

Predicting Bechdel Test Results through Statistical Modeling

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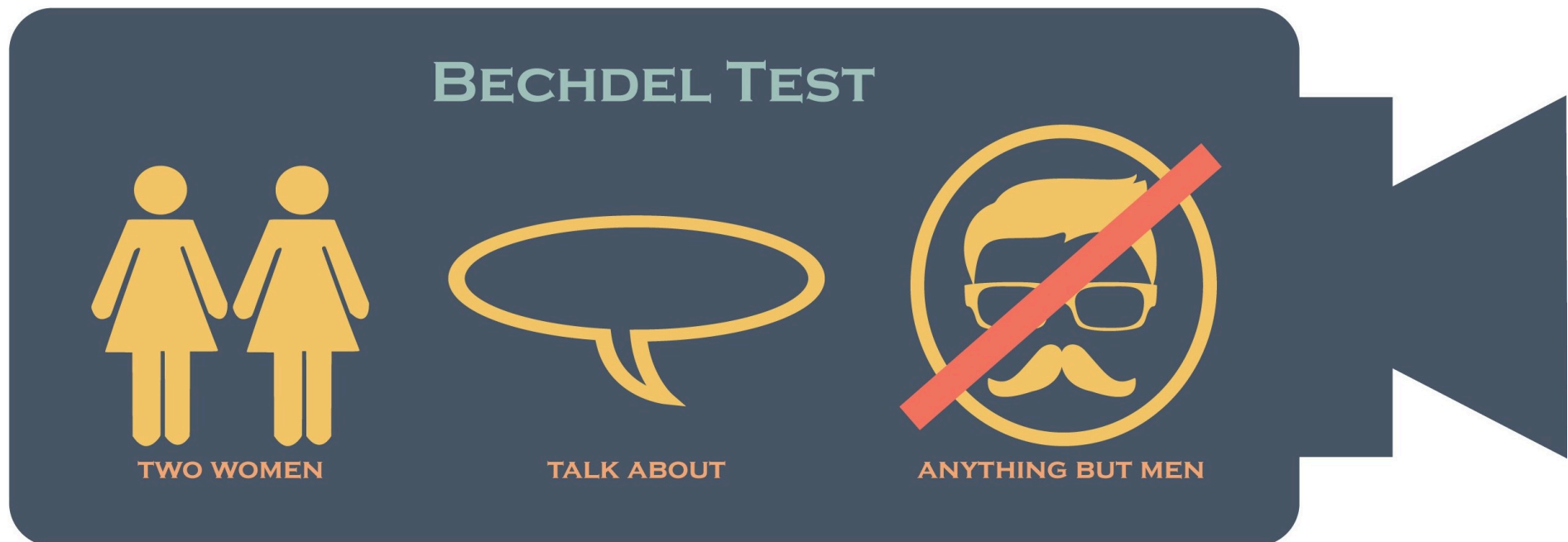


Abstract

- Logistic regression used to model **release year** and **genres**
- Rating analysis examines **budget**, **IMDb user ratings**, and **Metascore** ratings across time
- Findings show more recent movies in the *Comedy* or *Romance* genre have **higher predicted probability** of passing compared to other genres
 - Higher** critic ratings and **lower** user ratings = more likely to pass

What is the Bechdel Test?

- Created by Alison Bechdel in 1986
- Originally a comic strip
- Used to analyze the presence of women in movies [1]



Movie must contain **two named women** who have a **conversation** that is **NOT** about a *man*.

Flaws of the Bechdel Test

- Too simple requirements
- Disregards which kinds of women have dialogue [2]

Data

- Final data set contains **10,178** movies - ranging from **1874** to **2023**

Table 1: IMDb Data

Title	IMDb ID	Year	Genres
Star Wars	76759	1977	Action,Adventure,Fantasy
Grown Ups	1375670	2010	Comedy
Bullet Train	12593682	2022	Action,Comedy,Thriller

Data Source: IMDb Non-Commercial Datasets

Table 2: API Data

Title	IMDb ID	Year	Bechdel Rating
Star Wars	76759	1977	Fail
Grown Ups	1375670	2010	Pass
Bullet Train	12593682	2022	Fail

Data Source: Bechdel Test Movie List (bechdeltest.com)

Rating Analysis

$$\text{logit}(\pi) = \beta_0 + \beta_1 \cdot \text{Budget} + \beta_2 \cdot \text{Year} + \beta_3 \cdot \text{IMDb Rating} + \beta_4 \cdot \text{Metascore}$$

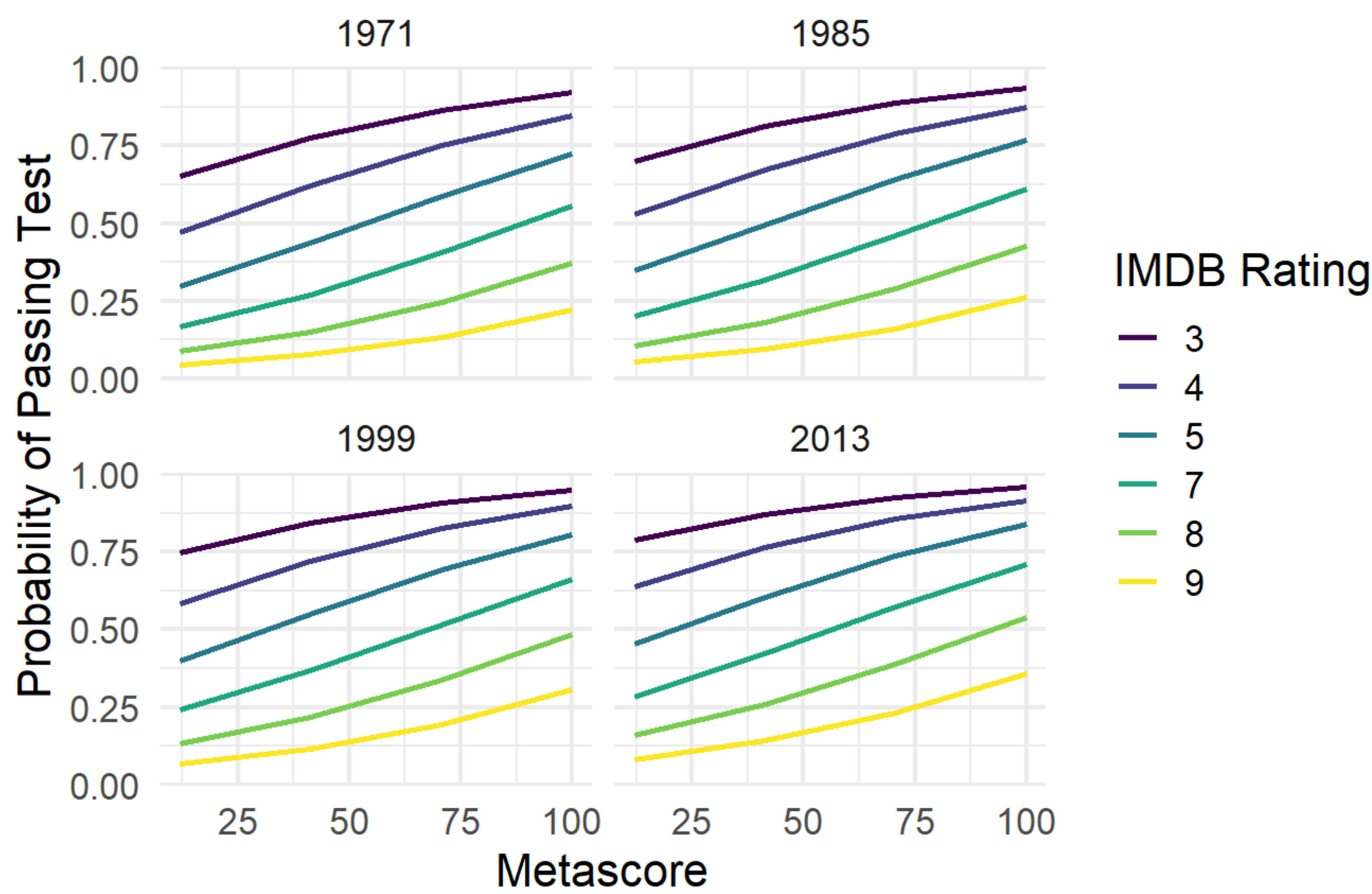
- π = probability of passing the test

- logit = log odds of passing the test

- IMDb Rating = **User** ratings

- Metascore = **Critic** ratings

Ratings and Budget Over Time



Data Source: TidyTuesday social data project (Github)

Interpretation

Predicted probability of a movie **PASSING increases** for:

- Movies with **lower budgets**
- Movies with **lower IMDb user ratings**
- Movies with **higher critic ratings**

Table 3: Logistic Regression Model Coefficients

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-29.56	17.86	-1.655	0.09793
budget_2013	-4.733e-09	1.211e-09	-3.909	9.255e-05
year	0.0161	0.00886	1.817	0.06923
imdb_rating	-0.5709	0.1055	-5.413	6.213e-08
metascore	0.02071	0.005734	3.611	0.0003046

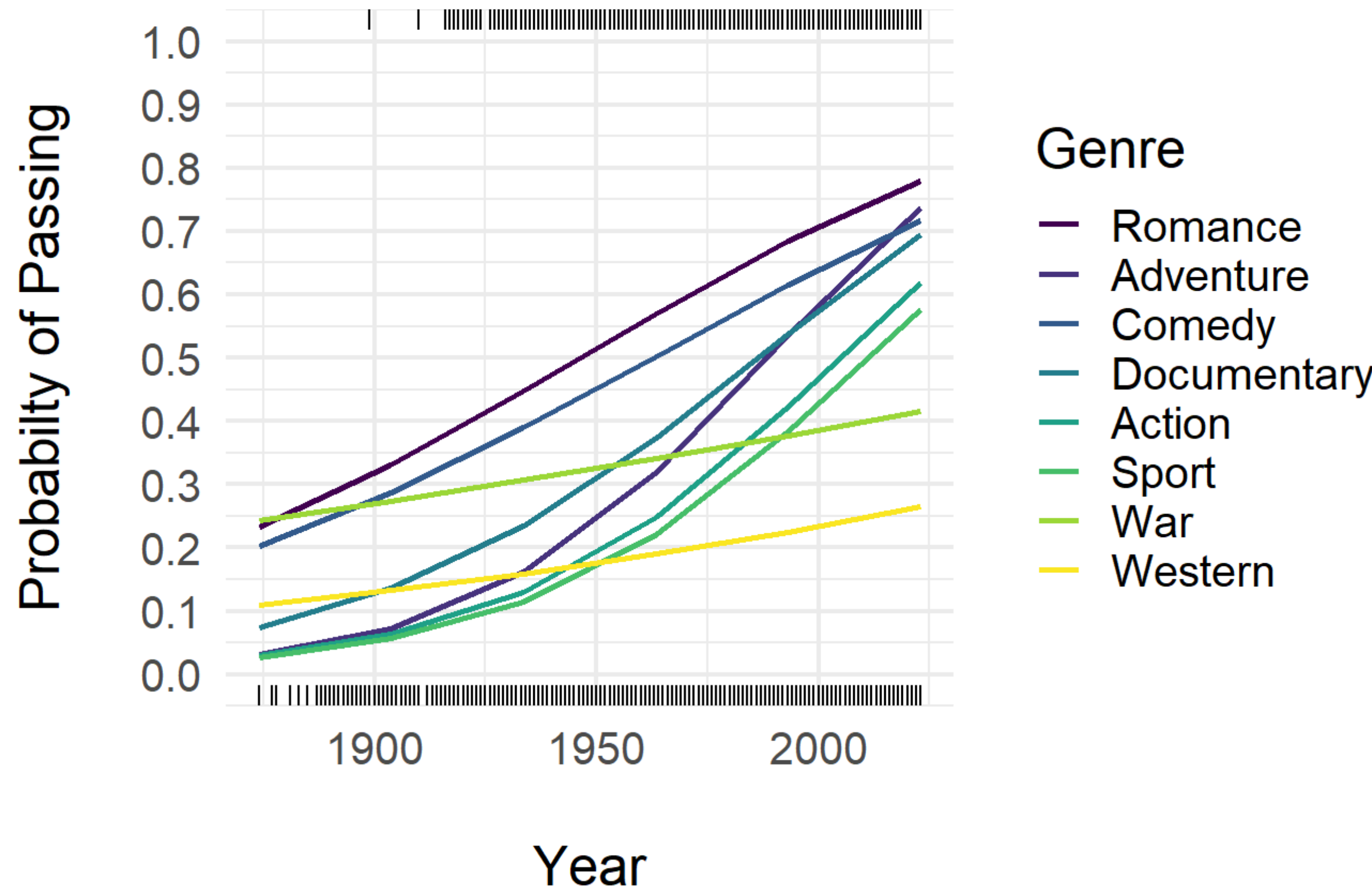
Genre Analysis

$$\text{logit}(\pi) = \beta_0 + \beta_1 \cdot \text{Year} + \beta_2 \cdot \text{Animation} + \beta_3 \cdot \text{Action} + \beta_4 \cdot \text{Adult} + \beta_5 \cdot \text{Adventure} + \dots + \beta_{29} \cdot \text{Year:Western}$$

- $\text{Animation} = 1$ (*yes*) or 0 (*no*)

- $\text{Year} : \text{Western}$ = interaction term

Different Genres Over Time



Interpretation

For recent years, genres with **higher probability** of **PASSING**:

- Romance, Adventure, Comedy*

Genres with **lower probability** of **PASSING**:

- War, Western, Sport*

Limitations

- Data for *Rating Analysis* only contains movies up to 2013
- Bechdel data contains most popular movies reported by users

References

- Alison Bechdel, 1986. *Dykes to watch out for*. Firebrand Books.
- [What “The Bechdel Test” doesn’t tell us: examining women’s verbal and vocal \(dis\)empowerment in cinema](#) (O’Meara, J., 2016)