

# Analyzing Gender Bias within Narrative Tropes

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## Abstract

Popular media reflects and reinforces societal biases through the use of *tropes*, which are narrative elements, such as archetypal characters and plot arcs, that occur frequently across media. In this paper, we specifically investigate *gender bias* within a large collection of tropes. To enable our study, we crawl [tvtropes.org](http://tvtropes.org), an online user-created repository that contains 30K tropes associated with 1.9M examples of their occurrences across film, television, and literature. We automatically score the “genderedness” of each trope in our TVTROPES dataset, which enables an analysis of (1) highly-gendered topics within tropes, (2) the relationship between gender bias and popular reception, and (3) how the gender of a work’s creator correlates with the types of tropes that they use.

## 1 Introduction

Tropes are commonly-occurring narrative patterns within popular media. For example, the **evil genius** trope occurs widely across literature (Lord Voldemort in *Harry Potter*), film (Hannibal Lecter in *The Silence of the Lambs*), and television (Tywin Lannister in *Game of Thrones*). Unfortunately, many tropes exhibit gender bias<sup>1</sup>, either explicitly through stereotypical generalizations in their definitions, or implicitly through biased representation in their usage that exhibits such stereotypes. Movies, TV shows, and books with stereotypically gendered tropes and biased representation reify and reinforce gender stereotypes in society (Rowe, 2011; Gupta, 2008; Leonard, 2006). While **evil genius** is not an

explicitly gendered trope (as opposed to, for example, **women are wiser**), the online [tvtropes.org](http://tvtropes.org) repository contains 108 male and only 15 female instances of **evil genius** across film, TV, and literature.

To quantitatively analyze gender bias within tropes, we collect TVTROPES, a large-scale dataset that contains 1.9M examples of 30K tropes in various forms of media. We augment our dataset with metadata from [IMDb](http://IMDb) (year created, genre, rating of the film/show) and [Goodreads](http://Goodreads) (author, characters, gender of the author), which enable the exploration of how trope usage differs across contexts.

Using our dataset, we develop a simple method based on counting pronouns and gendered terms to compute a *genderedness score* for each trope. Our computational analysis of tropes and their genderedness reveals the following:

- **Genre impacts genderedness:** Media related to sports, war, and science fiction rely heavily on male-dominated tropes, while romance, horror, and musicals lean female.
- **Male-leaning tropes exhibit more topical diversity:** Using LDA, we show that male-leaning tropes exhibit higher topic diversity (e.g., science, religion, money) than female tropes, which contain fewer distinct topics (often related to sexuality and maternalism).
- **Low-rated movies contain more gendered tropes:** Examining the most informative features of a classifier trained to predict IMDb ratings for a given movie reveals that gendered tropes are strong predictors of low ratings.
- **Female authors use more diverse gendered tropes than male authors:** Using author gender metadata from Goodreads, we show that female authors incorporate a more diverse set of female-leaning tropes into their works.

★ Authors contributed equally.

<sup>1</sup>Our work explores gender bias across two identities: cis-gender male and female. The lack of reliable lexicons limits our ability to explore bias across other gender identities, which should be a priority for future work.

	Titles (w/ metadata)		Tropes	Examples
<b>Literature</b>	15,495	(5,208)	27,229	679,618
<b>Film</b>	17,019	(8,816)	27,450	751,594
<b>TV</b>	7,921	(4,192)	27,134	488,632
<b>Total</b>	40,435	(18,216)	29,457	1,919,844

Table 1: Statistics of TVTROPES.

Our dataset and experiments complement existing social science literature that qualitatively explore gender bias in media (Lauzen, 2019). We publicly release TVTROPES<sup>2</sup> to facilitate future research that computationally analyzes bias in media.

## 2 Collecting the TVTROPES dataset

We crawl [TVTropes.org](http://TVTropes.org) to collect a large-scale dataset of 30K tropes and 1.9M examples of their occurrences across 40K works of film, television, and literature. We then connect our data to metadata from IMDb and Goodreads to augment our dataset and enable analysis of gender bias.

### 2.1 Collecting a dataset of tropes

Each trope on the website contains a *description* as well as a set of *examples* of the trope in different forms of media. Descriptions normally consist of multiple paragraphs (277 tokens on average), while examples are shorter (63 tokens on average). We only consider titles from film, TV, and literature, excluding other forms of media, such as web comics and video games. We focus on the former because we can pair many titles with their IMDb and Goodreads metadata. Table 1 contains statistics of the TVTROPES dataset.

### 2.2 Augmenting TVTROPES with metadata

We attempt to match<sup>3</sup> each film and television listed in our dataset with publicly-available IMDb metadata, which includes year of release, genre, director and crew members, and average rating. Similarly, we match our literature examples with metadata scraped from Goodreads, which includes author names, character lists, and book summaries. We additionally manually annotate author gender from Goodreads author pages. The second column of Table 1 shows how many titles were successfully matched with metadata through this process.

<sup>2</sup><http://github.com/dhruvilgala/tvtropes>

<sup>3</sup>We match by both the work’s title and its year of release to avoid duplicates.

## 2.3 Who contributes to TVTROPES?

One limitation of any analysis of social bias on TVTROPES is that the website may not be representative of the true distribution of tropes within media. There is a confounding *selection bias*—the media in TVTROPES is selected by the users who maintain the [tvtropes.org](http://tvtropes.org) resource. To better understand the demographics of contributing users, we scrape the pages of the 15K contributors, many of which contain unstructured biography sections. We search for biographies that contain tokens related to gender and age, and then we manually extract the reported gender and age for a sample of 256 contributors.<sup>4</sup> The median age of these contributors is 20, while 64% of them are male, 33% female and 3% bi-gender, genderfluid, non-binary, trans, or agender. We leave exploration of whether user-reported gender correlates with properties of contributed tropes to future work.

## 3 Measuring trope genderedness

We limit our analysis to male and female genders, though we are keenly interested in examining the correlations of other genders with trope use. We devise a simple score for trope genderedness that relies on matching tokens to male and female lexicons<sup>5</sup> used in prior work (Bolukbasi et al., 2016; Zhao et al., 2018) and include gendered pronouns, possessives (*his*, *her*), occupations (*actor*, *actress*), and other gendered terms. We validate the effectiveness of the lexicon in capturing genderedness by annotating 150 random examples of trope occurrences as male (86), female (23), or N/A (41). N/A represents examples that do not capture any aspect of gender. We then use the lexicon to classify each example as male (precision = 0.85, recall = 0.86, and F1 score = 0.86) or female (precision = 0.72, recall = 0.78, and F1 score = 0.75).

To measure genderedness, for each trope  $i$ , we concatenate the trope’s description with all of the trope’s examples to form a document  $X_i$ . Next, we tokenize, preprocess, and lemmatize  $X_i$  using NLTK (Loper and Bird, 2002). We then compute the number of tokens in  $X_i$  that match the male lexicon,  $m(X_i)$ , and the female lexicon,  $f(X_i)$ . We also compute  $m(\text{TVTROPES})$  and  $f(\text{TVTROPES})$ , the total number of matches for each gender across

<sup>4</sup>We note that some demographics may be more inclined to report age and gender information than others.

<sup>5</sup>The gender-balanced lexicon is obtained from Zhao et al. (2018) and comprises 222 male-female word pairs.

Male Tropes	$g$	Female Tropes	$g$
Motivated by Fear	-1.8	Ms. Fanservice	3.4
Robot War	-1.6	Socialite	3.1
Cure for Cancer	-1.5	Damsel in Distress	2.7
Evil Genius	-1.3	Hot Scientist	2.2
Grand Finale	-1.2	Ditzy Secretary	2.0

Table 2: Instances of highly-gendered tropes.

all trope documents in the corpus. The *raw genderedness score* of trope  $i$  is the ratio  $d_i =$

$$\underbrace{\frac{f(X_i)}{f(X_i) + m(X_i)}}_{r_i} / \underbrace{\frac{f(\text{TVTROPES})}{f(\text{TVTROPES}) + m(\text{TVTROPES})}}_{r_{\text{TVTROPES}}}.$$

This score is a trope’s proportion of female tokens among gendered tokens ( $r_i$ ), normalized by the global ratio in the corpus ( $r_{\text{TVTROPES}}=0.32$ ). If  $d_i$  is high, trope  $i$  contains a larger-than-usual proportion of female words.

We finally calculate the *genderedness score*  $g_i$  as  $d_i$ ’s normalized  $z$ -score.<sup>6</sup> This results in scores from  $-1.84$  (male-dominated) to  $4.02$  (female-dominated). For our analyses, we consider tropes with genderedness scores outside of  $[-1, 1]$  (one standard deviation) to be highly gendered (see Table 2 for examples).

While similar to methods used in prior work (García et al., 2014), our genderedness score is limited by its lexicon and susceptible to gender generalization and explicit marking (Hitti et al., 2019). We leave exploration of more nuanced methods of capturing trope genderedness (Ananya et al., 2019) to future work.

## 4 Analyzing gender bias in TVTROPES

Having collected TVTROPES and linked each trope with metadata and genderedness scores, we now turn to characterizing how gender bias manifests itself in the data. We explore (1) the effects of genre on genderedness, (2) what kinds of topics are used in highly-gendered tropes, (3) what tropes contribute most to IMDb ratings, and (4) what types of tropes are used more commonly by authors of one gender than another.

### 4.1 Genderedness across genre

We can examine how genderedness varies by genre. Given the set of all movies and TV shows in TVTROPES that belong to a particular genre, we

<sup>6</sup> $g_i \approx 0$  when  $r_i = r_{\text{TVTROPES}}$

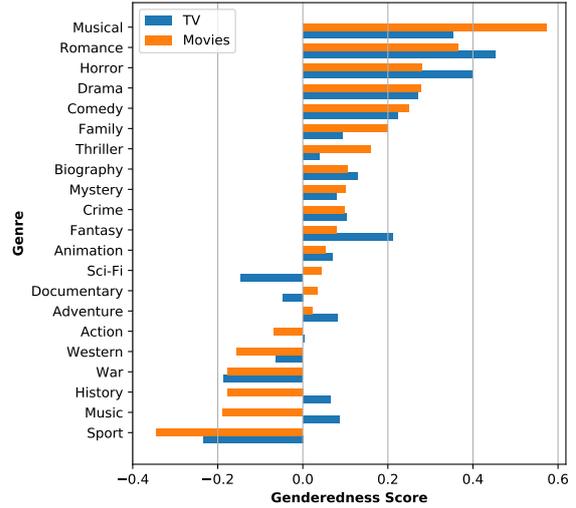


Figure 1: Genderedness across film and TV genres.

extract the set of all tropes used in these works. Next, we compute the average genderedness score of all of these tropes. Figure 1 shows that media about sports, war, and science fiction contain more male-dominated tropes, while musicals, horror, and romance shows are heavily oriented towards female tropes, which is corroborated by social science literature (Lauzen, 2019).

### 4.2 Topics in highly-gendered tropes

To find common topics in highly-gendered male or female tropes, we run latent Dirichlet analysis (Blei et al., 2003) on a subset of highly-gendered trope descriptions and examples<sup>7</sup> with 75 topics. We filter out tropes whose combined descriptions and examples (i.e.,  $X_i$ ) have fewer than 1K tokens, and then we further limit our training data to a balanced subset of the 3,000 most male and female-leaning tropes using our genderedness score. After training, we compute a gender ratio for every *topic*: given a topic  $t$ , we identify the set of all tropes for which  $t$  is the most probable topic, and then we compute the ratio of female-leaning to male-leaning tropes within this set.

We observe that 45 of the topics are skewed towards male tropes, while 30 of them favor female tropes, suggesting that male-leaning tropes cover a larger, more diverse set of topics than female-leaning tropes. Table 3 contains specific examples of the most gendered male and female topics. This experiment, in addition to a qualitative inspection of the topics, reveals that female topics

<sup>7</sup>We use Gensim’s LDA library (Řehůřek and Sojka, 2010).

	Topics (Most salient terms)
Male	ship earth planet technology system build weapon destroy alien
	super strong strength survive slow damage speed hulk punch armor
	god jesus religion church worship bible believe angel heaven belief
	skill rule smart training problem student ability level teach genius
Female	money rich gold steal company city sell business criminal wealthy
	relationship married marry wife marriage together husband wedding
	beautiful blonde attractive beauty describe tall brunette eyes ugly
	naked sexy fanservice shower nude cover strip pool bikini shirt
	parent baby daughter pregnant birth kid die pregnancy raise adult
	food drink eating cook taste weight drinking chocolate wine

Table 3: Topic assignments in highly-gendered tropes.

(maternalism, appearance, and sexuality) are less diverse than male topics (science, religion, war, and money). Topics in highly-gendered tropes capture all three dimensions of sexism proposed by Glick and Fiske (1996) – female topics about motherhood and pregnancy display gender differentiation, topics about appearance and nudity can be attributed to heterosexuality, while male topics about money and strength capture paternalism. The bias captured by these topics, although unsurprising given previous work (Bolukbasi et al., 2016), serves as a sanity check for our metric and provides further evidence of the limited diversity in female roles (Lauzen, 2019).

### 4.3 Identifying implicitly gendered tropes

We identify *implicitly gendered tropes* (Glick and Fiske, 1996)—tropes that are not defined by gender but nevertheless have high genderedness scores—by identifying a subset of 3500 highly-gendered tropes whose titles do not contain gendered tokens.<sup>8</sup> A qualitative analysis reveals that tropes containing the word “genius” (**impossible genius**, **gibbering genius**, **evil genius**) and “boss” (**beleaguered boss**, **stupid boss**) lean heavily male. There are interesting gender divergences within a high-level topic: within “evil” tropes, male-leaning tropes are diverse (**necessarily evil**, **evil corporation**, **evil army**), while female tropes focus on sex (**sex is evil**, **evil eyeshadow**, **evil is sexy**).

### 4.4 Using tropes to predict ratings

Are gendered tropes predictive of media popularity? We consider three roughly equal-sized bins of IMDb ratings (Low, Medium, and High).<sup>9</sup> For

<sup>8</sup>This process contains noise due to our small lexicon: a few explicitly gendered, often problematic tropes such as **absolute cleavage** are not filtered out.

<sup>9</sup>Low: (0-6.7], Medium: (6.7-7.7], High: (7.7-10]

High Rated		Low Rated	
Trope	$g$	Trope	$g$
<b>Edutainment Show</b>	1.2	<b>Alpha Bitch</b>	2.7
<b>Cooking Stories</b>	1.0	<b>Sexy Backless Outfit</b>	2.6
<b>British Brevity</b>	-0.9	<b>Fanservice</b>	1.9
<b>Wedding Smashers</b>	0.8	<b>Shower Scene</b>	1.4
<b>Just Following Orders</b>	-0.7	<b>Sword and Sandal</b>	-1.0

Table 4: Gendered tropes predictive of IMDb rating.

each IMDb-matched title in TVTROPES, we construct a binary vector  $z \in \{0, 1\}^T$ , where  $T$  is the number of unique tropes in our dataset.<sup>10</sup> We set  $z_i$  to 1 if trope  $i$  occurs in the movie, and 0 otherwise. Tropes are predictive of ratings: a logistic regression classifier<sup>11</sup> achieves 55% test accuracy with this method, well over the majority class baseline of 36%. Table 4 contains the most predictive gendered tropes for each class; interestingly, low-rated titles have a much higher average *absolute* genderedness score (0.73) than high-rated ones (0.49), providing interesting contrast to the opposing conclusions drawn by Boyle (2014). While IMDb ratings offer a great place to start in correlating public perception with genderedness in tropes, we may be double-dipping into the same pool of internet movie reviewers as TVTROPES. We leave further exploration of correlating gendered tropes with box office results, budgets, awards, etc. for future work.

### 4.5 Predicting author gender from tropes

We predict the author gender<sup>12</sup> by training a classifier for 2521 Goodreads authors based on a binary feature vector encoding the presence or absence of tropes in their books. We achieve an accuracy of 71% on our test set (majority baseline is 64%). Interestingly, the top 50 tropes most predictive of male authors have an average genderedness of 0.04, while those most correlated with female authors have an average of 0.89, indicating that books by female authors contain more female-leaning tropes. Eighteen female-leaning tropes ( $g_i > 1$ ), varying in scope from the non-traditional **feminist fantasy** to the more stereotypical **hair of gold heart of gold**, are predictive of female authors. In contrast, only

<sup>10</sup>We consider titles and tropes with 10+ examples.

<sup>11</sup>We implement the classifier in scikit-learn (Pedregosa et al., 2011) with L-BFGS solver, L2 regularization, inverse regularization strength C=1.0 and an 80-20 train-test split.

<sup>12</sup>We annotate the author gender label by hand, to prevent misgendering based on automated detection methods, and we would also like to further this research by expanding our Goodreads scrape to include non-binary authors.

Male Author		Female Author	
Trope	<i>g</i>	Trope	<i>g</i>
Undressing the Unconscious	1.3	Cool Old Lady	2.7
First Girl Wins	1.3	Plucky Girl	2.5
Did Not Get the Girl	0.9	Feminist Fantasy	2.2
God is Evil	-0.8	Young Adult Literature	1.7
Retired Badass	-0.8	Extremely Protective Child	1.2

Table 5: Gendered tropes predictive of author gender.

two such character-driven female-dominated tropes are predictive of male authors; the stereotypical **undressing the unconscious** and **first girl wins**; see Table 5 for more. Furthermore, out of 115K examples of tropes in female-authored books, 17K are highly female, while just 2.2K are male-dominated. Since many of these gendered tropes are character-driven, this implies wider female representation in such gendered instances, previously shown in Scottish crime fiction (Hill, 2017). Overall, female authors frequently use both stereotypical and non-stereotypical female-oriented tropes, while male authors limit themselves to more stereotypical kinds. However, it is important to note the double selection bias at play in both selecting which books are actually published, as well as which published books are reviewed on Goodreads. While there are valid ethical concerns with a task that attempts to predict gender, this task only analyzes the tropes most predictive of author gender, and the classifier is not used to do inference on unlabelled data or as a way to identify an individual’s gender.

## 5 Related Work

Our work builds on computational research analyzing gender bias. Methods to measure gender bias include using contextual cues to develop probabilistic estimates (Ananya et al., 2019), and using gender directions in word embedding spaces (Bolukbasi et al., 2016). Other work engages directly with `tvtropes.org`: Kiesel and Grimnes (2010) build a wrapper for the website, but perform no analysis of its content. García-Ortega et al. (2018) create PicTropes: a limited dataset of 5,925 films from the website. Bamman et al. (2013) collect a set of 72 character-based tropes, which they then use to evaluate induced character personas, and Lee et al. (2019) use data crawled from the website to explore different sexism dimensions within TV and film.

Analyzing bias through tropes is a popular area of research within social science. Hansen (2018) focus in on the titular princess character in the video game *The Legend of Zelda* as an example of the

Damsel in Distress trope. Lacroix (2011) study the development and representation in popular culture of the Casino Indian and Ignoble Savage tropes.

The usage of biased tropes is often attributed to the lack of equal representation both on and off the screen. Geena Davis Inclusion Quotient (Google, 2017) quantifies the speaking time and importance of characters in films, and finds that male characters have nearly twice the presence of female characters in award-winning films. In contrast, our analysis looks specifically at tropes, which may not correlate directly with speaking time. Lauzen (2019) provides valuable insight into representation among film writers, directors, crew members, etc. Perkins and Schreiber (2019) study an ongoing increase in the representation of women in independent productions on television, many of which focus on feminist content.

## 6 Future Work

We believe that the TVTROPES dataset can be used to further research in a variety of areas. We envision setting up a task involving trope detection from raw movie scripts or books; the resulting classifier, beyond being useful for analysis, could also be used by media creators to foster better representation during the writing process. There is also the possibility of using the large number of examples we collect in order to generate augmented training data or adversarial data for tasks such as coreference resolution in a gendered context (Rudinger et al., 2018). The expansion of our genderedness metric to include non-binary gender identities, which in turn would involve creating similar lexicons as we use, is an important area for further exploration.

It would also be useful to gain further understanding of the multiple online communities that contribute information about popular culture; for example, an analysis of possible overlap in contributors to TVTROPES and IMDb could better account for sampling bias when analyzing these datasets.

## 7 Acknowledgements

We would like to thank Jesse Thomason for his valuable advice.

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