**Large-scale patterns of entertainment gratifications in linguistic content of U.S. films**

**Abstract**

We count words in film subtitle files in an attempt to reveal morally relevant patterns of linguistic content. We argue that function words (e.g., pronouns, prepositions, conjunctions) should be positively associated with thought-provoking narrative forms. To test this hypothesis, we associate function words to aggregate measures of film viewership and appraisals. Results suggest that function words are negatively associated with measures of viewership but positively associated with appraisals. As such, our finding is consistent with the idea that function words are more likely to occur in narrative forms that audiences value more than they actually consume. We relate this finding to past research, which has shown the same pattern for hedonic versus meaningful entertainment gratifications. Discussion centers on implications for recent theorizing in this area.

*Keywords*: linguistic inquiry word count, liwc, entertainment theory, mass communication, moral psychology

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A recently proposed dual-process model distinguishes two psychological systems underlying appraisals of mediated narratives, one characterized by hedonic and intuitive response (labeled *enjoyment*) and another characterized by affectively mixed and deliberative response (labeled *appreciation*; Tamborini, 2011, 2013). Other media scholars have proposed similar distinctions based on whether narratives elicit pure pleasure versus mixed affect and cognitions, as well as the divergent gratifications these responses satisfy (e.g., Oliver & Bartsch, 2011; Vorderer & Ritterfeld, 2009; Wirth, Hofer, & Schramm, 2012). Recent content analyses of films have even begun to systematically probe depictions thought to elicit these divergent appraisal styles (AUTHORS; Grizzard et al., 2011; Oliver et al., 2014). A pattern consistent with these studies is that the features of narratives associated with ratings (perceptions of value) are different from those associated with wide consumption (Oliver et al., 2014). That is, favorable appraisals seem to be driven by different factors than high viewership. The current study seeks to extend this line of research by showing relationships between films’ linguistic content with measures of viewership and appraisal that match this pattern. We believe examining films’ linguistic content can help scholars further detect and decipher narrative forms that elicit these divergent psychological responses. We begin below by describing the dual-process understanding of morality and its recent application by entertainment scholars. We then introduce the rationale behind our word-count method.

**Moralities in Entertainment Media**

There has been a recent acknowledgement in media psychology that morality exists “in the plural,” and is central to how individuals process and understand narratives (Krcmar & Cingel, 2016; Tamborini, 2011, 2013; Weaver & Lewis, 2012; Weber, Popova, & Mangus, 2012). That is, moral judgments are based on a number of different psychological foundations relevant to diverse areas of social life, including issues such as ingroup loyalty, respect for authority, and the idea of purity and sanctity (Haidt & Joseph, 2007). As such, the domain of morality goes beyond justice concerns alone, which was the focus of older cognitive-developmental approaches (Kohlberg, 1981; Piaget, 1965). According to Haidt and Joseph’s (2007) moral foundations theory, judgments are based on five motivational foundations, labeled as follows: *Care* is concerned with feeling and disliking the pain of others; *fairness* is related to reciprocity, equality, and proportionality; *ingroup loyalty* relates to our tribal history as a species, and underlies ingroup biases and feelings of community; *authority* is about respecting dominance hierarchies, traditions, and high-status individuals; and *purity* is concerned with contamination—physical and metaphysical—and endeavoring to live in a more noble manner (Graham, Haidt, & Nosek, 2009).

Haidt (2001) claims that these foundations consist of intuitive bits of mental circuitry, each evolved for distinct social functions. For example, when an individual violates purity or care foundations by engaging in a disgusting or harmful act (e.g., incest, murder), a fast and automatic response yields a negative moral judgment of that person without the need for consciously reasoning about the consequences or wrongness of the behavior. These foundations, according to Haidt (2001), are more deeply evolved than the mental systems involved in more deliberative processes (e.g., self-control, planning, or inhibition). Haidt (2001) contends most moral judgments do not elicit any deliberation whatsoever, and may not even consciously register. However, the deliberative weighing of moral concerns does occur when moral foundations are placed in conflict, such as in moral dilemmas (Haidt, 2001). For example, consider a child who was told to strike another child by a highly respected schoolteacher. The child may sense internal conflict and be forced to consider whether to violate her sense of care to uphold authority or to violate her sense of respect for authority to uphold care (Greene et al., 2004; Haidt, 2001). As such, moral judgments stem from multiple preconscious drives, which may either align intuitively or misalign to yield cognitive conflict and deliberation. Moral foundations theory is therefore a dual-process perspective, wherein some judgments are fast and intuitive and others are deliberative and slow.

Tamborini (2011) adopted this dual-process perspective specifically to label two potential responses to mediated narratives, labeling those responses enjoyment versus appreciation. This dual-process distinction applies to narratives similarly as in the real-life example above. Consider a film such as *Taken*, starring Liam Neeson. The story is about a former government operative, played by Neeson, whose daughter is abducted by human traffickers to sell as a sex slave. The film depicts Neeson using his black ops skills to hunt down the bad guys and find his daughter. In the end, Neeson violently kills several individuals associated with the trafficking and rescues his daughter. His daughter even meets her favorite pop singer at the end of the story. This dramatic depiction of justice restoration in the end should be associated with hedonic enjoyment, as little or no moral ambiguity is present to elicit conflicting thoughts about whether the story ending was good. By contrast, consider a film such as *Schindler’s List*, also starring Neeson. The story is about a German businessman, played by Neeson, who staffs his factories with Jewish workers during World War II, protecting them from otherwise being killed or sent to camps. The film depicts Schindler taking risks to save others, as well as having to reluctantly leave innocent people to die or suffer in order to save others. The film ends with many innocent people having died, Schindler being chased by the Red Army, and ashamed he did not save even more lives. This depiction is unsettling and elicits explicit deliberation over whether the protagonist made the correct decisions along the way. Tamborini (2011, 2013) emphasizes that one way to distinguish these two narrative forms is via the dual-process perspective above. Note that appreciation is slower and requires more cognitive effort, whereas enjoyment is fast and intuitive. Since audiences are known to avoid cognitive dissonance (Festinger, 1957; Zillmann, 1988), it might be expected that they will consume films with moral ambiguity less frequently since those narratives are more difficult to process.

Other researchers, with similar understandings of enjoyment and appreciation, have shown that narrative forms eliciting these two responses diverge in terms their functional value for audiences. Specifically, Oliver et al. (2014) emphasize that the features of narratives that drive greater pleasure or consumption are not the same features as those that drive greater perceived value:

Indeed, the phrase ‘guilty pleasure’ to refer to many types of entertainment offerings seems to capture the feelings that result from engaging in activities that are perceived as less important or intrinsically valuable than other activities that are experienced as more intellectually challenging, engaging, or emotionally relevant. (p. 855)

This comment aligns well with the manner in which moral ambiguity in narratives elicits effortful deliberation and why audiences may avoid such experiences. Although audiences may appreciate cognitive challenges more, there will be a tendency to consume them less than narratives that are easier to cognitively process. We propose that linguistic indicators of cognitively challenging film content should show a matching pattern such that they will be associated with lower consumption but higher ratings.

A great deal of literature focuses on the functional value of effortful moral reasoning on individuals and society (Kohlberg, 1981; Piaget, 1965; Schiller, 1911), which echoes an idea congruent with that of Oliver et al. (2014) in that such moral deliberation leads to positive developmental outcomes. We agree with this notion, and further believe the linguistic content of films can provide insight into the concrete features and social-psychological contexts that differentiate the two narrative forms.

**Measuring Linguistic Content of Films**

To capture words associated with the divergent narrative forms above, we use two separate dictionaries (the 2015 linguistic inquiry word count dictionary [Pennebaker, Boyd, Jordan, & Blackburn, 2015] and the moral foundations dictionary [Graham, Haidt, & Nosek, 2009]) to take advantage of their different measurement properties. Specifically, whereas the LIWC dictionary contains *function* words (e.g., pronouns, prepositions, articles, conjunctions, and auxiliary verbs that can hint at linguistic styles, social contexts, and even psychological states; Chung & Pennebaker, 2007) the moral foundations dictionary contains *content* words (e.g., nouns and regular verbs that denote the topic of conversation).

The LIWC’s function words should be closely related to content depicting complex issues such as moral dilemmas. Broadly, function words rely on more complex social understandings between speakers and listeners than content words (Chung & Pennebaker, 2011). Additionally, the use of function words is related to how complex or precisely a person is thinking (Pennebaker & King, 1999), engagement in perspective taking, (Seih, Chung, & Pennebaker, 2011), and greater cognitive complexity in descriptions of social situations (Pennebaker & King, 1999; Pennebaker, Berry, & Richards, 2003). As such, the verbal expressions of moral ambiguity (e.g., a character or narrator describing a moral dilemma) should use function words more frequently, on average, than other linguistic content in film because moral ambiguity requires more nuanced and abstract language.

In the context of film narratives, the ability to understand character dialogue or narration using function words (e.g., “I can’t believe that he gave it to her”; Chung & Pennebaker, 2007) also requires an audience member to follow a conversational thread using past social knowledge to understand referents, and suggests understanding of the relationships between multiple actors. At the very least, higher proportions of function words like pronouns, prepositions, and conjunctions means there is more information audience members must follow to process the narrative dialogue. Beyond this association, function words should occur more frequently when films depict mitigating circumstances or moral complexity, since narratives are thought to be, at their core, tools for the promotion of moral norms (e.g., Weber, Popova, & Mangus, 2013). Television characters are known to overtly express moral dilemmas sometimes (Lewis & Mitchell, 2014). Greater use of function words in linguistic content should suggest greater explicit discussion of various, potentially conflicting, moral concerns. Thus, we expect this category to be associated with the type of content that elicits deliberative audience response.

If function words are indeed associated with more thought-provoking media fare, the use of function words in films should show patterns that match those in previous content analyses (AUTHOR; Grizzard et al., 2011; Oliver et al., 2014). Specifically, measures of viewership or consumption should be negatively related to the use of function words whereas measures of perceived value positively related to the use of function words. We therefore predict that the use of function words will be negatively associated with indicators of consumption (box-office gross and IMDb popularity; H1a) but positively associated with favorable appraisals (IMDb ratings; H1b).

We also seek to measure thematic issues related to these narrative forms using the moral foundations dictionary. The moral foundations dictionary was originally developed to compare sermons given at various liberal churches (e.g., Unitarian Universalist) versus conservative churches (e.g., Southern Baptist) in the United States (Graham, Haidt, & Nosek, 2009). The dictionary has since been employed in a variety of contexts, such as detecting implicit moral justifications in participants’ responses (Leidner & Castano, 2011), priming religious concepts (Harrison & McKay, 2013), as well as examining moral rhetoric in the *New York Times*’ coverage of stem cells (Clifford & Jerit, 2013). Our expectation that this dictionary will capture thematic salience is based on the topical words it contains. For example, the sub-dictionaries contain words such as ‘kill’ and ‘safety’ (care), ‘justice’ and ‘exclusion’ (fairness), ‘outsider’ and ‘betray’ (ingroup loyalty), ‘obey’ and ‘rebel’ (authority), and ‘chastity,’ ‘indecency,’ and ‘desecrate’ (purity). We expect films dealing with these themes would be more likely to mention such relevant words explicitly in dialogue or narration. These themes are representations of the foundations themselves, and so should be indicators of their salience.

It is unclear exactly how linguistic content from the moral foundations sub-dictionaries should map onto narrative forms eliciting intuitive versus controlled appraisal styles since they are thought to be representations of the intuitive foundations themselves. However, there is reason to believe such variation will be observed, as genres differ by thematic salience, and genres are associated with the diverging narrative forms discussed above (Oliver et al., 2014). We therefore ask, how do the moral-foundations in films’ linguistic content relate to viewership versus appraisal (RQ1)?

By examining linguistic content on a large scale, we attempt to provide a validity check for the word-count method’s use in film content as well as extend findings from past content analysis (Grizzard et al., 2011; Oliver et al., 2014; AUTHOR) to identify concrete narrative features associated with the two narrative forms discussed above. After presenting our study, we revisit these implications as well as discuss how our study contributes to recent theorizing in this area.

**Method**

**Data Collection**

We downloaded the full English-language subtitle corpus from OpenSubtitles.org, an open-access sharing platform of user-generated subtitles for television programs and films. We de-duplicated the corpus to find approximately 88 thousand unique subtitle files. We then matched this corpus to metadata (relevant data are listed below in measures section) from IMDb’s public FTP site. We also had a relational database from OpenSubtitles.org that contained limited metadata along with numerical IMDb identifiers. For this study, we restricted our analyses to films (we excluded television programming). We selected only films that were produced in the United States, and excluded films produced elsewhere or that listed multiple countries that happened to include the United States. This yielded *N* = 10,945 unique, English-language subtitle files containing a total of approximately 77 million target words. After matching with viewership and ratings data, *N* (number of films) ranged from 2,380 to 10,945 depending on the outcome variable. Before conducting word counts, timing and location information within the subtitle files (contained in brackets, used by the video-display application to cue when and where the subtitles should appear on screen) was removed so that the files contained only linguistic information.

**Measures**

**Morality salience.**

***Moral foundations***. We used the moral foundations dictionary (Graham, Haidt, & Nosek, 2009) to capture the emphasis of thematic content related to the moral foundations. The full dictionary is available at moralfoundations.org, and contains 324 words and word stems comprising 11 categories – a vice and virtue category for each foundation and a general morality category. For each film, we computed the proportion of words related to a foundation (vice or virtue) as well as a general morality category. Although the original method and dictionary were designed for use with LIWC software (Pennebaker, Boyd, Jordan, & Blackburn, 2015), this proprietary software was unable to process data of this size in a reasonable time period. Therefore, we wrote an algorithm (see [*INSERT LINK TO GITHUB CODE AND DATA FILE AFTER ANONYMOUS REVIEW*]) that first parsed the subtitle files into text-based histogram files that contained counts for each word, number of total words, and the frequency of each word per file. Then, the application used those parsed histogram files to conduct the final word counts.

***LIWC 2015****.* We employed the LIWC 2015 dictionary as well (Pennebaker et al., 2015). The dictionary contains around 6,400 words yielding 90 output variables. (Descriptions of this output can be found at liwc.wpengine.com.) We focus primarily on the function words contained in the dictionary. Because we wished to correlate output from the LIWC dictionary with that from the MFT dictionary, we removed MFT’s dictionary words from the LIWC dictionary. This resulted in the removal of 74 entries from the LIWC dictionary. Also, our histogram method excluded the use of multi-word phrases, and so we removed an additional 47 multi-word entries from the LIWC 2015 dictionary. Only four of these were considered function words—all from the verb sub-dictionary. The rest were from secondary categories (affect, emotion, focus on the present, etc.). Contractions (e.g., ‘they’ll’) and word stems (e.g., ‘among\*,’ ‘somebod\*’) are not multi-word phrases, and so they remained in the dictionary for our analyses.

**Film metadata.**

All metadata were obtained from IMDb’s public FTP sites or the OpenSubtitles database.

***Genre***. According to IMDb’s genre assignments, there were 23 genres represented in our sample of film subtitles. Most films were tagged with multiple genres. These were drama, *n* = 4683, comedy, *n* = 3940, romance, *n* = 1767, action, *n* = 1552, crime, *n* = 1559, thriller, *n* = 1478, adventure, *n* = 1173, horror, *n* = 1113, documentary, *n* = 914, family, *n* = 874, mystery, *n* = 653, animation, *n* = 646, short, *n* = 534, fantasy, *n* = 530, music, *n* = 451, biography, *n* = 416, western, *n* = 393, musical, *n* = 328, war, *n* = 275, history, *n* = 274, sport, *n* = 258, adult, *n* = 101, and news, *n* = 7. (Since the news genre had only seven data points, we omitted it from genre-level analyses in the results section.) Genre definitions are available on IMDb’s submission guidelines web page.

***Budget & gross***. IMDb’s budget data are “based on media reports and are often supplied by sources close to production.” They are thus estimates rather than exact amounts. The budget estimates are explicitly for a film’s “negative cost,” which excludes expenses such as promotion or distribution. With regard to film gross, there are similar limitations. We analyze film gross only for the United States (i.e., excluding worldwide gross). IMDb explains in their “business.list” database header that all gross data do not include video rentals, sales, or television rights and are limited to theatrical release. We collected both opening weekend and running-total box-office gross in order to contrast these different measures of viewership.

***Ratings & popularity***. IMDb allows for users to rate film quality on a 10-point scale, using a star system, with higher numbers reflecting greater quality. We used the mean rating for each film as a measure of audience appraisal and also used the number of users who rated a film as a measure for viewership. With regard to viewership, note that this variable should be more representative of consumption as it is the number of raters rather than the actual rating. This measure was also used in the content analysis by Oliver et al. (2014), who note that the more users who have rated a particular film, the greater the film’s viewership in terms of sheer audience size.

***Release year***. Film year was included in both the OpenSubtitles.com and IMDb meta-data. The earliest film in our sample was produced in 1900. As we downloaded the corpus in Nov. 2014, the most recent films in the sample were released in 2014. The mean year was 1987, and modal year was 2013 (*skew* = -.99), suggesting the vast majority of films in the database were from recent decades.

**Results**

**Viewership & Appraisals**

To test our hypotheses, we regressed budget, box office gross, IMDb viewership, and IMDb ratings onto the MFT sub-dictionaries as well as the LIWC’s function words. Note that budget was negatively related to the use of function words (see Tables 2 and 4 for zero-order correlations), and we used this as a control variable in Model 2 of the hierarchical regressions. We predict some financial indicators unadjusted for inflation, and so we adopt the method of Oliver et al. (2014), who controlled for film release year in order to compensate for inflation. We also control for film budget in level 2 in order to corroborate previous research (Grizzard et al., 2011), which has shown that some relationships between content and box office gross may disappear after controlling for budget. Degrees of freedom range from 2,367 to 4,624, and are therefore reported separately for each outcome in Table 3.

There are several patterns immediately apparent in the regressions. The first notable pattern is for LIWC’s function words. The ratio of function words in film subtitles negatively predicts both opening weekend and total box office gross, although seems unrelated to IMDb popularity. By contrast, function words were positively predictive of IMDb ratings. We interpret these results as supportive of H1a and H1b. We also broke the relationships for function words down by the most frequent genres in the sample to see whether this pattern between viewership and appraisals would hold within each genre as well (see Table 4). Within these genres, all measures of viewership are either negatively related to function words, or non-significant. By contrast, IMDb ratings are positively related to function words, or non-significant. Despite some interesting variation between the genres, the results support the first hypothesis. The sub-category of function words with the strongest relationships to viewership and appraisals was prepositions. Whereas the ratio of prepositions is negatively related to viewership levels on the zero order (*r*opening weekend = -.10, *p* < .001, *r* total box office= -.09, *p* < .001, *r*IMDb popularity = -.05, *p* < .001) the ratio is positively related to IMDb appraisals, *r*IMDb ratings = .15, *p* < .001.

Our research question asked about moral foundations themselves and their association with these film-success outcomes. Tables 2 and 3 show the care and fairness foundations were, similar to function words, directionally opposite for viewership versus appraisals, indicating the clearest pattern of the foundations. This suggests they may also be associated with the two narrative forms discussed above. Whereas care is positively associated with viewership, fairness is negatively associated with viewership (the opposite is true for IMDb ratings). Looking at the genre rankings across these categories (Table 1) corroborates this idea. Action films, thought to be a hedonic genre (Oliver et al., 2014), rank highly on care words across both vice and virtue categories. By contrast, history, documentary, and drama, thought to be more meaningful or thought-provoking fare (Oliver et al., 2014; Oliver & Bartsch, 2011), rank highly on fairness across both vice and virtue categories.

**Discussion**

Our study sought to extend a line of research on film content eliciting thoughtful deliberation or moral reasoning by examining function words and their relationships with measures of viewership and appraisals. By showing that function words were negatively associated to measures of viewership but positively to ratings, we extend similar past studies. Our study should also help future researchers to better discern this type of content by knowing concrete linguistic features associated with it.

The importance of identifying content-level features that serve as indicators of moral ambiguity is important for MIME-based research. Tamborini (2011, 2013) suggested conflict between moral intuitions in media narratives will influence audience values depending on which moral intuition is ultimately upheld or violated by the narrative resolution. For example, a narrative pitting social justice against traditional authority in a moral dilemma may resolve that dilemma by upholding fairness and violating authority in the end (consider a story about an unwanted arranged marriage). MIME representations suggest this would lead to a greater relative emphasis of fairness over authority for the audience over time. Additionally, recent research by AUTHORS shows that moral ambiguity (vs. clarity) primes audience members to report more politically liberal values. It is therefore important in the long term for researchers to be able to (a) identify where in narratives this conflict is depicted, (b) determine which specific moral intuitions are in conflict, (c) determine which specific moral intuition is ultimately upheld, violated, or left unsatisfied by the resolution, and (d) assess relationships between ambiguity in content and the moral values of target audiences. Our study helps to more reliably identify when moral ambiguity is depicted in narratives by identifying function words as indicators, and could therefore be helpful to future content analysts wanting to reliably detect such conflict or go further and identify specific moral intuitions made salient in those depictions or predict related outcomes.

With regard to past research, our findings complement those of Oliver et al. (2014), who showed divergent patterns of viewership versus ratings for audience gratifications associated with enjoyment versus appreciation. Specifically, Oliver et al. (2014) found that whereas critical acclaim was higher for dramatic films with dark, contemplative, or emotional themes, viewership was higher for the less contemplative action and adventure themes. It seems that the function words (especially prepositions) examined in our study mirrored this pattern. Moreover, care words mirrored their pattern for action and adventure themes. As such, our study replicates the patterns observed by Oliver et al. (2014) but also indicates a previously unidentified content feature (i.e., function words and thematic words related to care) that future researchers can use to detect and decipher relevant depictions in narrative media. Our findings also complement those of Grizzard et al. (2011), who showed these outcomes’ relationships with adherence to disposition theory. Grizzard et al. (2011) coded film summaries for virtuosity levels and reward/punishment of main characters, and computed scores (the disposition-theory vector; Weber et al., 2008) representing the overall degree to which films adhered to disposition theory (positive scores) or violated disposition theory (negative scores). They found adherence was positively associated with both budget and box-office gross. Adherence to a basic dispositional formula (good guy wins, bad guy loses) is generally associated with relatively un-thoughtful narratives. Anti-heroes or tragic endings violate the basic formula (Raney, 2004). When viewed in this light, it seems function words may be mirroring the pattern observed by Grizzard et al. (2011) as well since they were negatively associated with budget and measures of viewership.

Beyond complementing this previous research, our observations are important for understanding the consequences of the different ways media response behaves on the aggregate level. To integrate our study with recent theorizing, Tamborini’s (2011, 2013) model of intuitive morality and exemplars represents a link between audience appraisals (both automatic vs. controlled re-appraisal), and their downstream effect on aggregate selective exposure. The model’s micro-level links show that audiences will select future moral-foundation adhering media based on their past appraisals. Also, the most frequently upheld moral foundations in one’s media environment are represented as influencing that person’s pattern of moral-foundation emphasis. The model represents dominantly emphasized moral foundations influencing selection regardless appraisal type. That is, liking or appraisals are determined by the degree to which dominantly salient moral foundations are upheld even if others are violated. However, our content analysis and those cited above suggest the two narrative forms behave differently in the media system. That is, films associated with controlled re-appraisals are less popular in terms of consumption, even though they are valued more by audiences and critics. Such conditions might hamper the ability of thought-provoking narrative forms to ultimately impact audiences’ pattern of moral-foundation emphasis or their ability to impact future selective exposure. This leaves a gap for future researchers. Some studies have shown priming effects of narratives on moral-foundation emphasis (Eden et al., 2014), but none has manipulated whether narrative form or appraisal type moderates this effect.

**Limitations**

Our choice of method left us with several limitations we should acknowledge. These limitations may also provide an impetus for future research. First, since our word-count method cannot capture endorsement versus negation of the moral foundations, we are left with measures of the general salience of morality rather than a tool for capturing which moral domains are upheld or negated. This is an important concept for MIME research, as Tamborini (2011, 2013) states that the frequent upholding of moral domains in media should lead to greater emphasis of those domains by audiences.

This relates to another limitation of our word-count method, which is its inability to capture audience response. Although we use theory that describes audience response in our rationale, we cannot make conclusions about audience response since we examine only the linguistic content of films. This limitation is common to most content analyses, but we feel it is particularly relevant to our study as we strongly wish to integrate these findings with psychological understandings of audiences found in other studies by other entertainment scholars (e.g., Oliver et al., 2014; Tamborini, 2011, 2013).

Another limitation regards our avoidance of more sophisticated content-analytic techniques. There are alternatives to counting words, such as machine learning algorithms (e.g., naïve Bayes, support vector machines) that are currently being employed in text classification. We chose against these methods for two main reasons. First, they rely on training sets of data that are pre-labeled by human coders. As such, they suffer the same replication problems as traditional content analysis. There is also no guarantee such algorithms can be validated. Assuming human coders reach traditional agreement thresholds, the trained classifiers must also pass a validation check. Error is thus introduced at multiple levels. By contrast, the word count method is completely replicable due to its concreteness. Second, as these classifiers yield only categorical dependent variables, they cannot be used to assess continuous constructs on the individual-film level. We do see strong value in using machine-learning techniques in future content analysis, especially because they may uncover relevant, but previously unidentified content features. For example, using a naïve Bayes “bag of words” model, one could potentially identify words (or “n-grams” – groups of words) that indicate the presence or absence of moral dilemmas, specific moral foundations, perhaps even negation or endorsement of foundations. (The creation of the moral foundations dictionary was comparatively less systematic; see Graham, Haidt, & Nosek, 2009.) Although, as mentioned above, using supervised learning techniques would rely on the quality and size of a previously human-coded training set. We leave this to future research.

**Conclusion**

Our study adopted a lesser-used method in mass communication scholarship by counting words in films’ linguistic content. By linking words to genre, viewership, appraisals, and social-psychological contexts, we were able to triangulate some measurement properties of the word count method. Our study showed further support from recent findings regarding viewership and appraisal patterns for contemplative and emotional films (Oliver et al., 2014), and also extended this research by identifying function words as an indicator of thought-provoking content. Given the fact that our overall goals are to link psychological concepts with such film success outcomes, we hope this study is useful to both researchers and practitioners alike.

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| Table 1    *Mean differences in domain emphasis by genre. Positive numbers show over-representation and negative numbers under-representation* | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | Vice | | | | | | | | | | Virtue | | | | | | | | | |  | |
| *n* | Genre | | Care | | Fairness | | Authority | | Ingroup | | Purity | | Care | | Fairness | | Authority | | | Ingroup | Purity | | Gen. Morality | |
| 4683 | drama | | -.00030 | | +.00001 | | +.00004 | | +.00002 | | +.00013 | | -.00005 | | +.00001 | | +.00056 | | | +.00005 | +.00005 | | +.00031 | |
| 3940 | comedy | | -.00102 | | n.s. | | -.0001 | | -.00017 | | n.s. | | -.00034 | | n.s. | | -.00063 | | | -.00017 | -.00005 | | +.00048 | |
| 1767 | romance | | -.00096 | | n.s. | | -.00007 | | -.00011 | | -.00004 | | -.00030 | | n.s. | | -.00012 | | | -.00011 | -.00008 | | +.00047 | |
| 1559 | crime | | +.00036 | | n.s. | | -.00003 | | -.00009 | | -.00008 | | +.00014 | | n.s. | | -.00047 | | | -.00019 | n.s. | | n.s. | |
| 1552 | action | | +.00204 | | -.00001 | | +.00017 | | +.00031 | | -.00020 | | +.00064 | | -.00002 | | n.s. | | | -.00001 | -.00010 | | -.00022 | |
| 1478 | thriller | | +.00044 | | -.00002 | | -.00005 | | -.00002 | | -.00006 | | +.00019 | | -.00005 | | -.00053 | | | -.00017 | -.00007 | | -.00022 | |
| 1173 | adventure | | +.00083 | | -.00001 | | +.00014 | | +.00023 | | -.00019 | | +.00045 | | n.s. | | +.00039 | | | -.00014 | -.00005 | | -.00021 | |
| 1113 | horror | | +.00075 | | -.00003 | | -.00011 | | -.00014 | | +.00016 | | n.s. | | -.00014 | | -.00059 | | | -.00032 | n.s. | | -.00027 | |
| 914 | documentary | | n.s. | | +.00003 | | n.s. | | +.00008 | | -.00022 | | -.0001 | | +.00011 | | -.00023 | | | +.00075 | +.00006 | | -.00126 | |
| 874 | family | | -.00091 | | n.s. | | -.00006 | | -.00014 | | -.00019 | | -.00021 | | n.s. | | -.00017 | | | -.00026 | -.00012 | | n.s. | |
| 653 | mystery | | +.00019 | | -.00001 | | -.00008 | | -.00010 | | -.00006 | | -.00011 | | -.00005 | | -.00045 | | | -.00027 | n.s. | | -.00040 | |
| 646 | animation | | n.s. | | n.s. | | n.s. | | n.s. | | -.00013 | | n.s. | | n.s. | | -.00053 | | | -.00028 | -.00016 | | -.00043 | |
| 534 | short | | n.s. | | n.s. | | n.s. | | n.s. | | n.s. | | n.s. | | n.s. | | -.00035 | | | +.00024 | +.00018 | | -.00080 | |
| 530 | fantasy | | +.00055 | | n.s. | | +.00004 | | +.00004 | | n.s. | | +.00020 | | n.a. | | +.00016 | | | -.00019 | n.s. | | n.s. | |
| 451 | music | | -.00085 | | n.s. | | -.00004 | | -.00010 | | -.00010 | | -.00034 | | n.s. | | -.00087 | | | n.s. | -.00007 | | -.00023 | |
| 416 | biography | | n.s. | | +.00002 | | +.00013 | | +.00014 | | n.s. | | +.00007 | | +.00010 | | +.00074 | | | +.00036 | +.00017 | | -.00018 | |
| 393 | western | | +.00146 | | -.00001 | | n.s. | | n.s. | | -.00013 | | +.00027 | | +.00014 | | n.s. | | | -.00021 | n.s. | | +.00040 | |
| 328 | musical | | -.001 | | n.s. | | -.00003 | | n.s. | | -.00010 | | -.00032 | | n.s. | | +.00031 | | | n.s. | n.s. | | n.s. | |
| 275 | war | | +.00237 | | n.s. | | +.00028 | | +.00066 | | -.00011 | | +.00054 | | n.s. | | +.00151 | | | +.00070 | n.s. | | -.00019 | |
| 274 | history | | +.00148 | | +.00004 | | +.0005 | | +.00068 | | n.s. | | +.00076 | | +.00014 | | +.00224 | | | +.00077 | +.00042 | | -.00067 | |
| 258 | sport | | n.s. | | n.s. | | -.00012 | | -.00016 | | -.00029 | | -.00019 | | n.s. | | -.00089 | | | n.s. | -.00016 | | +.00059 | |
| 101 | adult | | -.00055 | | -.00002 | | -.00010 | | -.00014 | | +.00024 | | n.s. | | n.s. | | -.00051 | | | -.00026 | n.s. | | n.s. | |
| *Note*. The notation “n.s.” represents no significant difference (*p* > .05) detected between films in that genre versus films not from that genre. | | | | | | | | | | | | | | | | | | | | | | | | |
| Table 2 | |  | |  | |  | |  | |  | |  | |  | |  | |  |  | | |  | |  | |
| *Zero-order correlations between word-count categories with budget and film-success outcomes* | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | LIWC | | MFT Vice | | | | | | | | | | MFT Virtue | | | | | | | | | |  | |
|  | | Function | | Care | | Fair | | Ingroup | | Authority | | Purity | | Care | | Fair | | Ingroup | Authority | | | Purity | | General | |
| Budget | | **-.08** | | **.05** | | **-.02** | | **.08** | | .00 | | **-.09** | | **.10** | | .00 | | -.01 | **.04** | | | **-.06** | | -.01 | |
| OW Gross | | **-.10** | | **.09** | | **-.04** | | **.08** | | -.01 | | **-.06** | | **.12** | | -.03 | | -.02 | .02 | | | **-.04** | | -.03 | |
| Total Gross | | **-.08** | | **.04** | | **-.03** | | **.04** | | .00 | | **-.06** | | **.08** | | -.02 | | -.03 | .02 | | | **-.06** | | .00 | |
| IMDb viewers | | -.01 | | **.04** | | -.02 | | .00 | | .00 | | -.01 | | **.03** | | -.01 | | -.02 | .00 | | | .00 | | .01 | |
| IMDb ratings | | .00 | | **-.04** | | **.04** | | .02 | | .00 | | **-.05** | | **-.06** | | **.08** | | **.05** | **.06** | | | -.01 | | .01 | |

*Note*. Boldface coefficients are significant at *p* < .01.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table 3 |  |  |  |  |  |  |  |  |  |
| *Standardized regression coefficients with word-count categories (model 1) and film budget (model 2) predicting film success outcomes* | | | | | | | | | |
|  |  | *df* = 2,367 | | *df* = 3,158 | | *df* = 4,624 | | *df* = 4,624 | |
|  |  | Opening Weekend | | Total Box Office | | IMDb popularity | | IMDb ratings | |
|  |  | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| *LIWC* | Function | **-.11** | **-.05** | **-.09** | **-.03** | -.03 | .01 | **.03** | **.05** |
| *MFT Vice* | Care | **.09** | .02 | .03 | -.02 | **.05** | **.04** | **-.03** | **-.03** |
|  | Fair | -.03 | -.01 | -.02 | .00 | -.01 | .00 | **.05** | **.05** |
|  | Ingroup | **.06** | -.01 | .01 | **-.05** | .00 | **-.03** | -.02 | **-.03** |
|  | Authority | **-.11** | -.03 | **-.05** | .01 | -.02 | .00 | .03 | **.04** |
|  | Purity | -.04 | .01 | **-.05** | .00 | **-.03** | .01 | **-.05** | **-.04** |
| *MFT Virtue* | Care | **.11** | .02 | **.09** | .02 | .03 | -.01 | **-.05** | **-.07** |
|  | Fair | -.01 | -.03 | -.01 | -.02 | .02 | .01 | **.05** | **.05** |
|  | Ingroup | -.03 | .01 | -.02 | .01 | **-.04** | -.02 | .02 | **.03** |
|  | Authority | .02 | **-.05** | **.05** | -.01 | .03 | -.01 | **.04** | .03 |
|  | Purity | **-.07** | .01 | **-.08** | -.01 | -.03 | .01 | .00 | .01 |
|  | *Gen. Moral* | .00 | .00 | .02 | .02 | .00 | -.02 | .01 | .00 |
|  | *Year* | **.22** | **.05** | **.15** | **-.08** | **.13** | -.01 | **-.37** | **-.43** |
|  | *Budget* |  | **.71** |  | **.67** |  | **.48** |  | **.18** |
|  | Adj. *R*2 | .09 | .52 | .04 | .42 | .02 | .23 | .16 | .19 |
|  | *p <* | .001 | .001 | .001 | .001 | .001 | .001 | .001 | .001 |

*Note*. Coefficients in boldface are significant at *p* < .05.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Table 4 |  |  |  |  |  |
| *Within genre zero-order correlations between function-word ratios and budget as well as film-success outcomes.* | | | | | |
|
|  | Budget | Opening Weekend | Total Box Office | IMDb popularity | IMDb ratings |
| Drama | **-.07** | **-.15** | **-.12** | **-.05** | **.05** |
| Comedy | **-.08** | **-.09** | **-.07** | .00 | -.01 |
| Romance | -.06 | -.06 | **-.09** | **-.07** | **.09** |
| Crime | **-.12** | **-.13** | **-.12** | -.05 | **.07** |
| Action | -.05 | -.02 | -.01 | .00 | -.03 |
| Thriller | **-.11** | -.04 | -.06 | -.05 | .04 |
| *Note*. Boldface coefficients are significant at *p* < .01. | | | | | |