hold true, it would indicate that in a task-oriented virtual environment a participant’s level of extraversion is not a significant predictor when it comes to team interaction. Instead, the participant’s level of conscientiousness would be an appropriate predictor of interaction. This could be imperative for hiring managers who are still using face-to-face selection criteria when selecting team members for virtual teams. In a virtual environment, extraversion may no longer be an important characteristic of effective team members.

**Linguistic Inquiry and Word Count**

Pennebaker and King (1999) found that the way individuals express themselves in written language is stable across time. Using the Linguistic Inquiry Word Count (LIWC) to analyze essays written by students, they were able to discover a pattern in the language styles that individuals used in written language. From these patterns they identified personality types. The benefit of using written language to assess personality is that even if the participants are writing about topics other than themselves, their word choices can reveal aspects of their personality (Pennebaker & King, 1999). The use of the LIWC as an alternate way to measure personality could be used in situations where traditional personality tests are not practical. Traditional personality tests are more subjective. Participants have the opportunity to consider how their honest answers reflect on them and change their answers accordingly. Analyzing writing style for personality is a little more objective, in that altering your writing style is much more difficult. Because virtual teams rely so heavily on written communication, this type of personality assessment could be particularly applicable for the selection of individuals for virtual teams.
Based on the findings of Pennebaker and King (1999), we hypothesized that extraversion and conscientiousness would be negatively correlated with the “making distinctions” category. The making distinctions category includes the following subcategories: exclusive (e.g., but, without), tentative (e.g., maybe, perhaps), negations (e.g., no, not), and inclusive (e.g., and, with). Extraversion was expected to negatively correlate with the making distinctions category because extraverts are less formal in their communication. Additionally, conscientiousness was expected to negatively correlate with making distinctions based on the results of a motivation study by Pennebaker and King (1999). Their results indicated that the making distinctions category negatively correlated with achievement motivation. Conscientious individuals are by nature task-motivated, goal-motivated, and achievement-motivated (Bell, 2007, Luse et al., 2013).

Given that extraverts enjoy being social with others it was expected that extraverts would often reference their interactions with others. We hypothesized that extraversion would also be positively correlated with the “social process” category, which includes the following subcategories: references to other people through communication (e.g., talk, listen), pronoun use (i.e., all pronouns except first-person singular), and references to friends, family, and other humans. Because extraverts take pleasure in socializing, interacting with others will make them happy and therefore they were expected to use more positive emotion words. Extraversion was predicted to be positively related to the use of positive emotion words (e.g., love, nice). Pennebaker and King (1999) found that participants whose writing was immediate and simple rated themselves lower in openness to experience. Consequently, we hypothesized that openness would be negatively correlated with the “immediacy” category. The immediacy category includes the
following subcategories: first person singular (e.g., I, me), articles (i.e., a, an, the), words that contain more than six letters, present tense (e.g., is, does), and discrepancy (e.g., should, would).

H6: a) Participants who were high in extraversion would use a lower percentage of words that make distinctions than participants who were low in extraversion.

H6: b) Participants who were high in extraversion would use a higher percentage of social words than participants who were low in extraversion.

H6: c) Participants who were high in extraversion would use a higher percentage of positive emotion words than participants who were low in extraversion.

H6: d) Participants who were high in conscientiousness would use a lower percentage of words that make distinctions than participants who were low in conscientiousness.

H6: e) Participants who were high in openness will use a lower percentage of immediacy words than participants who were low in openness.

Hypotheses

In sum, the following were hypothesized (for individual level hypotheses see Figure 1.1; for team level hypotheses see Figure 1.2):

1. a) Teams that were high in conscientiousness would have better performance than teams that were low in conscientiousness.

b) Teams that were higher in openness to experience would have better performance than teams that were low in openness.
2. a) Teams that were high in conscientiousness and received clarification or rotation cross-training would have better performance than the control group teams who were high in conscientiousness.

b) Teams that were high in openness and received clarification or rotation cross-training would have better performance than the control group teams that were high in openness to experience.

3. a) Participants who were higher in extraversion would have less formal communications than participants who were lower in extraversion.

b) Participants who received clarification or rotation cross-training would have less formal communication than control group participants when providing information.

c) Participants who received clarification or rotation cross-training would have more formal communication than control group participants when requesting information.

4. a) Teams that were high in extraversion would exhibit lower levels of formal communication than groups who were low in extraversion.

b) Teams that exhibited less formal communications would have better performance than teams that exhibited more formal communications.

Consequently, combined with H4a, team communication style would mediate the relationship between team level personality and team performance.

5. a) Participants who were higher in extraversion would generate more chat messages than participants who were lower in extraversion.
b) Participants who were lower in extraversion and high in conscientiousness would have more chat messages than participants who were lower in extraversion and low in conscientiousness.

6. a) Participants who were high in extraversion would use a lower percentage of words that make distinctions than participants who were low in extraversion.

b) Participants who were high in extraversion would use a higher percentage of social words than participants who were low in extraversion.

c) Participants who were high in extraversion would use a higher percentage of positive emotion words than participants who were low in extraversion.

d) Participants who were high in conscientiousness would use a lower percentage of words that make distinctions than participants who were low in conscientiousness.

e) Participants who were high in openness would use a lower percentage of immediacy words than participants who were low in openness.
Figure 1.1 Individual Level Hypotheses
Figure 1.2 Team Level Hypotheses
CHAPTER II

Method

Participants

Undergraduate students attending The University of Alabama in Huntsville that participated \((N = 210)\) received three activity points toward their lower level psychology class as compensation for completing the study. Of the 57 intact teams \((N = 171)\), the mean age of participants was 20.73 years \((SD = 3.41)\). The participant sample was composed of 39 % of males. A total of 63 % of the sample indicated their ethnicity as Caucasian.

Thirteen of the original teams were not used in the analyses. Four teams failed to follow instructions and nine teams had extensive technical issues that rendered the data unusable. The data of the remaining 57 intact teams \((N = 171)\) were included in the analyses. All APA ethical guidelines were adhered to in this study. Parental consent was obtained for all participants under the age of 19. (See Appendix A for UHSC form).

Materials

Tinsel Town simulation. In teams of three, participants acted as a virtual team of vice presidents at a fictional movie studio in the business simulation game Tinsel Town (Devine, Habig, Martin, Bott, & Grayson, 2004). Each participant within the team represented the head of a different department: Marketing, Industry Research, and Talent
Appraisal. All participants received general shared information in addition to information that was specific only to their role (See Appendix B for simulation materials). The team goal was to maximize profit in a simulated business year. Based on a limited budget, teams chose screenplays and decided on a marketing strategy for each film selected. At the end of the discussion, team members were required to agree unanimously on the team’s final selection of films and marketing strategies.

**Google chat.** The Google’s chat function was utilized to allow team members to communicate virtually. Google’s chat function is available through Google’s email service, Gmail. This function allows users to send and receive instant messages to and from other Google chat users individually or as a group. Generic email accounts were created and assigned numbers (e.g., Participant1.virtual@gmail.com) to make assigning teams easier (See Appendix C for image).

**Surveymonkey.com.** Surveys were presented to participants via [www.surveymonkey.com](http://www.surveymonkey.com), a web-based survey solution designed by Survey Monkey Brand Perception Survey to gather information and to assist in data analysis.

**Measures.**

**The Big Five Inventory.** The Big Five Inventory (BFI; John, Donahue, & Kentle, 1991) was used to measure individual level personality. The BFI consists of five subscales that measure all five facets of personality for a total of 44 items (See Appendix D for the full measure). Participants responded to the 44 item scale using a 5 point Likert-type scale, where 1 represented “strongly disagree” and 5 represented “strongly agree.” John et al. (2008) reported the Cronbach’s alpha coefficients for the items on the sub-tests of the BFI to range from .79 to .87 and average about .83, indicating that the
internal reliability of the subscales fall within acceptable range. These reliabilities are comparable to the NEO Five Factor Inventory reliabilities that range from .75 to .87 and average .81 (John et al., 2008), which is considered to be the gold-standard of personality tests.

**Team level personality.** Diversity among teams was measured by first categorizing individuals as low, medium, or high on a personality trait based whether their scores fell in the bottom, middle, or top 33% of overall trait scores. Teams were then labeled very low, low, medium, and high based on the number of members on the team that were high on a given trait. For statistical purposes teams that had zero members high in a trait were labeled 1 indicating very low, teams with one member high in the trait were labeled 2 indicating low, teams with two members high in a trait were labeled 3 indicating medium, and teams with three members high in a trait were labeled 4 indicating high.

**Linguistic Inquiry and Word Count.** The Linguistic Inquiry and Word Count (LIWC), designed by Pennebaker, Booth, and Francis (2007), is a text analysis software program that determines the extent to which people use different categories of words across a wide array of texts. The mean Cronbach’s alpha across all 72 language variables was .59 in reliability studies performed by Pennebaker and King (1999). The mean alpha was calculated across three reliability studies in which writing topics and constraints varied. Of the language variable alpha coefficients in all three studies, 60% were .60 or higher which fall within an acceptable range (Pennebaker & King, 1999). Communication scores at the team level were achieved by totaling the individual scores for each team.
**Formal communication.** Heylighen and Dewaele (2002) define the context of language as everything outside of the expression that is necessary for unambiguous interpretation. A frequency score (F-score) was used to determine the formality of communications. This score was achieved using formula (2.1) and is based on the frequencies of which different word classes are used. F-score formula:

\[
F = \frac{(\text{noun frequency} + \text{adjective frequency} + \text{preposition frequency} - \text{pronoun frequency} - \text{verb frequency} - \text{adverb frequency} + 100)}{2}
\]  

(2.1)

The frequencies here are written as percentages of the number of words belonging to a particular category with respect to the total number of words in the message. F will then vary between 0 and 100%. The more formal the message, the higher the value of F is expected to be (Heylighen & Dewaele, 2002).

**Team level communication.** Team level communication scores were achieved by totaling individual F-scores on each team.

**Message count.** Message count was measured at the individual level. Message count for each participant was the total of all chat messages sent by that participant during the discussion period.

**Team performance.** Each team’s performance was evaluated by totaling their profits and dividing the sum by the maximum possible profit for the simulation.

**Demographics.** Basic demographic questions such as age, sex, and ethnicity were presented at the end of the study. The participants were asked the following additional questions: What is your native language?, Did you know any of your team members prior
to the session?, and How many days a week do you communicate through virtual chat the way you did with your team mates today?.

**Procedure**

Prior to the arrival of participants, email accounts were logged in, group chats were created, and materials were distributed. A seating chart was created using the numbers in the email addresses to ensure members of the same team did not sit next to each other. The SurveyMonkey website and email accounts were logged on using the designated computers. Group chats were then initiated such that only members of each team were allowed access to their team’s chat. A materials folder that contained the *Tinsel Town* simulation material and a scratch sheet of paper was placed at each computer along with a pen and a calculator. The inside of each folder was labeled with a role and a participant number. Once the email accounts were logged in and materials were in place the actual participant number, role, email account number, and date were recorded for accuracy. On arrival participants sat at any desktop computer that had materials. Participants selected a seat without knowing which role or team had been assigned to that station. After informed consent was obtained participants received a brief introduction to the *Tinsel Town* simulation game. In teams of three, participants worked collectively as top managers of a fictional movie studio and attempted to maximize profit. The objective was to choose screenplays and to decide on a marketing strategy for each film selected while staying within the budget of a simulated business year. Next, participants were given role-specific information in addition to information that was distributed amongst the entire team. Participants received training on their specific role and any additional
training provided their training condition required it. Introduction and training lasted approximately 20 min.

Then, participants completed an online survey on surveymonkey.com about team efficacy and inter-positional knowledge. Participants then utilized the Google chat function for their discussion and communicated exclusively through virtual communication to come to a decision. Following the submission of their final screen play selections and market strategies, individual participants completed a brief survey on surveymonkey.com about transactive memory, personality, and demographic information. Finally, participants were debriefed and dismissed. Participants did not receive performance feedback. See Figure 2.1 for a full overview of the procedure. Please note that variables in red boxes were not examined in this study and are not included in the Appendices.

Figure 2.1 Full Procedure Overview.
CHAPTER III

RESULTS

Reliability Statistics

Prior to analyses, Cronbach’s alphas were calculated for the BFI personality sub-scales to confirm that the internal consistencies were acceptable for the obtained sample. The internal reliability for the Extraversion (α = .87), Conscientiousness (α = .79), Openness (α = .74), Agreeableness (α = .70), and Neuroticism (α = .84) were all found to be acceptable.

Hypothesis Testing

Team level conscientiousness as a predictor of team performance. Hypothesis 1a predicted a positive relationship between team level conscientiousness and team performance. A simple regression was conducted with team performance as the criterion and team level conscientiousness as the predictor. Team level conscientiousness (See Table 3.1 for total number of teams high in conscientiousness) was not a significant predictor of team performance, $\beta = -.02$, $t (55) = -.17$, $p = .86$, and accounted for 0% of the variance ($R^2 = .00$). These results do not support hypothesis 1a.
Table 3.1

<table>
<thead>
<tr>
<th></th>
<th>E</th>
<th>C</th>
<th>O</th>
<th>N</th>
<th>A</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>1</td>
<td>57</td>
<td>60</td>
<td>52</td>
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<td>52</td>
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<td></td>
<td>2</td>
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<td>59</td>
<td>66</td>
<td>62</td>
<td>51</td>
<td>58</td>
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<td>Team</td>
<td>1</td>
<td>18</td>
<td>12</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>23</td>
<td>26</td>
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</tr>
<tr>
<td></td>
<td>3</td>
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<td>17</td>
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<td>11</td>
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<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Note.** For Individual: 1 = Low, 2 = Medium, 3 = High
For Team: 1 = Very Low, 2 = Low, 3 = Medium, 4 = High
Personality Variables: E = Extraversion, C = Conscientiousness, O = Openness, N = Neuroticism, A = Agreeableness

**Team level openness to experience as a predictor of team performance.**

Hypothesis 1b predicted that teams that were higher in openness to experience would have better performance than teams that were low in openness to experience. A simple regression was conducted with team performance as the criterion and team level openness to experience as the predictor. Team level openness to experience (See Figure 3.1 for total number of teams high in openness to experience) was not a significant predictor of team performance, $\beta = .09, t (55) = .64, p = .52$, and accounted for 1% of the variance ($R^2 = .01$). These results do not lend support to hypothesis 1b.

**Moderator effect of cross-training between team conscientiousness and team performance.** Hypothesis 2a predicted that teams that were high in conscientiousness and who also received clarification or rotation cross-training would have better team performance than the control group teams who were high in conscientiousness. A
multiple regression was conducted to test the moderating effect of cross-training on the relationship between team level conscientiousness and team performance. Overall, the regression was not significant, \( F(3, 53) = .56, p = .64, R^2 = .03 \). Of the variables investigated, both cross-training (\( \beta = .20, t(53) = .53, p = .60 \)) and team level conscientiousness (\( \beta = .23, t(53) = .71, p = .48 \)) were non-significant. The interaction between team level conscientiousness and cross-training (\( \beta = -.42, t(53) = -.91, p = .37 \)) was also non-significant. These results do not support hypothesis 2a.

**Moderator effect of cross-training between team openness to experience and team performance.** Hypothesis 2b predicted that teams that were high in openness to experience and who also received clarification or rotation cross-training would have better team performance than the control group teams who were high in openness to experience. A multiple regression was conducted to test the moderating effect of cross-training on the relationship between team level openness to experience and team performance. Overall, the regression was not significant, \( F(3, 53) = .39, p = .76, R^2 = .02 \). Of the variables investigated, both cross-training (\( \beta = -.09, t(53) = -.25, p = .81 \)) and team level openness to experience (\( \beta = .12, t(53) = .34, p = .74 \)) were non-significant. The interaction between team level openness to experience and cross-training (\( \beta = -.04, t(53) = -.09, p = .93 \)) was also non-significant. These results do not support hypothesis 2b.

**Correlation between individual extraversion and individual communication.** Hypothesis 3a predicted that participants who were higher in extraversion would have less formal communications than participants who were lower in extraversion. A Pearson correlation was performed to test this hypothesis. There was a significant positive
relationship between individual extraversion (See Figure 3.1 for total number of individuals high in extraversion) and individual communication, \( r (171) = .14, p = .03 \).

Though this is a small, positive relationship between individual extraversion and individual communication it does not lend support to hypothesis 3a.

**Effects of cross-training on providing information.** Hypothesis 3b proposed that participants who received clarification or rotation cross-training would have less formal communication than control group participants when providing information. A one-way between participants ANOVA was conducted to compare the effect of cross-training on formal communication when providing information, with cross-training being the between participants factor. The level of formal communication varied by cross-training condition, \( F (2, 168) = 6.88, p < .01, \eta^2_p = .08 \). Tukey’s post hoc procedure indicated that participants who received clarification (\( M = 57.18, SD = 4.86 \)) had significantly more formal communication than participants who received rotational cross-training (\( M = 53.71, SD = 5.70 \)). However, there was no significant difference between participants in the control condition (\( M = 55.08, SD = 4.10 \)) and the cross-training conditions. Although there was a significant difference between cross-trained conditions, hypothesis 3b was not supported.

**Effects of cross-training on requesting information.** Hypothesis 3c proposed that participants who received clarification or rotation cross-training would have more formal communication than control group participants when requesting information. A one-way between participants ANOVA was conducted to compare the effect of cross-training on formal communication when requesting information, with cross-training being the between participants factor. The level of formal communication varied by
cross-training condition, $F(2, 168) = 3.49, p = .03, \eta^2_p = .04$. Tukey’s post hoc procedure indicated that participants who received clarification ($M = 53.52, SD = 10.52$) had significantly more formal communication than participants who received rotational cross-training ($M = 49.10, SD = 7.92$). However, there was no significant difference between participants in the control condition ($M = 51.46, SD = 7.90$) and the cross-training conditions. Although there was a significant difference between cross-trained conditions, hypothesis 3c was not supported.

**Team level extraversion as a predictor of team communication.** Hypothesis 4a predicted that teams who are high in extraversion would exhibit lower levels of formal communication compared to teams who are low in extraversion. A simple regression was conducted with team communication as the criterion and team level extraversion (See Figure 3.1 for total number of teams high in extraversion) as the predictor. Team level extraversion was not a significant predictor of team communication, $\beta = .18, t(55) = 1.33, p = .19$, and accounted for 3% of the variance ($R^2 = .03$). These results do not support hypothesis 4a.

**Team level communication as a predictor of team performance.** Hypothesis 4b predicted that teams who exhibit lower levels of formal communication would have better performance than teams who exhibit more formal communication. A simple regression was conducted with team performance as the criterion and team level communication as the predictor. Team level communication was not a significant predictor of team performance, $\beta = -.11, t(55) = -.79, p = .43$, and accounted for 1% of the variance ($R^2 = .01$). These results do not support hypothesis 4b.
Mediating effect of team level communication between team extraversion and team performance. It was predicted that team level communication style would mediate the relationship between team level personality and team performance. A multiple regression was conducted to test this hypothesis. Overall, the regression was not significant, $F(3, 53) = .79, p = .51, R^2 = .04$. Of the variables investigated, both team level communication ($\beta = -.17, t(53) = -1.15, p = .26$) and team level extraversion ($\beta = .17, t(53) = .91, p = .37$) were not significant. These results do not support the hypothesis that team level communication mediates the relationship between team level extraversion and team performance.

Correlation between individual extraversion and number of chat messages. Hypothesis 5a predicted that participants who are higher in extraversion will generate more chat messages than participants who are lower in extraversion. A Pearson correlation was performed to test this hypothesis. There was not a significant relationship between individual level extraversion and number of chat messages generated, $r(171) = .07, p = .17$. These results do not support hypothesis 5a.

Moderator effect of individual conscientiousness between individual extraversion and number of chat messages. Hypothesis 5b predicted participants who were lower in extraversion and high in conscientiousness would have more chat messages than participants who were lower in extraversion and low in conscientiousness. A 3 x 3 between-subjects ANOVA was performed to test the moderating effect of conscientiousness (See Figure 3.1 for total number of individuals high in conscientiousness) on the relationship between extraversion and number of chat messages. The results showed no significant main effect for the individual level
extraversion, $F(2, 162) = 1.20, p = .31$ and no significant main effect for individual level conscientiousness, $F(2, 162) = .38, p = .69$. There was, however, a significant interaction between individual level extraversion and individual level conscientiousness, $F(4, 162) = 2.88, p = .03$. Participants who were low in extraversion and medium in conscientiousness produced the least amount of chat messages and participants who were medium in extraversion and medium in conscientiousness produced the highest amount of chat messages (See Table 3.2 for means and SDs). However, participants who were low in extraversion and high in conscientiousness did not provide a significantly different number of chats. Thus, there is no support for hypothesis 5b.

Table 3.2

*Means and Standard Deviations for the Effect of Individual Level Extraversion and Individual Level Conscientiousness on the Number of Chat Messages*

<table>
<thead>
<tr>
<th>Conscientiousness</th>
<th>Low Mean(SD)</th>
<th>Medium Mean(SD)</th>
<th>High Mean(SD)</th>
<th>Total Mean(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraversion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>21.65(13.18)</td>
<td>16.73(6.24)</td>
<td>22.32(11.28)</td>
<td>20.58(11.15)</td>
</tr>
<tr>
<td>Medium</td>
<td>20.04(11.07)</td>
<td>28.78(15.51)</td>
<td>21.31(12.68)</td>
<td>23.20(13.39)</td>
</tr>
<tr>
<td>High</td>
<td>27.39(13.44)</td>
<td>22.08(10.26)</td>
<td>19.88(9.84)</td>
<td>21.98(11.03)</td>
</tr>
<tr>
<td>Total</td>
<td>22.25(12.54)</td>
<td>22.98(12.60)</td>
<td>20.86(10.74)</td>
<td>21.91(11.85)</td>
</tr>
</tbody>
</table>

*Note. SD = Standard Deviation*

**Correlation between individual extraversion and words that make distinctions.** Hypothesis 6a predicted participants who are high in extraversion would use a lower percentage of words that make distinctions. A Pearson correlation was performed to test this hypothesis. There was a significant negative relationship between individual level extraversion and percentage of words that make distinctions,
The strength relationship between individual level extraversion and percentage of words that make distinctions was small, but did support the inverse relationship proposed in the hypothesis.

**Correlation between individual extraversion and social words.** Hypothesis 6b predicted that participants who are high in extraversion would use a higher percentage of social words than participants who are low in extraversion. A Pearson correlation was performed to test this hypothesis. There was a significant relationship between individual level extraversion and percentage of social words, \( r(171) = -0.14, p = 0.04 \). Though there is a small, significant relationship between individual level extraversion and percentage of social words it does not support the positive relationship predicted in hypothesis 6b.

**Correlation between individual extraversion and positive emotion words.** Hypothesis 6c predicted that participants who are high in extraversion would use a higher percentage of positive emotion words than participants who were low in extraversion. A Pearson correlation was performed to test this hypothesis. There was not a significant relationship between individual level extraversion and percentage of positive emotion words, \( r(171) = -0.10, p = 0.10 \). These results do not support hypothesis 6c.

**Correlation between individual conscientiousness and words that make distinctions.** Hypothesis 6d predicted that participants who are high in conscientiousness would use a higher percentage of words that make distinction. A Pearson correlation was performed to test this hypothesis. There was not a significant relationship between individual level conscientiousness and percentage of words that make distinctions, \( r(171) = 0.03, p = 0.34 \). These results do not support hypothesis 6d.
Correlation between individual openness to experience and immediacy words. Hypothesis 6e predicted that participants who were high in openness to experience would use a lower percentage of immediacy words. A Pearson correlation was performed to test this hypothesis. There was a significant positive relationship between individual level openness to experience and percentage of immediacy words, $r (171) = .13, p = .05$. The strength relationship between individual level openness to experience and percentage of immediacy words was small, but the positive relationship does not support hypothesis 6e.
CHAPTER IV

DISCUSSION

This research investigated the influence of personality on communication and the impact that communication and cross-training had on performance in virtual teams. The study examined potential influences of personality on team performance (Barrick & Mount, 1991; Bell, 2007; LePine, 2003) and on individual and team communications (Gill & Oberlander, 2002; Heylighen & Dewaele, 2002; Pennebaker & King, 1999). Additionally, the study examined the effects of communication characteristics on personality (Luse et al., 2013; Volpe et al., 1996). Finally, from the perspective of cross-training, the study examined potential influences on the relationship between team personality and team performance (Barrick & Mount, 1991; Bell, 2007), and communication and team performance (Volpe et al., 1996).

Team level conscientiousness and team level openness to experience were not shown to be predictors of team performance. One potential explanation could be that the Tinsel Town simulation sets limits by requiring that the teams stay within the provided budget, only offering seven screen play options, and one performance simulation. These limitations could explain the large range and variability in team performance scores. Additionally, research by Barrick and Mount (1991) concluded that openness to experience was a better predictor of training proficiency. The results indicated that those
who are higher in openness tend to have better attitudes towards learning experiences. 

There was also no evidence of support for the moderating effect of cross-training on these relationships. This is not unexpected considering no relationship was found between team level extraversion and performance or team level openness to experience and performance. The level of formality in team communication did not mediate the relationship between team extraversion and team performance because there was no relationship between team level extraversion and performance.

A significant relationship between individual level extraversion and formality in individual communication was found, but in the opposite direction as originally predicted. It was hypothesized that because extraverts are more social that they would be less likely to remain focused on the task thus losing formality in their communication (Gill & Oberlander, 2002). This opposite relationship indicates that it might be possible for extraverts to fulfill the need for constant interaction (Heylighen & Dewaele, 2002) and still remain on task. Perhaps, the extraverts’ preferences for traditional face-to-face interactions allowed them abstain from non-task related, social interactions and focus on the simulation (Amichai-Hamburger, 2005).

Cross-training was shown to have an effect on the formality of individual communication, but not in the way that was predicted. It was originally hypothesized that participants who received cross-training would have less formal communication when providing information and more formal communication when requesting information. The results, however, indicated that participants who received clarification cross-training were more formal in both instances than were the rotational cross-training groups and the control groups. These results suggest that the effect of cross-training is
the same for both providing and requesting information. Further research should be conducted to determine whether clarification cross-training actually has the same effect on providing and requesting information or whether there is simply no effect at all. It is possible that clarification groups were more formal than control groups because the control groups were not provided with enough information to know who to ask for what specific information. If this were true, it would then be expected that the rotation groups, who were provided with the most information during the simulation, would be far more formal than either clarification or control. However, because rotation groups were provided with all the available information in the same amount of time as the other two groups it is possible that they were overwhelmed with information.

At the team level, extraversion was not found to predict the level of formality in team communication. This conflicts with our earlier findings that individual level extraversion was able to predict individual level of formality in communication. It is possible that the sample size in the current study was not large enough to detect this relationship at the team level.

The level of formality in team communication was hypothesized to predict team performance (Volpe et al., 1996), but the results provided no evidence of support. Volpe and colleagues (1996) suggested that the level of formality of language in a situation would increase and decrease given certain factors. Their results indicated that formality would increase with the importance of the communication and the lack of feedback. Conversely, the level of formality in communication would decrease with the size of the shared context. Large shared context is when the conversers know each other more intimately, the audience is smaller, when the sender and receiver are in the same
environment, when the time between sending and receiving is smaller, and when a shared context has been created by previous discourse (Volpe et al., 1996). In sum, the level of formality of language is not just dependent on the individual difference of the conversers, but also the characteristics of the environment. The virtual environment that was created in this study lacked feedback, but also had a smaller audience, a shared location, and small time gaps between sending and receiving messages. Taken together this virtual environment consisted of a mix of characteristics that are suggested to both increase and decrease formality. These conflicting influences could explain why the level of formality in team communication was unable to accurately predict team performance.

Individual level extraversion was not found to influence the number of chat messages sent. If all levels of extraverts contributed to the conversation equally, as these results might suggest, then it lends support to the idea that introverts behave more extraverted in virtual environments (Amichai-Hamburger, 2005). Further research should be conducted to provide a more direct comparison between extraverts and introverts in both virtual and face-to-face environments to determine whether the virtual environment actually mediates this behavior. Because extraversion was not found to influence the number of chat messages participants sent, individual level conscientiousness could not moderate the suggested relationship.

Finally, the results of the correlations between individual personality traits and language use were mixed and somewhat conflicting with prior research. Individual extraversion was negatively correlated with the use of words that make distinctions as suggested by Pennebaker and King (1999). These results do, however, conflict with our original belief that extraverts would use a lower percentage of words that make
distinctions because they were less formal in their communications. Individual level extraversion and the use of social words were found to negatively correlate and conflicted with our predicted positive correlation and the findings of Pennebaker and King (1999). This is not surprising when the results indicating that extraverts were found to be more formal than predicted are also considered. The positive correlation between individual level openness to experience and immediacy words also differed from our predictions and the findings of Pennebaker and King (1999). Finally, there was no evidence to support a relationship between individual level extraversion and the use of positive emotion words or between individual level conscientiousness and words that make distinctions.

Pennebaker and King’s correlations (1999) were obtained using a personality measure and class writing exercises. It is possible that the topic of the task simulation and/or the back and forth between participants instead of straight forward writing influenced several of these relationships. In the *Tinsel Town* simulation participants are presented with facts and are asked to make decisions based on those facts. The discussion of these facts does not leave much room in the conversation for the participant to interject aspects of their personality or opinions. Furthermore, because the writing sample used in the current experiment was one part of a three-way conversation it is entirely possible that the participants influenced each other. These samples differ from the class writing exercises used by Pennebaker and King (1999) that were free flow, written by one participant, and written on a particular topic allowing the participant to have more control over the communication.
Potential Limitations and Future Research

The current study had several key limitations in addition to the limitations mentioned above. One of the more important limitations was in the Tinsel Town simulation itself. The original simulation consisted of four roles, simulated three business years, provided feedback after each business year, and included several additional screenplays to choose from. Due to the current study’s time constraints, the simulation was reduced to three roles, one simulated business year, no feedback and only seven screenplays. This reduction in the content of the simulation could have influenced the variability of performance between teams. Future researchers who choose to use the Tinsel Town might consider making fewer alterations to the original simulation.

A second limitation was the 25 min limit on the discussion period. The discussion period was the first interaction for most participants. It may not be reasonable to expect team members to develop effective communication in such a brief period of time. Utilizing all three of the original simulated business years would have allowed for the examination of communication development across time. It is also possible that a longer discussion period or additional discussion periods would allow the participants the opportunity to interject their personalities into their communications. This would provide more accurate measurements of formality in communication. Additionally, using the discussion as a writing sample for language use was also a limitation. The participants in the current study were utilizing the same information and terminology to complete the same task. All of the participants were having essentially the same conversation, using the same terms, and writing with the same purpose. Prior researchers utilized in-class essays, written on a number of different topics to obtain writing samples. This technique,
as opposed to a single, conversational, task-oriented sample may have better measured individual differences. Prospective researchers might consider using writing samples from all three simulated business years or perhaps requiring a separate, brief writing sample on a topic unrelated to the given task.

In conclusion, this study set out to identify which personality characteristics, if any, influence communication and to examine the characteristics of communication that might influence performance in virtual teams. Identifying important personality characteristics in virtual teams would affect the current selection and hiring methods thus broadening the applicant pool. Understanding the impact that the characteristics of communication have on performance will help managers better identify training needs among current employees. Hiring the right people and proper training will in turn reduce turnover costs thus saving employers time and money (Davis, 2013). The results of the current study conflicted with prior research and suggest additional research be conducted to confirm there were no underlying causes that altered the outcomes.
APPENDIX A

UHSC Form

Amanda Pryor, Jennifer Brown, and Dr. Carpenter
Department of Psychology
College of Liberal Arts
October 15, 2013
Dear Ms. Pryor, Ms. Brown, and Dr. Carpenter,

The UAH Institutional Review Board of Human Subjects Committee has reviewed your proposal, Cross-Training, Personality, and Communication in Virtual Teams, and found it meets the necessary criteria for approval. This proposal is approved, and you may begin your research. Your proposal seems to be in compliance with this institution’s Federal Wide Assurance (FWA) 00019998 and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46) and has been classified as expedited.

Please note that this approval is good for one year from the date on this letter. If data collection continues past this period, you are responsible for processing a renewal application a minimum of 60 days prior to the expiration date.

No changes are to be made to the approved protocol without prior review and approval from the UAH IRB. All changes (e.g. a change in procedure, number of subjects, personnel, study locations, new recruitment materials, study instruments, etc) must be prospectively reviewed and approved by the IRB before they are implemented. You should report any unanticipated problems involving risks to the participants or others to the IRB Chair.

If you have any questions regarding the IRB’s decision, please contact me.

Sincerely,

[Signature]

Pam O’Neal PhD, RN
IRB Chair
College of Nursing, University of Alabama in Huntsville,
328 Nursing Building, Huntsville, AL 35899
phone: 256.824.2437 or 6100 and fax: 256.824.2850 email: irb@uah.edu
Appendix B

Tinsel Town Materials

Simulation Algorithms

(1) **Movie Profit** (in millions) = Movie Revenue – Movie Cost

(2) **Movie Cost** (in millions) = Production Cost + Marketing Cost

(3) **Movie Revenue** (in millions) = Average Ticket Price * #Viewers

(4) **#Viewers** (in millions) = Viewer Appeal* Movie Quality*MPAA Rating

(5) **Viewer Appeal** = (Content Appeal + Star Appeal)*Marketing Level

(6) **Movie Quality**\(^a\) = Script Quality*Director Skill*Acting Quality\(^b\)

For a movie with 2 Lead Roles:

(6a) **Acting Quality** = (LR Acting Skill\(_1\) * LR Acting Skill\(_2\))^0.5

For a movie with 3+ Lead Roles:

(6b) **Acting Quality** = Σ(LR Acting Skill)/# Lead Roles

\(^a\)Movie Quality for Animated Films = Script Quality*Script Quality*Director Skill

\(^b\)The Acting Skill of Supporting Actors is ALWAYS ignored for the purposes of calculating Acting Quality.
GENERAL MEMO

To: Vice-President, Industry Research
Vice-President, Talent Appraisal
Vice-President, Marketing

From: Stan Friedman, CEO

RE: Choosing films for production next year

Thanks for agreeing to meet on such short notice. As usual, the task in front of you is one of picking the movies that we will produce and release in the upcoming year. The fiscal solvency of our studio is riding on the decisions you make. Pick the best movies and we (as well as our stockholders) will be swimming in profit; pick the wrong ones and we may go belly up.

As you all know, profit from the movies we make is determined by taking the revenue earned by each film and subtracting its cost:

\[
\text{Movie Profit} = \text{Movie Revenue} - \text{Movie Cost}
\]

Movie cost is estimated by adding the production cost (which is fixed) to the marketing cost (which is under our control):

\[
\text{Movie Cost} = \text{Production Cost} + \text{Marketing Cost}
\]

Movie revenue is estimated by multiplying the number of viewers by the average ticket price for a particular film:

\[
\text{Movie Revenue} = \# \text{ of Viewers} \times \text{Average Ticket Price}
\]

As you are well aware, the number of viewers for any given film depends on five main factors:

1. Viewer Appeal: basically a function of popular interest in the film’s content (i.e., setting, plot, special effects), as well as the popularity of the talent involved (i.e., director and actors/actresses).
3. Marketing: increases public awareness of our movie,
4. MPAA rating: constrains the size of our audience base
5. Average Ticket Price: reflects the age of the average viewer and, to a certain extent, the time of day that the typical viewer goes to see the movie. Movies with the highest average ticket prices draw mostly adults who go to see the movie in the evening; movies with lower average ticket prices attract younger viewers and people who go when matinees prices are in effect
All of these things interact with one another, and each one is important. If a movie has a good script and good actors/actresses but a terrible director, the movie will not be very good. Similarly, if a movie has a good director and good stars but a poor script, it will also be bad. It probably goes without saying that a movie that is poor in all three categories will just plain stink. The point here is that all five factors must be considered when estimating how much revenue a film will bring in.

We generated script quality ratings by having two of our most experienced readers go through each screenplay and assign a rating on a scale of 1 to 10, then we averaged the ratings.

When we made our ratings, as always, we paid attention to the quality of the dialogue, plot coherence, pacing, and factors appropriate to each type of movie. For example, for dramas we considered character development and plot twists, whereas for science fiction films we looked for a unique vision of the future and a realistic extrapolation from current society. In other words, we took into account that what makes one kind of movie good is not necessarily the same thing that makes another kind of movie good.

Script Quality Ratings and Expected MPAA Ratings for Potential Movies.

<table>
<thead>
<tr>
<th>Movie Title</th>
<th>Script Quality</th>
<th>Expected MPAA Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrapolation</td>
<td>9</td>
<td>PG-13</td>
</tr>
<tr>
<td>Welcome to My Room</td>
<td>9</td>
<td>PG</td>
</tr>
<tr>
<td>We, The People</td>
<td>8</td>
<td>PG-13</td>
</tr>
<tr>
<td>Line of Duty</td>
<td>6</td>
<td>PG-13</td>
</tr>
<tr>
<td>The Reactor</td>
<td>6</td>
<td>PG-13</td>
</tr>
<tr>
<td>Air Cav</td>
<td>5</td>
<td>PG-13</td>
</tr>
<tr>
<td>Oil &amp; Water</td>
<td>3</td>
<td>G</td>
</tr>
</tbody>
</table>

(Positional Clarification Training Condition)
You each have access to information regarding the other factors that you need to consider:

VP of Industry research has access to information regarding Viewer Appeal.
VP of Talent Appraisal has access to information regarding Movie Quality.
VP of Marketing has access to information regarding ticket prices and marketing.

**Each exec is responsible for ensuring that their information is considered when choosing movies that will bring in the most profit.

Our spending allowance for this year is $150 million. It’s hard to tell from a brief summary how much a film is going to cost because it depends on many factors, including star salaries, shooting location and duration, and special effects. However, our screenplay reviewers are pretty good and the estimates they provide should be very close.
I would like you to examine the information at your disposal and figure out how to spend our $150 million to maximize total profit for the year. As usual, I don’t care if you spend the $150 million on one blockbuster or divvy it up over 10 little art-house projects – just figure out the ones that will bring in the most profit. While a film’s total revenue is important, keep in mind that it’s return on investment that is critical. *In other words, the most important value to estimate is a potential film’s profit divided by its cost (i.e., profit/cost, or profit ratio). Profit ratio reflects the number of dollars of profit we get for every dollar we spend.* A good film will end up making about twice as much as it cost (including marketing), and a great film may end up making three to four times as much.

And don’t bother trying to save any money – it’s there to be spent, so use as much as you can.

I know that picking movies isn’t an easy task, but do the best you can. Your staffs have provided you with a good deal of useful information, and I think our screening team has identified a good set of potential choices for you. Feel free to use your personal experiences and gut feelings, but let the hard numbers provided by our research team have the final say. I look forward to seeing your recommendations on my desk next week. Good luck!
MEMO

To: Vice-President, Industry Research
From: Industry Research Staff

RE: Viewer Appeal ratings

Here is the market research that you requested on potential movies for next year. We pulled together 10 focus groups as usual to get this data. Each focus group was led by someone on our staff and involved a roundtable discussion of the movie’s premise and cast, plus formal ratings of content and star appeal by each member of the focus group. We gave the focus groups the same movie capsules that your committee is using to make your decisions. See Table 1 for a summary of the findings from the focus group research.

Table 1 contains two separate estimates of a film’s appeal based on its content and stars. We asked people in the focus group to discuss (and rate) Content Appeal and Star Appeal separately. **Content Appeal** concerns a movie’s premise, plot, character development, and special effects; the film’s genre and emergent themes play a role as well. **Star Appeal** has to do with the popularity of the actors/actresses as well as the director. Industry research suggests that content is roughly twice as important as stars in determining who goes to see a movie, so we scaled Content Appeal values from 0-200, and Star Appeal values from 0-100. Basically, a Content Appeal score of 200 means that the movie should have a very broad demographic appeal and the focus group participants were dying to see the screenplay get turned into a movie. In contrast, a Content Appeal score of 0 means that no one was interested in seeing the movie get made solely on its subject matter. A Star Appeal score of 100 means that basically every role in the film has A-List stars that people want to see; a score of 0 means that the cast is essentially unknown to the audience. Star Appeal is based on physical attractiveness, charisma, and the success of recent films and has little to do with talent – it only reflects “popular demand.”

Films with unusual situations and big-name stars tend to have more appeal to viewers. In particular, action/adventure, war, science-fiction, and suspense films tend to interest people more than dramas or comedies. Animated films almost always do well with families and often become blockbusters – they have a built-in audience if based on a book or story familiar to the audience. Horror movies do well with males (especially younger ones) and some pull in women as well. Comedies do well if the situation is right and the casting is good. Dramas are the most variable; they tend to draw discriminating viewers from all groups, but usually have much lower content appeal because their situations are more ordinary. More importantly, movies with lots of special effects are very attractive regardless of their genre – in part because of extensive repeat viewing.

To summarize, the Content Appeal and Star Appeal values quantify the appeal of a film based on its subject matter and cast, respectively. **A good overall index of the “buzz” surrounding a potential movie is to add up its Content Appeal and Star Appeal.**
Focus Group Research on Viewer Appeal of Potential Movies.

<table>
<thead>
<tr>
<th>Movie Title</th>
<th>Content Appeal</th>
<th>Star Appeal</th>
<th>Staff Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Reactor</td>
<td>190.00</td>
<td>95.00</td>
<td>This looks like a can’t-miss summer blockbuster – great special effects and all-star cast.</td>
</tr>
<tr>
<td>We, The People</td>
<td>180.00</td>
<td>80.00</td>
<td>The war on terrorism takes an Orwellian turn after a U.S. city is nuked. Popular cast and knock-out special effects. Very timely.</td>
</tr>
<tr>
<td>Oil &amp; Water</td>
<td>170.00</td>
<td>70.00</td>
<td>There is a huge market out there for this kind of film. A 21st century take on <em>The Parent Trap</em>.</td>
</tr>
<tr>
<td>Air Cav</td>
<td>160.00</td>
<td>55.00</td>
<td>Sort of <em>Black Hawk Down</em> set in Vietnam – above average cast; very realistic.</td>
</tr>
<tr>
<td>Welcome to My Room</td>
<td>150.00</td>
<td>50.00</td>
<td>Spoof of suburbia and documentaries seen through the eyes of a kid. Nice supporting cast.</td>
</tr>
<tr>
<td>Line of Duty</td>
<td>140.00</td>
<td>100.00</td>
<td>An action flick with a twist – focus groups were drooling over the cast.</td>
</tr>
<tr>
<td>Extrapolation</td>
<td>115.00</td>
<td>35.00</td>
<td>Hot topic due to popularity of “Diablo” computer game. Should bring out the teens.</td>
</tr>
</tbody>
</table>
MEMO

To: Vice-President, Talent Appraisal  
From: Talent Appraisal Staff  
RE: Skill Ratings for Actors, Actresses, and Directors

We were finally able to compile the information regarding actor and director skill values. It took quite a bit of work, but we now have the data you requested.

Basically, we surveyed a panel of movie critics and asked them to rate a list of actors, actresses, and directors for their professional skill. For directors, we asked the critics to consider things like artistic vision, ability to inspire actors and actresses, work ethic, and capturing the “feel” of situations. For those in front of the camera, skill consists of raw acting talent, intensity, emotional expressiveness, and range.

Director Skill pertains to the ability of a director to create a unified artistic vision and get the most out of the actors and actresses. Director ratings were made on a scale of 1-5, with 1 indicating a true hack with no talent and 5 indicating a director who could make an Oscar-winner with volunteers from regional theater. Some of these ratings may surprise you. Acting Skill is primarily a function of an actor/actresses’ ability to credibly display a range of emotions. Some actors/actresses are very good in limited roles, but the truly great ones can yearn, pine, lust, cry and rage with amazing ability. Lead actors and actresses are rated on a 5-point scale, with 1 indicating an actor/actress who would be challenged to do well on a soap opera and 5 indicating an actor/actress that can do any role with convincing authority.

With regard to how the Acting Skill of the various actors/actresses affects the overall Acting Quality of the movie, here is what our research seems to suggest:

1. The Acting Skill of supporting actors can pretty much be ignored – these people are usually not on screen long enough for their flaws to do much damage.

2. Acting Quality can be estimated by averaging the Acting Skill ratings for the Lead Roles. When there are only two lead roles, however, it’s actually a little less than average if there is a large discrepancy in the Acting Skill values of the leads. In other words, the lesser actor weighs the film down.
Table 1. Director Skill Ratings

<table>
<thead>
<tr>
<th>Director</th>
<th>Skill Rating (0-5 stars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Carpenter</td>
<td>3.5</td>
</tr>
<tr>
<td>Chris Columbus</td>
<td>2</td>
</tr>
<tr>
<td>Stanley Eider</td>
<td>3</td>
</tr>
<tr>
<td>Nora Ephron</td>
<td>4</td>
</tr>
<tr>
<td>Milos Foreman</td>
<td>4.5</td>
</tr>
<tr>
<td>William Friedkin</td>
<td>3</td>
</tr>
<tr>
<td>Jonathan Glazer</td>
<td>3.5</td>
</tr>
<tr>
<td>Ron Howard</td>
<td>4</td>
</tr>
<tr>
<td>Jean Jacques-Annaud</td>
<td>3.5</td>
</tr>
<tr>
<td>Stephen King</td>
<td>2.5</td>
</tr>
<tr>
<td>Neil LaBute</td>
<td>4</td>
</tr>
<tr>
<td>Mimi Leder</td>
<td>3.5</td>
</tr>
<tr>
<td>Ang Lee</td>
<td>5</td>
</tr>
<tr>
<td>Barry Levinson</td>
<td>4</td>
</tr>
<tr>
<td>Michael Mann</td>
<td>4</td>
</tr>
<tr>
<td>Garry Marshall</td>
<td>3.5</td>
</tr>
<tr>
<td>John McTiernan</td>
<td>4</td>
</tr>
<tr>
<td>Sam Mendes</td>
<td>3.5</td>
</tr>
<tr>
<td>Mike Nichols</td>
<td>4</td>
</tr>
<tr>
<td>Wolfgang Peterson</td>
<td>3.5</td>
</tr>
<tr>
<td>Sam Raimi</td>
<td>3</td>
</tr>
<tr>
<td>Harold Ramis</td>
<td>3</td>
</tr>
<tr>
<td>Brett Ratner</td>
<td>2</td>
</tr>
<tr>
<td>Ivan Reitman</td>
<td>2.5</td>
</tr>
<tr>
<td>George Romero</td>
<td>3</td>
</tr>
<tr>
<td>Joel Schumacher</td>
<td>1.5</td>
</tr>
<tr>
<td>Ridley Scott</td>
<td>5</td>
</tr>
<tr>
<td>Bryan Singer</td>
<td>2.5</td>
</tr>
<tr>
<td>Steven Söderbergh</td>
<td>5</td>
</tr>
<tr>
<td>Oliver Stone</td>
<td>5</td>
</tr>
<tr>
<td>Billy Bob Thornton</td>
<td>3.5</td>
</tr>
<tr>
<td>Simon West</td>
<td>2</td>
</tr>
<tr>
<td>Robert Zemeckis</td>
<td>4.5</td>
</tr>
</tbody>
</table>
Table 2. Acting Skill Ratings for Lead Actors (0-5 Stars).

<table>
<thead>
<tr>
<th>Actor/Actress</th>
<th>Skill</th>
<th>Actor/Actress</th>
<th>Skill</th>
<th>Actor/Actress</th>
<th>Skill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ben Affleck</td>
<td>3 ½</td>
<td>Josh Hartnett</td>
<td>3</td>
<td>Freddie Prinze, Jr.</td>
<td>3</td>
</tr>
<tr>
<td>Jessica Alba</td>
<td>3 ½</td>
<td>Ethan Hawke</td>
<td>3 ½</td>
<td>Dennis Quaid</td>
<td>3 ½</td>
</tr>
<tr>
<td>Kevin Bacon</td>
<td>4</td>
<td>Katie Holmes</td>
<td>3</td>
<td>Daniel Radcliffe</td>
<td>3 ½</td>
</tr>
<tr>
<td>Alec Baldwin</td>
<td>4 ½</td>
<td>Jeremy Irons</td>
<td>4 ½</td>
<td>Len Randall</td>
<td>4 ½</td>
</tr>
<tr>
<td>Tom Berenger</td>
<td>4</td>
<td>Samuel L. Jackson</td>
<td>4</td>
<td>Christina Ricci</td>
<td>5</td>
</tr>
<tr>
<td>Halle Berry</td>
<td>3 ½</td>
<td>Angelina Jolie</td>
<td>3</td>
<td>Denise Richards</td>
<td>2</td>
</tr>
<tr>
<td>Sandra Bullock</td>
<td>2 ½</td>
<td>Ashley Judd</td>
<td>4</td>
<td>Chris Rock</td>
<td>3</td>
</tr>
<tr>
<td>Steve Buscemi</td>
<td>4</td>
<td>Nastassia Kinski</td>
<td>4 ½</td>
<td>Keri Russell</td>
<td>3 ½</td>
</tr>
<tr>
<td>Nicholas Cage</td>
<td>3 ½</td>
<td>Shia LaBeouf</td>
<td>3 ½</td>
<td>Kurt Russell</td>
<td>4</td>
</tr>
<tr>
<td>Hayden Christensen</td>
<td>3</td>
<td>Eriq La Salle</td>
<td>3 ½</td>
<td>Elisabeth Shue</td>
<td>4</td>
</tr>
<tr>
<td>Jennifer Connelly</td>
<td>4 ½</td>
<td>Jude Law</td>
<td>4 ½</td>
<td>Gary Sinise</td>
<td>4 ½</td>
</tr>
<tr>
<td>Russell Crowe</td>
<td>5</td>
<td>Donal Logue</td>
<td>4</td>
<td>Tom Skelton</td>
<td>4 ½</td>
</tr>
<tr>
<td>Emily Cryton</td>
<td>5</td>
<td>Jennifer Lopez</td>
<td>3</td>
<td>Kevin Spacey</td>
<td>5</td>
</tr>
<tr>
<td>Matt Damon</td>
<td>4 ½</td>
<td>John Malkovich</td>
<td>4 ½</td>
<td>Dwayne Stevens</td>
<td>4</td>
</tr>
<tr>
<td>Keith David</td>
<td>4</td>
<td>Julianna Margulies</td>
<td>4</td>
<td>Sharon Stone</td>
<td>3</td>
</tr>
<tr>
<td>Daniel Day-Lewis</td>
<td>4 ½</td>
<td>James Marsden</td>
<td>3 ½</td>
<td>Madeline Stowe</td>
<td>4 ½</td>
</tr>
<tr>
<td>Vin Diesel</td>
<td>3 ½</td>
<td>Dylan McDermott</td>
<td>3</td>
<td>Kiefer Sutherland</td>
<td>3</td>
</tr>
<tr>
<td>Richard Dreyfuss</td>
<td>4</td>
<td>Rose McGowan</td>
<td>3 ½</td>
<td>Mena Suvari</td>
<td>3 ½</td>
</tr>
<tr>
<td>Eliza Dushku</td>
<td>4</td>
<td>Tobey McQuire</td>
<td>4 ½</td>
<td>Uma Thurman</td>
<td>4</td>
</tr>
<tr>
<td>Charles Dutton</td>
<td>3 ½</td>
<td>Teri Miller</td>
<td>4 ½</td>
<td>Amber Valletta</td>
<td>4 ½</td>
</tr>
<tr>
<td>Dakota Fanning</td>
<td>4 ½</td>
<td>Bill Murray</td>
<td>5</td>
<td>Mark Wahlberg</td>
<td>4</td>
</tr>
<tr>
<td>Will Ferrell</td>
<td>4</td>
<td>Liam Neeson</td>
<td>4 ½</td>
<td>Denzel Washington</td>
<td>5</td>
</tr>
<tr>
<td>Linda Fiorentino</td>
<td>4</td>
<td>Ronda Nelson</td>
<td>4</td>
<td>Damon Wayans</td>
<td>3</td>
</tr>
<tr>
<td>James Franco</td>
<td>3 ½</td>
<td>Edward Norton</td>
<td>5</td>
<td>Sigourney Weaver</td>
<td>5</td>
</tr>
<tr>
<td>Morgan Freeman</td>
<td>5</td>
<td>Chris O'Donnell</td>
<td>2 ½</td>
<td>Elijah Wood</td>
<td>4 ½</td>
</tr>
<tr>
<td>John Goodman</td>
<td>4</td>
<td>Haley Joel Osment</td>
<td>4</td>
<td>Michelle Yeoh</td>
<td>3 ½</td>
</tr>
<tr>
<td>Gene Hackman</td>
<td>5</td>
<td>Jason Owens</td>
<td>5</td>
<td>Catherine Zeta-Jones</td>
<td>3 ½</td>
</tr>
<tr>
<td>Tom Hanks</td>
<td>5</td>
<td>Anna Paquin</td>
<td>4 ½</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ed Harris</td>
<td>4 ½</td>
<td>Natalie Portman</td>
<td>4 ½</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MEMO

To: Vice-President, Marketing
From: Marketing Staff

RE: Impact of Marketing Strategy, MPAA Rating, and Expected Ticket Prices

Table 1.

Marketing Strategy Information.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Cost (in millions)</th>
<th>Impact on Viewer Appeal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word-of-Mouth</td>
<td>$0</td>
<td>+0%</td>
</tr>
<tr>
<td>Print + Outdoor</td>
<td>$5</td>
<td>+30%</td>
</tr>
<tr>
<td>Pre-Release TV</td>
<td>$10</td>
<td>+55%</td>
</tr>
<tr>
<td>Saturation TV</td>
<td>$20</td>
<td>+75%</td>
</tr>
</tbody>
</table>

As shown in Table 1, there are four feasible marketing strategies we can employ, each with a given cost and impact. Note that, as our marketing strategy gets more sophisticated, the costs and the positive change in viewers go up. Basically, the more expensive the strategy, the more effective it is. It is important to note, however, that marketing is most effective when there is a movie with high Viewer Appeal – marketing doesn’t help much if the content of the film isn’t all that intriguing or if there are no big-name stars. If we’re going to produce any “small” high-quality films, it’s probably better to just rely on word-of-mouth to spread the news. Overall, a good strategy is to spend money marketing a movie in proportion to its cost – cheap ones we can get away with little or no marketing; expensive ones can benefit from saturation TV marketing.

Table 2.

Impact of MPAA Movie Rating on Size of Potential Viewer Base.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Projected Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>0%</td>
</tr>
<tr>
<td>PG</td>
<td>-10%</td>
</tr>
<tr>
<td>PG-13</td>
<td>-15%</td>
</tr>
<tr>
<td>R</td>
<td>-25%</td>
</tr>
<tr>
<td>NC-17</td>
<td>-40%</td>
</tr>
</tbody>
</table>

As you can see, “R” or “NC-17” movies take a big hit in that a good proportion of people who go to see movies are excluded from the start. Even if those movies are good, we won’t get as many people coming to see them simply because the potential viewer base is smaller! Obviously, “G” films give us the largest possible base, so we should keep an eye out for any of those.
We had the bean-counters in Finance use their fancy regression models to predict the average ticket price for each potential movie based on projected demographics. These financial models take into account a host of factors and they’re usually pretty accurate. As you can see from Table 3, the potential movies for next year are predicted to have average ticket prices ranging from $6.25 to $7.50.

Table 3.

Average Ticket Price in Dollars for Potential Movies.

<table>
<thead>
<tr>
<th>Movie Title</th>
<th>Average Ticket Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Cav</td>
<td>$ 7.00</td>
</tr>
<tr>
<td>We, The People</td>
<td>$ 7.00</td>
</tr>
<tr>
<td>Line of Duty</td>
<td>$ 6.75</td>
</tr>
<tr>
<td>The Reactor</td>
<td>$ 6.75</td>
</tr>
<tr>
<td>Welcome to My Room</td>
<td>$ 6.50</td>
</tr>
<tr>
<td>Extrapolation</td>
<td>$ 6.25</td>
</tr>
<tr>
<td>Oil &amp; Water</td>
<td>$ 6.25</td>
</tr>
</tbody>
</table>
1. You may only use the amount of money budgeted for this session, $150 million. You cannot spend more than $150 million; if a plan that involves overspending is mistakenly submitted, your group will not be eligible to receive the performance bonus. It is your responsibility to make sure that your plan is valid.

2. Any unused money will count towards your revenue.

3. All team members must agree on the final decisions.

4. You have 25 minutes to make your choices; if your team has not completed its selection process within the allotted time, only the valid choices you have selected will count and the unused portion of your budget will be counted as revenue.

5. TO CHOOSE A MOVIE FOR PRODUCTION, DO THE FOLLOWING:
   a. Indicate your choice by checking the appropriate box below
   b. Choose a dollar amount to spend on marketing (the default is $0)
   c. Add the total
   d. Write each movie, the marketing funding, and total cost into the chat window
   e. ALL team members write “I agree” below the movies in order to indicate their consent to the decisions.

<table>
<thead>
<tr>
<th>Title</th>
<th>Production $</th>
<th>+</th>
<th>Marketing $</th>
<th>=</th>
<th>Total $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Cav</td>
<td>$49</td>
<td>+</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Extrapolation</td>
<td>$27</td>
<td>+</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Line of Duty</td>
<td>$46</td>
<td>+</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Oil &amp; Water</td>
<td>$23</td>
<td>+</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>The Reactor</td>
<td>$67</td>
<td>+</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Welcome to My Room</td>
<td>$31</td>
<td>+</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>We, The People</td>
<td>$72</td>
<td>+</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

**Total:** $520 < $150
Screenplay Profile

Title: Welcome to My Room

Genre: Comedy

Audience: Diverse; families

Plot Summary:

Charming, nine-year-old Ben Murray loves movies and decides he wants to make one about his family, so he “hires” Nicollette, a six-year-old neighbor girl who never speaks, and the two make a documentary about Ben’s life with the family’s camcorder. They interview Ron and Sandy, Ben’s parents, as well as Ben’s 13-year-old brother Andy, his 16-year-old sister Natalie, and the many different pets in the Murray household. The movie portrays all the classic events of suburban family life through the eyes of an innocent nine-year-old, including waking up in the morning, rushing to get ready for school, power breakfasts, waiting for the bathroom, long car trips, and torturing new babysitters. Many of the film’s most humorous moments come from the lengths that Ben and faithful Nicollette go to get candid shots and interviews, waiting in cupboards, hanging upside down from a roof, barging into the bathroom during showers, and waking “interviewees” up from a deep sleep. As the film progresses, the relationship between precocious Ben and reclusive Nicollette deepens into a strong and loyal friendship. Along the way, some problems also become apparent in the Murray household, but the film showcases how the bonds of family are stronger than the stresses of modern suburban life. Ultimately, it should appeal to all members of the family through a combination of slapstick, suburban spoof, and parody of documentary film-making.

Talent     Role    Type
Daniel Radcliffe   Ben    Lead
Dakota Fanning                                  Nicollette                                 Lead
Anthony Edwards   Father    Support
Frances McDormand   Mother    Support
James Franco    Brother   Support
Britney Spears    Sister    Support

Director: Ivan Reitman

Cost: $31 million
Title: The Reactor

Genre: Action/Adventure

Audience: Diverse

Plot Summary:

A nuclear reactor near a small town in Arizona begins to leak and by the time it is discovered, the leak is virtually out of control and there is danger of a core breach. A panic ensues as order collapses and the town spirals into mob rule. A team of experts from the Nuclear Regulatory Commission is flown in to try to save the reactor and, failing that, to get as many people to safety as possible. Entering the town, the relief team is attacked by a group of hysterical citizens convinced that the team has come to cover up all traces of the disaster and make sure that none of the townspeople get out alive to tell others. Meanwhile, people are dying one-by-one in a gruesome fashion as the radiation continues to ooze out of the leak. The NRC team is kept constantly on the run while they try to help those they can and get to the reactor. Eventually they learn that a group of citizens led by a psychotic madman has taken over the reactor and is trying to facilitate a core breach to “cleanse” the area of undesirables and pave the way for a new civilization. Outside, another group of crazed citizens is trying to batter their way in. In the climactic finale, the team arrives in time to fight through the mob, take out the tyrant, and stop the core breach just before the reactor blows up. Many special effects.

Talent

<table>
<thead>
<tr>
<th>Talent</th>
<th>Role</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samuel L. Jackson</td>
<td>NRC team member</td>
<td>Lead</td>
</tr>
<tr>
<td>Kevin Spacey</td>
<td>NRC team member</td>
<td>Lead</td>
</tr>
<tr>
<td>Catherine Zeta-Jones</td>
<td>NRC team member</td>
<td>Lead</td>
</tr>
<tr>
<td>Dennis Hopper</td>
<td>Vault Tyrant</td>
<td>Support</td>
</tr>
</tbody>
</table>

Director: Ron Howard

Cost: $67 million
Title: *Air Cav*

Genre: War

Audience: Adults; young males

Plot Summary:

Based on the book *We Were Soldiers Once…and Young*. Depicts the first major engagement in Vietnam between the U.S. and North Vietnamese regulars. U.S. troops of the 1st Cavalry (Airmobile) land behind enemy lines in the Central Highlands, right next to a massive NVA base camp. The landing force is attacked and a ferocious fight ensues over possession of the landing zone. Nearby, in a second battle, another force of U.S. troops lands unopposed but is ambushed while attempting to march overland through difficult terrain to come to the aid of the first unit. The second unit is surrounded and divided, with groups cut off from one another and forced to endure a long night in the jungle as NVA soldiers move around the perimeter, killing wounded U.S. soldiers in the dark. After a final ferocious assault is beaten back at dawn, the NVA slip away and the remaining U.S. troops in both units suddenly find themselves alone in the silent jungle. The movie takes a hard look at U.S. thinking early in the war, the reality of actual combat, the heroism of selected individuals, and the subsequent effort to hide the closeness of the outcome and spin the battle as a major U.S. victory.

<table>
<thead>
<tr>
<th>Talent</th>
<th>Role</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edward Norton</td>
<td>Sgt. Cassidy</td>
<td>Lead</td>
</tr>
<tr>
<td>Keith David</td>
<td>Major Wilson</td>
<td>Lead</td>
</tr>
<tr>
<td>Eriq La Salle</td>
<td>Lt. Raines</td>
<td>Lead</td>
</tr>
</tbody>
</table>

Director: Wolfgang Peterson

**Cost:** $49 million
Screenplay Profile

Title: *Line of Duty*

Genre: Action/Adventure

Audience: Diverse

Plot Summary:

Gangs are over-running Newark, New Jersey, and the drug problem has gotten so bad that a special task force composed of the nation’s premier undercover cops has been brought in. This task force is charged with bringing down one of the most powerful drug lords in the world. The members of the task force go undercover as small-time dealers in order to gain access to the leader of the drug cartel. During a routine sale, one of the undercover cops is identified, putting the entire operation in danger. The task force members are warned, except for one woman who is so deep undercover that she can’t be reached. As she unknowingly struggles to get to the top of the cartel, she battles corruption in the city government and the police department, as well as the cartel’s ever-growing suspicion that she is a cop. The movie builds to an extended chase through the city and a cat-and-mouse search through the sewer system. In the climactic scene, one of the task force cops must shoot the undercover female officer and accidentally kills her. Before she dies, the female officer saves the lives of the other task force cops by spotting and shooting the drug lord who is about to open fire with an automatic weapon.

<table>
<thead>
<tr>
<th>Talent</th>
<th>Role</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jennifer Lopez</td>
<td>Undercover Cop</td>
<td>Lead</td>
</tr>
<tr>
<td>Chris Rock</td>
<td>Task Force Cop</td>
<td>Lead</td>
</tr>
<tr>
<td>Josh Hartnett</td>
<td>Task Force Cop</td>
<td>Lead</td>
</tr>
<tr>
<td>Jackie Chan</td>
<td>Drug Lord</td>
<td>Support</td>
</tr>
</tbody>
</table>

Director: Brett Ratner

Cost: $46 million
Screenplay Profile

Title: *Oil and Water*

Genre: Comedy

Audience: Families; kids

Plot Summary:

A successful female lawyer with a 15-year-old daughter falls in love with a male cop who has a 16-year-old son. Unfortunately, the two teens were the hottest couple in school until a recent break-up. Although it has been three months, the two teens hate one another and are not thrilled about their parents’ deepening relationship. As tensions rise between the teens, the lawyer and cop get married and the two teens must endure the many trials and tribulations of living together under the same roof. After an all-out fight in the swimming pool, the two teens decide to join forces temporarily in an attempt to sabotage the marriage and force their parents into getting a divorce. After some comic blunders, the parents discover the teens’ plot and decide to pull a scheme of their own to get the kids to see that they still care a great deal about one another. The parents stage a huge fight, leading the teens to admit their scheme in a desperate attempt to stop the “violence.” To the shock of the teens, the parents then admit that they were only acting. In the final scene, the audience sees the bustling household of their “normal” family.

<table>
<thead>
<tr>
<th>Talent</th>
<th>Role</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandra Bullock</td>
<td>Wife</td>
<td>Lead</td>
</tr>
<tr>
<td>Dennis Quaid</td>
<td>Husband</td>
<td>Lead</td>
</tr>
<tr>
<td>Hayden Christensen</td>
<td>Son</td>
<td>Lead</td>
</tr>
<tr>
<td>Katie Holmes</td>
<td>Daughter</td>
<td>Lead</td>
</tr>
<tr>
<td>Cameron Diaz</td>
<td>Ex-wife</td>
<td>Support</td>
</tr>
</tbody>
</table>

Director: Chris Columbus

**Cost:** $23 million
Title: *Extrapolation*

Genre: Horror

Audience: Teens; young adults

Plot Summary:

On Halloween 2000, a group of teens plays a popular computer game, “Diablo II,” before leaving for school. The opening scenes of the movie show the group playing the game with gusto and sinking into their characters, becoming completely immersed in the final battle against the title character. For a single instant, they all lose track of reality, and their belief opens a portal to the netherworld. In the game, they kill the demon and witness a gory cut-scene finale that serves as an omen of things to come. Afterwards at school, strange things begin to happen and several people are killed in very bizarre ways. As the movie goes on, we learn that the original Diablo (in the first version of the game) escaped death by moving into the body of the character that tried to kill it. It appears that the same thing is happening again, only the demon has escaped from the game into the real world. One of the group figures out what is happening and proceeds to recruits a frail old man to fight the boy who has become possessed. Using their knowledge from the game, they eventually search out the demon in the midst of trick-or-treating and destroy it in the same manner as the demon was killed at the end of the game.

<table>
<thead>
<tr>
<th>Talent</th>
<th>Role</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>James Franco</td>
<td>Possessed Teen</td>
<td>Lead</td>
</tr>
<tr>
<td>Keri Russell</td>
<td>Teen Player</td>
<td>Lead</td>
</tr>
<tr>
<td>Alyssa Milano</td>
<td>Teen Player</td>
<td>Support</td>
</tr>
<tr>
<td>Martin Landau</td>
<td>Neighborhood Parent</td>
<td>Support</td>
</tr>
</tbody>
</table>

Director: Stephen King

**Cost:** $27 million
Screenplay Profile

**Title:** *We, The People*

**Genre:** Science Fiction

**Audience:** Diverse

**Plot Summary:**

In the year 2012, there is no longer a foreign threat to the United States. On the home front, airlines, businesses and whole cities are increasingly threatened by domestic terrorists. After terrorists explode a tactical nuclear warhead in Pittsburgh, a hard-line President is elected and Congress passes several emergency laws that drastically limit the rights of individual citizens to possess the “means of mass destruction.” Citizens are not allowed to possess weapons of any kind, militia are deployed in all major cities, and every electronic transmission is monitored. Rioting begins, martial law is declared, and an underground resistance movement arises. After an attempt to trap the terrorists takes place, the enraged group sets off another nuclear bomb that obliterates Miami. As the problems continue, Congress is disbanded and the President and her cabinet take control of the government. Meanwhile, the terrorists are located in Atlanta and National Guard units conduct a ruthless house-to-house search during which numerous atrocities are committed on both sides as the citizens desperately resist. In the end, the country collapses and lawlessness spreads through the cities. The movie follows the government, terrorists, and the citizens’ resistance and examines when the ends justify the means.

<table>
<thead>
<tr>
<th>Talent</th>
<th>Role</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sigourney Weaver</td>
<td>President</td>
<td>Lead</td>
</tr>
<tr>
<td>Russell Crowe</td>
<td>Terrorist</td>
<td>Lead</td>
</tr>
<tr>
<td>Charles Dutton</td>
<td>Resistance Leader</td>
<td>Lead</td>
</tr>
<tr>
<td>Dennis Franz</td>
<td>National Guard Commander</td>
<td>Support</td>
</tr>
</tbody>
</table>

**Director:** Michael Mann

**Cost:** $72 million
APPENDIX C

Google Chat
### APPENDIX D

### Questionnaire Items

#### 1.1. The Big Five Inventory

Please indicate the extent to which **you agree or disagree with the following statements.**

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>N/A</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**I am someone who...**

1. Is talkative
2. Tends to find fault with others
3. Does a thorough job
4. Is depressed, blue
5. Is original, comes up with new ideas
6. Is reserved
7. Is helpful and unselfish with others
8. Can be somewhat careless
10. Is curious about many different things
11. Is full of energy
12. Starts quarrels with others
13. Is a reliable worker
14. Can be tense
15. Is ingenious, a deep thinker
16. Generates a lot of enthusiasm
17. Has a forgiving nature
18. Tends to be disorganized
19. Worries a lot
20. Has an active imagination
21. Tends to be quiet
22. Is generally trusting
23. Tends to be lazy
24. Is emotionally stable, not easily upset
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25.</td>
<td>Is inventive</td>
</tr>
<tr>
<td>26.</td>
<td>Has an assertive personality</td>
</tr>
<tr>
<td>27.</td>
<td>Can be cold and aloof</td>
</tr>
<tr>
<td>28.</td>
<td>Perseveres until the task is finished</td>
</tr>
<tr>
<td>29.</td>
<td>Can be moody</td>
</tr>
<tr>
<td>30.</td>
<td>Values artistic, aesthetic experiences</td>
</tr>
<tr>
<td>31.</td>
<td>Is sometimes shy, inhibited</td>
</tr>
<tr>
<td>32.</td>
<td>Is considerate and kind to almost everyone</td>
</tr>
<tr>
<td>33.</td>
<td>Does things efficiently</td>
</tr>
<tr>
<td>34.</td>
<td>Remains calm in tense situations</td>
</tr>
<tr>
<td>35.</td>
<td>Prefers work that is routine</td>
</tr>
<tr>
<td>36.</td>
<td>Is outgoing, sociable</td>
</tr>
<tr>
<td>37.</td>
<td>Is sometimes rude to others</td>
</tr>
<tr>
<td>38.</td>
<td>Makes plans and follows through with them</td>
</tr>
<tr>
<td>39.</td>
<td>Gets nervous easily</td>
</tr>
<tr>
<td>40.</td>
<td>Likes to reflect, play with ideas</td>
</tr>
<tr>
<td>41.</td>
<td>Has few artistic interests</td>
</tr>
<tr>
<td>42.</td>
<td>Likes to cooperate with others</td>
</tr>
<tr>
<td>43.</td>
<td>Is easily distracted</td>
</tr>
<tr>
<td>44.</td>
<td>Is sophisticated in art, music, or literature</td>
</tr>
</tbody>
</table>
Appendix E

Demographic Questionnaire

Please complete the following questions. Your answers will be kept confidential and will only be used for the purposes of this study.

1. Gender:  
   - Male  
   - Female

2. Age: __

3. What is your ethnic heritage?
   - African American
   - American Indian/Alaska Native
   - Asian
   - Caucasian
   - Hispanic/Latino
   - Multi-racial
   - Native Hawaiian/Pacific Islander
   - Other (please specify) ____________

4. What is your native language? _______________

5. Did you know any of your team members prior to the session?
   - Yes
   - No

6. How many days a week do you communicate through virtual chat the way you did with your team mates today?
   - Less than 1
   - 2-3
   - 4-5
   - 6+
   - Never
References


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