

Cinematic Representations of Visible Facial Differences Across Time and Cultures

Running head: FACIAL ANOMALIES IN FILM

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Abstract: 179 words

Figures & Tables: 7 & 6

Manuscript: 4,141 words

References: 38

Abstract

The “scarred villain” trope, where facial differences like scars signify moral corruption, is ubiquitous in film (e.g., Batman’s *The Joker*). Strides by advocacy groups to undermine the trope, however, suggest cinematic representations of facial differences could be improving with time. This preregistered study characterized facial differences in film across cultures (US vs. India) and time (US: 1980-2019, India: 2000-2019). Top-grossing films by country and decade were screened for characters with facial differences. We found that the scarred villain trope has actually *worsened* with time, although in tandem with progress in also representing non-villainous characters with facial anomalies. Country of origin did not predict the presence of facial differences in villains or heroes. “Action” and “fantasy” movies were the most likely genres to depict villains with facial differences. Finally, villains’ facial differences crossed more facial subunits and were more likely to involve lips, chin, and mandible than when present in heroes. Our findings underscore the need for critical reflection on the role of cultural practices—even when seemingly innocuous—in shaping and maintaining negative biases against already stigmatized groups.

Keywords: disfigurement; faces; film; heroes; morality; villains

Introduction

How do filmmakers convince audiences that clowns are evil—including the rare movie goer who actually *likes* clowns? The writers of the 2008 film *The Dark Knight* instructed that clown and supervillain, “The Joker,” appear in “sweaty clown makeup [that obscures] the awful scars which widen his mouth into a permanent, ghoulisn smile” (Nolan & Nolan, 2008, p. 26, 11. 22-23). Unfortunately, visible facial differences have been exploited to signify moral badness since well before *The Dark Knight*. Cross-sectional work indicates that popular film villains harbor significantly more facial anomalies than heroes (Croley et al., 2017). The “scarred villain” trope is so ubiquitous that it even has its own entry on the “TV Tropes” website, which claims that “[you] can easily tell heroes from villains by their scars.”¹ Fortunately, progress has been made towards undermining the trope. In the United Kingdom, for instance, an organization called “Changing Faces” succeeded in persuading the British Film Institute to stop funding films with scarred villains in 2018.² Is this progress reflected in a decrease in the use of facial differences to indicate villainy in films? The research described herein seeks to answer this question.

Maybe filmmakers have intuited a deep-seated feature of human psychology—namely, that an adaptive disposition towards pathogen avoidance is erroneously triggered by facial differences, which has negative downstream consequences for evaluations of moral character (Workman et al., 2021; Workman et al., 2022). Consistent with this view, visible facial differences elicit disgust that scales with trait disgust sensitivity (Shanmugarajah et al., 2012) and presents similarly to disgust elicited by potential contagions (Ryan et al., 2012). Alternatively, maybe filmmakers are exploiting reliable disgust responses to an over-learned cultural association wrought by the ubiquity of the scarred villain trope. This view aligns with recent evidence that members of a hunter-gatherer tribe with the least exposure to outside cultures did not make negative moral inferences about scarred faces. (Workman et al., 2022). Furthermore, an intervention study that sought to downregulate negative implicit biases against facial differences in American volunteers (Bilici et al., 2022) underscored the flexibility of these attitudes. Surprisingly, something as simple as exposing people to anomalous faces and presenting them with counterexamples to the scarred villain trope downregulated negative

¹ Permalink: <https://web.archive.org/web/20221029174427/tvtropes.org/pmwiki/pmwiki.php/Main/GoodScarsEvilScars>

² Permalink: <https://web.archive.org/web/20230307075204/telegraph.co.uk/news/2018/11/27/british-film-institute-says-will-no-longer-fund-films-star-villains>

implicit biases (Bilici et al., 2022). Since people have limited opportunities to form impressions about people with facial differences in daily life, negative representations of facial differences in popular media may fill this knowledge gap in a perniciously outsized way.

People who are considered attractive benefit from positive assumptions about their social desirability, happiness, and trustworthiness (the “beauty-is-good” stereotype) (Dion et al., 1972; Todorov et al., 2009). Given that faces are reliably perceived as less attractive when they harbor anomalous features, and less attractive people are known to suffer social penalties, facial anomalies unsurprisingly trigger negative intuitions about trustworthiness and moral character (the recently proposed “anomalous-is-bad” stereotype) (Hartung et al., 2019; Jamrozik et al., 2019; Workman et al., 2021). Reports showing more favorable judgments of character following reconstructive surgery in patients with facial anomalies support this hypothesis (Mazzaferro et al., 2017; Villavisanis et al., 2022; Vu et al., 2020). Negative representations of facial differences in popular culture likely perpetuate the anomalous-is-bad stereotype. An effort to address these potentially harmful trends will undoubtedly benefit from the systematic characterization of representations of facial differences in film with corresponding historical and cultural context.

In this study, we examined characters from the top-grossing films from the last 4 decades using the Internet Movie Database (IMDb; <https://www.imdb.com/>) to document facial differences among good and evil characters. Each visible difference was graded by size and location as measured by the involvement of aesthetic facial subunits (as defined by plastic surgeons). First, we sought to understand whether the use of facial differences in characters, and in particular in villains, has changed over time. Second, we compared facial differences in films originating from the US and India. Just as work with the hunter-gatherers revealed the limited cross-cultural generalizability of the anomalous-is-bad stereotype (Workman et al., 2022), it is possible that film industries outside of the US like Bollywood do not rely as heavily on the scarred villain trope. Third, we investigated whether the location and size of facial differences varied between morally good and morally bad characters. Fourth, we investigated whether audience maturity ratings influenced the use of facial differences since movies with young audiences (Ryan et al., 2018) might have a disproportionate impact on stereotype formation. Finally, we compared the frequency and characteristics of facial differences among male and female characters. This study is relevant to understanding how facial differences are represented

in movies and to discussions around the social impacts that occur at the intersection of aesthetics and moral psychology.

Methods

Open Practices Statement: This study was preregistered: <https://osf.io/6mxxp2/>. The data and statistical analyses resulting from the study are publicly accessible: <https://osf.io/7kev5/>.

Study Design

Film Screening and Selection: This study used publicly available data sourced from IMDb (<https://www.imdb.com/>). For each year from 1980-2019, the 200 highest revenue-earning films (USD) were recorded from Box Office Mojo (<https://www.boxofficemojo.com/>) along with the domestic box office earnings. Box office revenue was adjusted using the Consumer Price Index Inflation Calculator published by the U.S. Bureau of Labor Statistics and adjusted to 2020 US dollars (https://www.bls.gov/data/inflation_calculator.htm). Films were then grouped by decade (1980-1989, 1990-1999, 2000-2009, 2010-2019) and sorted by inflation-adjusted revenue. The 50 highest-grossing films from each decade were included. Although fully animated films were excluded, films with live actors in addition to animated characters were included.

The same procedure was used to compile a list of highest-grossing Indian films. The IMDb does not maintain publicly available box office revenue for Indian films before 2000, so all Indian films that were included were released between 2000 and 2019. Specifically, the 50 highest-revenue Indian films from this period were selected. Representative films from each decade and country, along with photos of corresponding villains, are shown in Figure 1. For each film, we recorded the year of release, inflation-adjusted box office revenue, Motion Picture Association (MPA) rating, IMDb rating, Metacritic rating, Rotten Tomatoes audience rating, and genres. Genres were assigned on the IMDb webpage for each movie, and there was no limit to the number of genres assigned per movie. Genres were coded dichotomously. See Table S1 for a complete list of the US and Indian films included in this study and their corresponding genres.

Country of Origin	Box Office Decade	Box Office Year	Representative Movie: Title	Representative Movie: Poster	Representative Movie: Villain
United States	1980 - '89	1986	<i>Platoon</i>		
United States	1990 - '99	1991	<i>101 Dalmatians</i>		
United States	2000 - '09	2008	<i>The Dark Knight</i>		
United States	2010 - '19	2017	<i>Star Wars Ep. VIII: The Last Jedi</i>		
India	2000 - '19	2017	<i>2.0</i>		

Figure 1 | Five Representative Films, Their Promotional Posters, and Their Villains. Each representative film originated from one of the two countries (US and India) and four decades (1980-2019) under investigation. In addition to posters that advertised each movie, example villains with facial differences from those movies are provided in the rightmost column. The movie posters and character images in this figure belong to their respective copyright holders and have been reused here in accordance with fair use guidelines (i.e., <https://guides.library.upenn.edu/copyright/fair-use>).

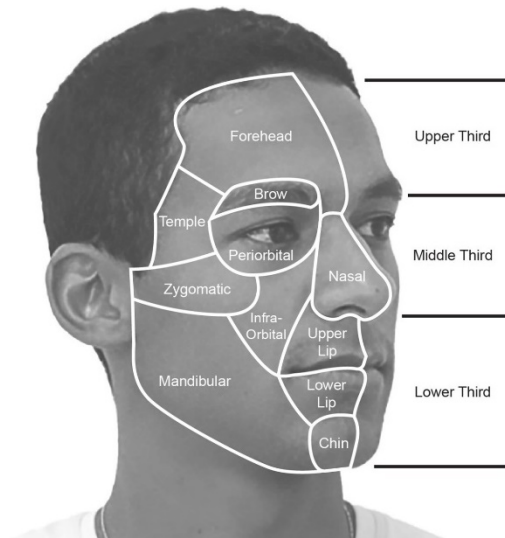


Figure 2 | Facial Aesthetic Subunits and Facial Thirds. Figure adapted from the FEI Face Database (permalink: <https://web.archive.org/web/20221222211214/https://fei.edu.br/~cet/facedatabase.html>).

Character Screening and Selection: Two researchers (C.S.W. and S.L.K.) completed the character screening process. Characters were screened for facial differences through still frames, posters, and trailers available in the photograph and video galleries on the IMDb page for each movie. Photographs from promotional events related to the movie were not screened. Facial differences were defined as any of the following: scarring, burns, deep rhytides (wrinkles), warts, focal pigmentation differences, macro/microcephaly, hypertelorism, nasal deformities, and others. Laterality was recorded for each character with a facial difference (unilateral, bilateral), as were the implicated facial subunits and facial thirds (Figure 2). Non-human characters were excluded if they lacked these aesthetic subunits. Only characters for whom an actor was listed in the gallery were included. Background actors were excluded. The gender of each character with a facial difference was recorded. The moral standing of each character with a facial difference was determined by reviewing the plot synopsis available on IMDb. Villains were broadly defined as characters who displayed unfairness, betrayal, or deceitfulness, or caused chaos or suffering. Heroes were broadly defined as characters who displayed fairness, loyalty, and purity (Graham et al., 2018). Discrepant categorizations were resolved by researcher consensus.

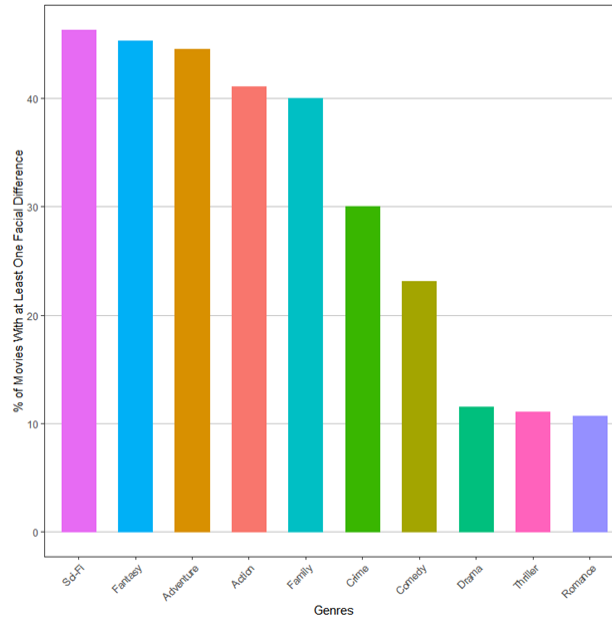


Figure 3 | The Prevalence of Facial Differences across Different Genres of US Film. Shown are the proportions of movies from each genre that depicted at least one character with a facial difference. The genres shown are the 10 most frequent classifications.

Statistical Analyses

Statistical analyses were performed in JASP (ver. 0.16.3; JASP Team, 2020) (Love et al., 2019). Cohen's Kappa was used to establish inter-rater reliability (C.S.W. and S.L.K.). Agreement was defined as either the joint determination that a movie did not have any character with a facial difference or that a character in a movie did have a facial difference. Disagreement was defined as one reviewer recording a character as having a facial difference while the other did not.

Movie genres, MPA ratings, box office revenue, and audience ratings were examined with descriptive statistics. Binomial tests determined whether the proportion of characters with facial differences differed significantly from expected in American movies. The expected proportion of male and female characters with facial differences was determined by recording the presenting gender of the first 5 actors listed in the photograph gallery for each of the 200 movies analyzed for a total of 1,000 characters. The proportion of male and female characters in the sample of 1,000 characters served as the reference levels for binomial testing. Chi-square tests: 1. identified univariate associations between the presence of facial differences and film decade of release, genre, audience rating, and country of origin, and 2. compared the proportion

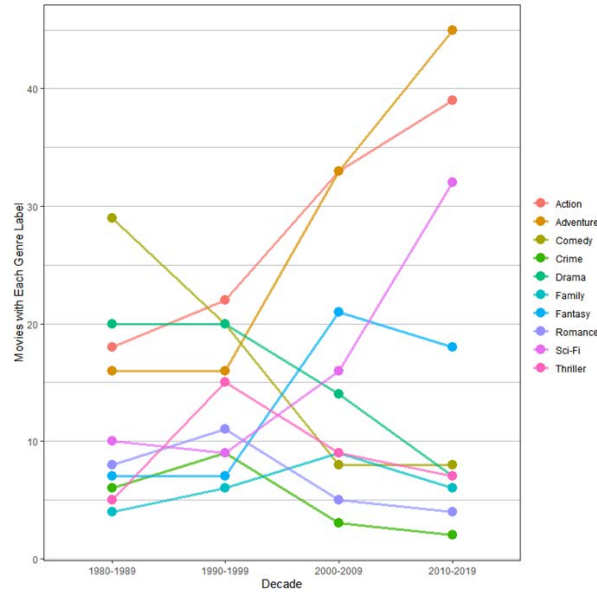


Figure 4 | The Genres of the Top 50 Highest Grossing US Films per Decade. Genres included were the 10 most frequent classifications.

of facial differences involving each aesthetic subunit and facial third, as well as the proportion of unilateral versus bilateral differences, among heroes relative to villains. Mann-Whitney *U* tests compared: 1. audience and critic ratings of movies with and without facial differences, and 2. the number of facial aesthetic subunits covered by the visible differences in heroes relative to villains.

Multivariate logistic regressions were used to: 1. test the effect of decade of release on the presence of at least one character with a facial difference in a movie, 2. predict the presence of at least one character with a facial difference incorporating country of origin, decade of release, and genre, and 3. assess factors predictive of the presence of a villain with a facial difference. The multivariate models included all variables that significantly predicted the presence of a facial difference at the univariate level. Of note, for the comparison between movies from the United States and India, the sample of the 50 Indian movies with the highest revenue from 2000-2019 was compared to the 50 highest revenue-generating movies from the United States over the same period.

Table 1 | The Descriptive Statistics Characterizing the Films Included in the Study.

	United States (%)	India (%)
N	200	50
Time Period		
1980-1989	50	0
1990-1999	50	0
2000-2009	50	13
2010-2019	50	37
Audience Rating		
G	1	2
PG	47	2
PG-13	114	1
R	38	0
Not Rated	0	45
Genre		
Action	112 (56)	32 (64)
Adventure	110 (55)	5 (10)
Biography	4 (2)	4 (8)
Comedy	65 (33)	26 (52)
Crime	20 (10)	11 (22)
Documentary	0 (0)	0 (0)
Drama	61 (31)	34 (68)
Family	25 (13)	2 (4)
Fantasy	53 (26)	0 (0)
Film Noir	0 (0)	0 (0)
History	1 (1)	2 (4)
Horror	3 (2)	1 (2)
Musical	2 (2)	3 (6)
Mystery	15 (8)	1 (2)
Romance	28 (14)	6 (12)
Sci-Fi	67 (34)	1 (2)
Sport	7 (4)	3 (6)
Thriller	36 (18)	5 (10)
War	5 (3)	0 (0)
Western	1 (1)	0 (0)
Domestic Box Office (USD)	\$265 ± 143 M	\$34 ± 29 M
IMDB rating	7.2 ± .8	6.5 ± 1.3
Metacritic Rating	64.5 ± 14.2	58.6 ± 14.2
Rotten Tomatoes	72.4 ± 20.0	61.0 ± 24.7

Results

We examined 250 films (200 American & 50 Indian). The most common MPA rating for the American movie cohort was “Parents Strongly Cautioned” (PG-13, 57%) followed by “Parental Guidance Suggested” (PG, 24%) and “Restricted” (R, 19%). Approximately 90% of Indian movies did not have an associated MPA rating. Among American films, “action” (56%), “adventure” (55%), “science fiction” (34%), and “comedy” (33%) were the most common genres (Table 1). Also, among American films, 61 movies (31%) featured at least one character with a

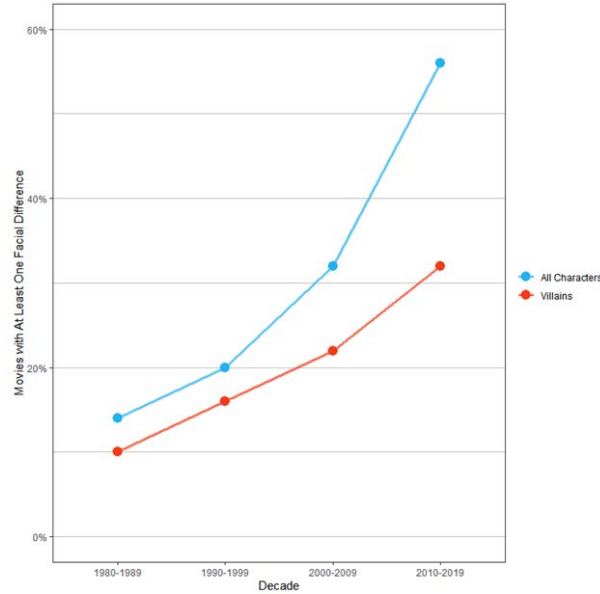


Figure 5 | The Prevalence of Characters and Villains with Facial Differences by Genre of US Film. Proportions of movies with at least one character (blue) or villain (red) with a facial difference across the four decades studied.

visible facial difference for a total of 98 total characters with facial differences across films (61 villains & 37 heroes). A Cohen’s Kappa of .78 was computed between raters (C.S.W. and S.L.K.) indicating substantial inter-rater agreement.

Film Genre: Films had a significantly higher incidence of displaying at least one character with a facial difference if they carried genre labels of “science fiction” (46%, $p < .001$), “fantasy” (45%,

Table 2 | Genres of the Top 50 Highest Grossing Films per Decade. Genres included were the 10 most frequent genre classifications.

Genre	1980–‘89 (%)	1990–‘99 (%)	2000–‘09 (%)	2010–‘19 (%)	<i>p</i>
Action	18 (36)	22 (44)	33 (66)	39 (78)	< .001
Adventure	16 (32)	16 (32)	33 (66)	45 (90)	< .001
Comedy	29 (58)	20 (40)	8 (16)	8 (16)	< .001
Crime	6 (12)	9 (18)	3 (6)	2 (4)	.083
Drama	20 (40)	20 (40)	14 (28)	7 (14)	.013
Family	4 (8)	6 (12)	9 (18)	6 (12)	.507
Fantasy	7 (14)	7 (14)	21 (42)	18 (36)	< .001
Romance	8 (16)	11 (22)	5 (10)	4 (8)	.173
Sci-Fi	10 (20)	9 (18)	16 (32)	32 (64)	< .001
Thriller	5 (10)	15 (30)	9 (18)	7 (14)	.055

Table 3 | The Prevalence of Facial Differences by Genre of American Films. A multivariate logistic regression predicted the presence of at one facial difference as a function of genre of American films. CI, confidence interval; OR, odds ratios; Ref, reference.

	OR	95% CI	<i>p</i>
Genre			
Action	2.81	1.09 ± 7.22	.032
Drama	.33	.12 ± .91	.032
Fantasy	1.63	.72 ± 3.71	.243
Sci-Fi	.75	.29 ± 1.93	.544
Romance	.46	.11 ± 1.96	.293
Thriller	.16	.05 ± .55	.004
Decade			
1980 - 1989	—	Ref	—
1990 - 1999	2.20	.70 ± 6.96	.178
2000 - 2009	2.11	.70 ± 6.34	.183
2010 - 2019	5.63	1.88 ± 16.80	.002

p = .006), “adventure” (45%, *p* < .001), and “action” (41%, *p* < .001) compared to films without those genre labels. The genres significantly associated with a lower incidence of depicting at least one character with a facial difference were “drama” (11%, *p* < .001), “thriller” (11%, *p* = .005), and “romance” (11%, *p* = .014, Figure 3). The proportion of “action,” “adventure,” “fantasy,” and “science fiction” films increased over time (*p*’s < .001), whereas the proportion of “drama” (*p* = .013) and “comedy” (*p* < .001) films decreased (Table 2, Figure 4).

MPA and Audience Ratings: Facial differences were found in at least one character in 37% of

Table 4 | The Prevalence of Villains with Facial Differences by Genre of American Films. A multivariate logistic regression predicted the presence of at one villain with a facial difference as a function of genre of American films. CI, confidence interval; OR, odds ratios; Ref, reference.

	OR	95% CI	<i>p</i>
Genre			
Action	2.98	1.10 ± 8.09	.032
Drama	.43	.14 ± 1.29	.131
Fantasy	3.27	1.42 ± 7.49	.005
Sci-Fi	.97	.38 ± 2.48	.947
Decade			
1980 - 1989	—	Ref	—
1990 - 1999	1.81	.51 ± 6.40	.356
2000 - 2009	1.46	.43 ± 4.97	.543
2010 - 2019	2.34	.71 ± 7.66	.162

Table 5 | Genre Categorizations of the Top Grossing American and Indian Movies.

Genre	Indian Top 50	American Top 50	<i>p</i>
Action	32	40	.075
Adventure	5	43	< .001
Comedy	26	4	< .001
Crime	11	3	.021
Drama	34	10	< .001
Family	2	6	.140
Fantasy	0	17	< .001
History	2	0	.153
Horror	1	0	.315
Mystery	1	3	.307
Romance	6	3	.295
Sci-Fi	1	33	< .001
Sport	3	0	.079
Thriller	5	7	.538

PG-13-, 23% of PG-, and 18% of R-rated American movies ($p = .052$). Only one G-rated movie was identified and was therefore excluded from statistical analysis. Movies with facial differences were rated an average of 7.4 (interquartile range [IQR] 6.9-7.8) on IMDb relative to 7.1 (IQR 6.5-7.7) *without* facial differences ($p = .050$). Neither Metacritic ratings (67.0, IQR 57.0-75.0 vs. 64.0, 54.0-75.0, $p = .204$) nor Rotten Tomatoes audience ratings (82.0, IQR, 61.0-91.0 vs. 75.0, 57.5-87.0, $p = .253$) differed for movies with and without facial differences.

Decade of Release: The prevalence of facial differences in films increased steadily over time, going from 14% in the period from 1980-1989 to 20% in 1990-1999, 32% in 2000-2009, and 56% in 2010-2019 ($p < .001$, Figure 5). A multivariate logistic regression predicting the presence of at least one facial difference in the American films incorporated decade and all genres that significantly predicted the presence of a facial difference. The genres “action” and “adventure” agreed across 146 of 200 movies (73%), so only “action” was included in the model owing to improved model accuracy (82.5% vs. 80.5%). In this model, the decade 2010-2019 predicted the presence of facial differences (OR 5.6, 95% CI 1.9-16.8, $p = .002$). The genres “action” (OR 2.8, 95% CI 1.1-7.2, $p = .032$), “thriller” (OR .16, 95% CI .1-.5, $p = .004$), and “drama” (OR .3, 95% CI .1-.9, $p = .032$) also predicted the presence of facial differences (Table 3).

The presence of at least one villain with facial differences increased across decades from 10% in 1980-1989 to 16% in 1990-1999, 22% in 2000-2009, and 32% in 2010-2019 ($p = .041$,

Table 6 | The Prevalence of Villains with Facial Differences in US versus Indian Films. A multivariate logistic regression predicted the presence of at least one villain with a facial difference in American relative to Indian films. CI, confidence interval; OR, odds ratios; Ref, reference; US, United States.

	OR	95% CI	<i>p</i>
Country			
India	—	Ref	—
US	1.90	.30 ± 12.25	.499
Genre			
Adventure	.47	.05 ± 4.11	.494
Drama	.30	.06 ± 1.42	.129
Fantasy	2.54	.43 ± 15.09	.307
Sci-Fi	6.91	1.09 ± 43.85	.040
Comedy	.48	.12 ± 2.03	.321

Figure 5). In a model predicting the presence of at least one villain in a movie having a facial difference, the 2010-2019 decade was not a significant predictor (OR 2.3, 95% CI .7-7.7, *p* = .162). The “action” (OR 3.0, 95% CI 1.1-8.1, *p* = .032) and “fantasy” movie genres (OR 3.3, 95% CI 1.4-7.5, *p* = .005), however, were associated with the presence of villains with facial differences (Table 4).

Country of Origin: From 2000-2019, 48% of the top 50 highest-grossing American movies had

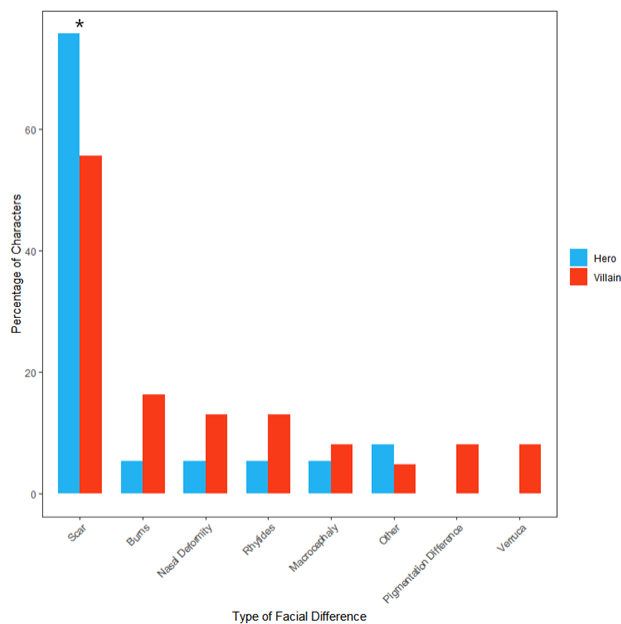


Figure 6 | Prevalence of Hero and Villain Characters with Different Kinds of Facial Differences. **p* < .05

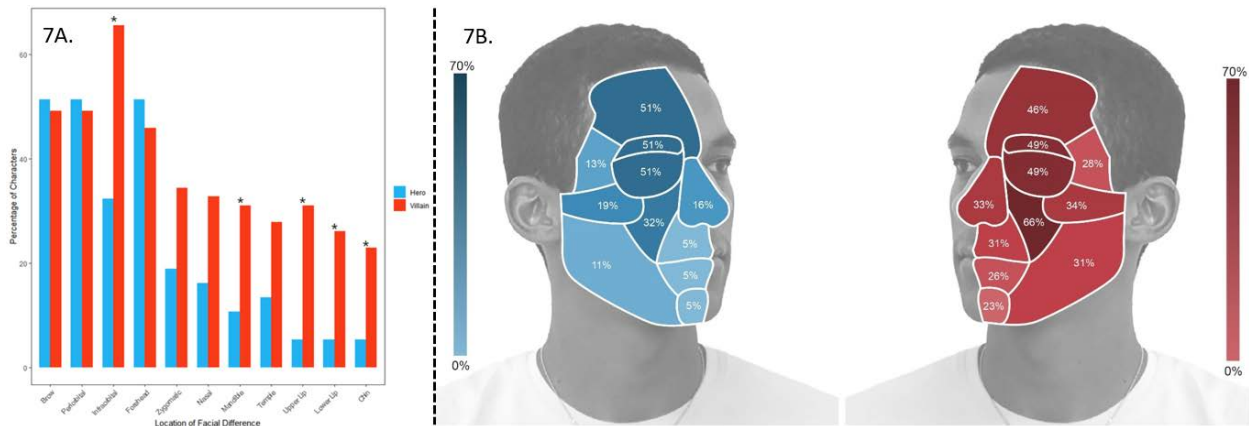


Figure 7 | Prevalence of Hero and Villain Characters with Facial Differences Across Facial Subunits. 7A. Percentages of characters who were classified as either heroes or villains with visible facial differences as a function of the affected facial subunits. $*p < .05$. 7B. A visual representation of the differences in locations of facial differences for heroes compared to villains. Figure adapted from the FEI Face Database (permalink: <https://web.archive.org/web/20221222211214/https://fei.edu.br/~cet/facedatabase.html>).

at least one character with a facial difference compared to 10% of Indian movies over the same time period ($p < .001$). The popularity of movie genres differed by country, with “adventure,” “fantasy,” and “science fiction” more common among American films and “drama” and “comedy” more common among Indian films (Table 5). In a model incorporating country of origin and only those genres that differed significantly in frequency between countries, only “sci-fi” predicted the presence of facial differences (OR 6.9, 95% CI 1.1-43.9, $p = .040$). It is important to note, however, that our sample included only one Indian “sci-fi” film. Whether movies originated from the United States was not a significant predictor of facial differences (OR 1.9, 95%, .3-12.2, $p = .499$, Table 6).

Types and Distributions of Facial Differences: Among characters with facial differences in American movies, linear scars were the most frequent (63%), followed by burns (12%), rhytides (10%), and nasal deformities (10%). There were no differences in the proportion of heroes and villains who had each type of facial difference except that linear scars made up a larger proportion of scars in heroes compared to villains (76% vs. 56%, $p = .047$, Figure 6).

Facial differences in villains from American movies covered more facial aesthetic subunits (median 4.0, IQR 2.0-8.0) than in heroes (median 2.0, IQR 1.0-3.0, $p = .001$).

Compared to heroes, villains were more frequently depicted with facial differences in the infraorbital region (66% vs. 32%, $p = .001$), upper lips (32% vs. 5%, $p = .003$), lower lips (26% vs. 5%, $p = .010$), chin (23% vs. 5%, $p = .023$), and mandible (31% vs. 10%, $p = .021$, Figure 7). Facial differences in villains were more likely to implicate the lower (49% vs. 11%, $p < .001$) and middle (85% vs. 68%, $p = .039$) facial thirds, but not the upper third (57% vs. 62%, $p = .640$). Among villains, facial differences were more likely to be bilateral than in heroes (53% vs. 27%, $p = .014$).

Facial Differences in Male and Female Characters: Out of 1,000 characters in the 200 highest-grossing American movies, 71.7% were male and 28.3% were female. Among only those characters with facial differences, 85 (87.6%) were male and 12 (12.4%) were female ($p < .001$). 63.5% of male characters with facial differences were villains compared to 50% of the female characters with facial differences ($p = 0.366$). The number of aesthetic subunits covered by facial differences in female characters (median 2.5, IQR 2.0-4.0) did not differ significantly from that of males (median 3.0, IQR 2.0-6.0, $p = .856$). The number of facial thirds involved did not differ between male (median 1.5, IQR 1.0-3.0) and female characters (median 1.0, IQR 1.0-2.0, $p = .191$).

Discussion

“You look nervous. It’s the scars, isn’t it?”

– The Joker in the 2008 film, *The Dark Knight*

(Nolan & Nolan, 2008, p. 53, ll. 24-25)

This pre-registered research asked whether there has been a decrease in the use of facial differences to indicate villainy in films. Our findings indicate that the representation of facial differences in film has improved relative to the 1980’s, in that facial differences are now less exclusive to villainous characters. However, there has also been an *increased* reliance on the scarred villain trope (Figure 5). “Action” and “fantasy” movies were highly associated with depictions of villains with facial differences, independent of time period. We did not detect differences in the depiction of facial differences in films originating from the United States

relative to India, which is indicative of cross-cultural uptake of the scarred villain trope. The results of our study provide historical and cultural context to the representation of facial differences and shed light on the characteristics of facial differences that filmmakers exploit to signify morality.

Our study provides nuance to discussion around the representation of visible differences in popular media. Films from the 21st century include fewer villains with dermatologic anomalies than in the 20th century, which was interpreted as progress towards dismantling the scarred villain trope (Ishida et al., 2017). Consistent with this interpretation, we did not detect a statistically significant increase in villains with facial differences over time. Nevertheless, the observation of an almost linear increase in the share of films with visibly different villains suggests that the trope is far from dismantled. Rather, the trope has thrived in particular genres. “Action” and “fantasy” movies were the most likely to include villains with facial differences and, critically, these genres have grown more popular with time (Table 5). Furthermore, while the presence of visible differences may rely less on a character’s moral status today than it did in the 80’s, we find that moral status is signified by the *type* of facial difference. Anomalous features on villainous faces crossed more aesthetic subunits and were more frequently bilateral. Rather than the *presence* of facial anomalies, it would seem specific *patterns* of anomalous features are used to denote moral status. If movie villains are still recognizable from their facial anomalies, as our study suggests, then work is yet to be done in rooting out the scarred villain trope.

A recent crowdsourcing investigation found that well-healed scars on the forehead were seen as friendlier and more confident, while vertical scars below the eye were negatively perceived (Zapatero et al., 2022). The forehead was a common region for heroes to have facial differences in the present study, while differences in the infraorbital region were more common in villains, consistent with these findings. This pattern could indicate that the passive transmission of cultural attitudes about facial differences through popular media has consequences for our intuitions about people who look different. Specifically, scars in locations associated with heroism were viewed more favorably than similar scars in locations associated with villainy. The most highly viewed structures of the face are in the middle and lower thirds, including the eyes, nose, and lips (Bindemann et al., 2009; Henderson et al., 2005; Walker-Smith et al., 1977). Villainous facial differences thus may exploit normal gaze patterns given that lower

third structures including the lips, chin, and mandible were more common in villains. Prior research also reported a nonlinear relationship between the severity of craniofacial anomalies and psychosocial adjustment in patients, with moderate relative to mild and severe anomalies representing a hurdle for adjustment given inconsistency in the reactions of others (Moss, 2005). Extending this work, we find that villainous faces harbor moderate visible differences that span an average of two more aesthetic subunits relative to heroic faces. We propose that the social penalties exacted against people with moderate craniofacial anomalies are exacerbated by negative portrayals of such differences in film.

Despite the sizable gap between American and Indian films in the incidence of facial differences, which were generally less prevalent in Indian films, there was no statistically significant difference between countries. Importantly, this study was designed to investigate portrayals of heroes and villains and cannot speak to *why* cross-cultural differences in the scarred villain trope were not detected. Cross-cultural evidence does find similarities in how people respond to facial differences (Bull & David, 1986), although unique culturally specific stigmas highlight variations (e.g., against fire/acid attack victims in India) (Furr, 2014). Other visual signifiers of group membership, like skin tone, were not examined here and could reveal cross-cultural variation in their cinematic associations with villainy (Ahuja et al., 2016; Coard et al., 2001; Jha & Adelman, 2009).

Even when accounting for baseline overrepresentation, characters with facial differences were overwhelmingly male, although male characters with facial differences were not significantly more likely to be villainous than female counterparts. These findings extend previous research that focused exclusively on *Bond* movies (Chen et al., 2022). There is consistent evidence that gender mediates both the perception of visible facial differences (Hartung et al., 2019) and the experience of having them oneself. Following disfiguring oncologic resections, women display higher rates of depression and lower quality of life (Arunachalam et al., 2011; Katz et al., 2003). Further, caretakers of oncology patients viewed facial differences in women as more severe than in males despite their undergoing identical surgical procedures (Lockhart, 1999). This tendency to overestimate the severity of women's facial differences suggests an aversion to anomalous features in women that may underpin their limited representation in film.

As younger generations consume more digital media, our findings may be particularly relevant to adolescent social development (Christakis & Moreno, 2009). It is well accepted that fictional stories shape misrepresentations of gender, race, and sexual orientation (Dill-Shackleford et al., 2017). Conversely, stories that described moral exemplars *similar to oneself* were more effective in inspiring altruistic behavior than were stories about famous exemplars (Han et al., 2022). Similarly, *Black Panther* (2018) was found to foster a sense of identification and empowerment among black youths, and the *Harry Potter* series was linked to improved feelings towards stigmatized outgroups (González-Velázquez et al., 2020; Vezzali et al., 2015). Unfortunately, however, *Harry Potter* features a main antagonist who bears the kind of nasal defect that has been ranked among the most disfiguring facial differences (Dropkin et al., 1983). Since we found that the favorability of critical responses to films did not depend on the presence or absence of facial differences, the film industry appears to gain nothing from continuing to exploit visible differences for storytelling purposes.

Despite its importance, this work has limitations that warrant consideration. First, we exclusively examined *facial* differences among movie characters. One could hypothesize that bodily differences outside of the face may also be subject to the anomalous-is-bad stereotype. Second, the comparison of American and Indian movies was limited to the past two decades because of the unavailability of data spanning a greater time period, which limits our ability to assess interactions between cross-cultural and temporal trends in depictions of facial differences. Finally, comparing only two countries limits the generalizability of our findings to the broader international film industry. Despite its limitations, this research generated multiple novel observations about the representation of facial differences in film that set the stage for future research aimed at clarifying the link between popular media depictions of facial differences and the prevalence and severity of the “anomalous-is-bad” stereotype (Workman et al., 2021). Minimizing the reliance of filmmakers on facial differences as visual shorthand for villainy and further expanding positive representations of facial differences stands to empower individuals with acquired or congenital visible differences.

Conclusion

This study revealed temporal and cross-cultural trends in the depiction of facial differences in film. Specifically, we found an overall increase in the non-villainous representation of facial differences over time, and that action and fantasy movies were more likely to exploit the scarred villain trope than were other genres. Differences in popular genres in the United States and India accounted for the gap in the use of facial differences between movies in the two countries. Facial differences belonging to villains were larger and more likely to impact the middle and lower thirds of the face. Instead of relying on the *presence* of facial anomalies to signify moral status, filmmakers are exploiting *patterns* of anomalous features to the same end. These results highlight a need for continued attention towards cultural practices that reinforce negative stereotypes towards already stigmatized groups like people with craniofacial anomalies.

Declaration of Interest: The authors declare no conflicts of interest.

Acknowledgments: All authors contributed to the study design. Data collection was performed by C.S.W and S.L.K. Analyses were performed by C.S.W. The manuscript was drafted by C.S.W. and C.I.W. All authors provided critical revisions and approved the final version of the manuscript. This research was supported by the University of Pennsylvania's Edwin & Fannie Gray Hall Center for Human Appearance (awarded to J.A.T. and A.C.) and the National Institute of Dental & Craniofacial Research of the National Institutes of Health (F32DE029407 awarded to C.I.W). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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Cinematic Representations of Visible Facial Differences Across Time and Cultures

Supplementary Online Materials (SOM)

Table S1 | The Complete List of Films and Selected Characteristics. An overview of the characteristics of the films that were identified for inclusion into the current study.

No.	Film Title	Country of Origin	Box Office Decade	Box Office Year	Gross Revenue* (millions of USD)
1	E.T. the Extra-Terrestrial	US	1980-'89	1982	\$984
2	Star Wars: Episode V - The Empire Strikes Back	US	1980-'89	1980	\$695
3	Star Wars: Episode VI - Return of the Jedi	US	1980-'89	1983	\$667
4	Indiana Jones & the Raiders of the Lost Ark	US	1980-'89	1981	\$630
5	Beverly Hills Cop	US	1980-'89	1984	\$594
6	Ghostbusters	US	1980-'89	1984	\$580
7	Batman	US	1980-'89	1989	\$535
8	Back to the Future	US	1980-'89	1985	\$516
9	Tootsie	US	1980-'89	1982	\$486
10	Indiana Jones & the Temple of Doom	US	1980-'89	1984	\$455
11	Indiana Jones & the Last Crusade	US	1980-'89	1989	\$420
12	Top Gun	US	1980-'89	1986	\$415
13	Crocodile Dundee	US	1980-'89	1986	\$411
14	Three Men & a Baby	US	1980-'89	1987	\$389
15	Rain Man	US	1980-'89	1988	\$385
16	Gremlins	US	1980-'89	1984	\$375
17	Rambo: First Blood Part II	US	1980-'89	1985	\$369
18	Fatal Attraction	US	1980-'89	1987	\$363
19	Beverly Hills Cop II	US	1980-'89	1987	\$357
20	An Officer & a Gentleman	US	1980-'89	1982	\$356
21	On Golden Pond	US	1980-'89	1981	\$354
22	Who Framed Roger Rabbit	US	1980-'89	1988	\$349
23	9 to 5	US	1980-'89	1980	\$343
24	Rocky III	US	1980-'89	1982	\$340
25	Stir Crazy	US	1980-'89	1980	\$336
26	Platoon	US	1980-'89	1986	\$326
27	Superman II	US	1980-'89	1981	\$321
28	Lethal Weapon 2	US	1980-'89	1989	\$314
29	Rocky IV	US	1980-'89	1985	\$313
30	Look Who's Talking	US	1980-'89	1989	\$298
31	Porky's	US	1980-'89	1982	\$289
32	Good Morning, Vietnam	US	1980-'89	1987	\$287

No.	Film Title	Country of Origin	Box Office Decade	Box Office Year	Gross Revenue* (millions of USD)
33	Terms of Endearment	US	1980-'89	1983	\$286
34	Coming to America	US	1980-'89	1988	\$286
35	Arthur	US	1980-'89	1981	\$284
36	Honey, I Shrunk the Kids	US	1980-'89	1989	\$278
37	The Karate Kid Part II	US	1980-'89	1986	\$270
38	Star Trek IV: The Voyage Home	US	1980-'89	1986	\$258
39	Big	US	1980-'89	1988	\$256
40	Back to the Future Part II	US	1980-'89	1989	\$252
41	Twins	US	1980-'89	1988	\$250
42	Flashdance	US	1980-'89	1983	\$245
43	Crocodile Dundee II	US	1980-'89	1988	\$244
44	Ghostbusters II	US	1980-'89	1989	\$240
45	The Color Purple	US	1980-'89	1985	\$231
46	Driving Miss Daisy	US	1980-'89	1989	\$227
47	Back to School	US	1980-'89	1986	\$214
48	Parenthood	US	1980-'89	1989	\$213
49	Dead Poets Society	US	1980-'89	1989	\$204
50	When Harry Met Sally...	US	1980-'89	1989	\$198
51	Titanic	US	1990-'99	1997	\$973
52	Star Wars: Episode I - The Phantom Menace	US	1990-'99	1999	\$677
53	Jurassic Park	US	1990-'99	1993	\$646
54	Home Alone	US	1990-'99	1990	\$577
55	Forrest Gump	US	1990-'99	1994	\$574
56	Independence Day	US	1990-'99	1996	\$511
57	The Sixth Sense	US	1990-'99	1999	\$461
58	Ghost	US	1990-'99	1990	\$440
59	Men in Black	US	1990-'99	1997	\$406
60	Twister	US	1990-'99	1996	\$404
61	Mrs. Doubtfire	US	1990-'99	1993	\$397
62	Terminator 2: Judgment Day	US	1990-'99	1991	\$393
63	Dances with Wolves	US	1990-'99	1990	\$372
64	The Lost World: Jurassic Park	US	1990-'99	1997	\$371
65	Pretty Woman	US	1990-'99	1990	\$360
66	Saving Private Ryan	US	1990-'99	1998	\$346
67	The Fugitive	US	1990-'99	1993	\$333
68	Home Alone 2: Lost in New York	US	1990-'99	1992	\$325
69	Austin Powers: The Spy Who Shagged Me	US	1990-'99	1999	\$323
70	Armageddon	US	1990-'99	1998	\$323
71	Robin Hood: Prince of Thieves	US	1990-'99	1991	\$318
72	Batman Forever	US	1990-'99	1995	\$317

No.	Film Title	Country of Origin	Box Office Decade	Box Office Year	Gross Revenue* (millions of USD)
73	Liar Liar	US	1990-'99	1995	\$312
74	Batman Returns	US	1990-'99	1992	\$304
75	Mission: Impossible	US	1990-'99	1996	\$302
76	Apollo 13	US	1990-'99	1995	\$296
77	The Firm	US	1990-'99	1993	\$287
78	There's Something About Mary	US	1990-'99	1998	\$282
79	Air Force One	US	1990-'99	1997	\$280
80	Lethal Weapon 3	US	1990-'99	1992	\$271
81	The Matrix	US	1990-'99	1999	\$269
82	A Few Good Men	US	1990-'99	1992	\$264
83	Sister Act	US	1990-'99	1992	\$261
84	The Waterboy	US	1990-'99	1998	\$258
85	Jerry Maguire	US	1990-'99	1996	\$257
86	Big Daddy	US	1990-'99	1999	\$257
87	True Lies	US	1990-'99	1994	\$255
88	The Santa Clause	US	1990-'99	1994	\$252
89	As Good as It Gets	US	1990-'99	1997	\$241
90	Runaway Bride	US	1990-'99	1999	\$239
91	Doctor Dolittle	US	1990-'99	1998	\$231
92	Ransom	US	1990-'99	1996	\$228
93	101 Dalmatians	US	1990-'99	1996	\$227
94	Rush Hour	US	1990-'99	1998	\$226
95	Good Will Hunting	US	1990-'99	1997	\$224
96	The Rock	US	1990-'99	1996	\$224
97	The Blair Witch Project	US	1990-'99	1999	\$221
98	Godzilla	US	1990-'99	1998	\$218
99	Patch Adams	US	1990-'99	1998	\$216
100	The Green Mile	US	1990-'99	1999	\$215
101	Avatar	US	2000-'09	2009	\$915
102	The Dark Knight	US	2000-'09	2008	\$651
103	Spider-Man	US	2000-'09	2002	\$589
104	Pirates of the Caribbean: Dead Man's Chest	US	2000-'09	2006	\$550
105	The Lord of the Rings: The Return of the King	US	2000-'09	2003	\$535
106	Spider-Man 2	US	2000-'09	2004	\$519
107	The Passion of the Christ	US	2000-'09	2004	\$515
108	Star Wars: Episode III - Revenge of the Sith	US	2000-'09	2005	\$513
109	The Lord of the Rings: The Two Towers	US	2000-'09	2002	\$496
110	Transformers: Revenge of the Fallen	US	2000-'09	2009	\$491
111	Harry Potter & the Sorcerer's Stone	US	2000-'09	2001	\$467
112	The Lord of the Rings: The Fellowship of the Ring	US	2000-'09	2001	\$461

No.	Film Title	Country of Origin	Box Office Decade	Box Office Year	Gross Revenue* (millions of USD)
113	Star Wars: Episode II - Attack of the Clones	US	2000-'09	2002	\$441
114	Pirates of the Caribbean: The Curse of the Black Pearl	US	2000-'09	2003	\$434
115	Spider-Man 3	US	2000-'09	2007	\$427
116	Transformers	US	2000-'09	2007	\$405
117	The Matrix Reloaded	US	2000-'09	2003	\$400
118	How the Grinch Stole Christmas	US	2000-'09	2000	\$398
119	The Chronicles of Narnia: The Lion, the Witch & the Wardrobe	US	2000-'09	2005	\$394
120	Harry Potter and the Goblet of Fire	US	2000-'09	2005	\$394
121	Pirates of the Caribbean: At World's End	US	2000-'09	2007	\$393
122	Iron Man	US	2000-'09	2008	\$389
123	Meet the Fockers	US	2000-'09	2004	\$388
124	Indiana Jones and the Kingdom of the Crystal Skull	US	2000-'09	2008	\$387
125	Harry Potter and the Chamber of Secrets	US	2000-'09	2002	\$383
126	Harry Potter and the Order of the Phoenix	US	2000-'09	2007	\$371
127	Harry Potter and the Half-Blood Prince	US	2000-'09	2009	\$368
128	The Twilight Saga: New Moon	US	2000-'09	2009	\$362
129	Cast Away	US	2000-'09	2000	\$357
130	My Big Fat Greek Wedding	US	2000-'09	2002	\$352
131	Harry Potter and the Prisoner of Azkaban	US	2000-'09	2004	\$347
132	Bruce Almighty	US	2000-'09	2003	\$345
133	The Hangover	US	2000-'09	2009	\$338
134	Signs	US	2000-'09	2002	\$333
135	Rush Hour 2	US	2000-'09	2001	\$332
136	Mission: Impossible II	US	2000-'09	2000	\$330
137	Night at the Museum	US	2000-'09	2006	\$326
138	I Am Legend	US	2000-'09	2007	\$326
139	War of the Worlds	US	2000-'09	2005	\$316
140	Star Trek	US	2000-'09	2009	\$314
141	The Blind Side	US	2000-'09	2009	\$312
142	Austin Powers in Goldmember	US	2000-'09	2002	\$311
143	X2: X-Men United	US	2000-'09	2003	\$305
144	X-Men: The Last Stand	US	2000-'09	2006	\$305
145	The Bourne Ultimatum	US	2000-'09	2007	\$289
146	The Da Vinci Code	US	2000-'09	2006	\$283
147	National Treasure: Book of Secrets	US	2000-'09	2007	\$279
148	Hancock	US	2000-'09	2008	\$278
149	King Kong	US	2000-'09	2007	\$277
150	300	US	2000-'09	2007	\$267
151	Star Wars: Episode VII - The Force Awakens	US	2010-'19	2015	\$1,030

No.	Film Title	Country of Origin	Box Office Decade	Box Office Year	Gross Revenue* (millions of USD)
152	Avengers: Endgame	US	2010-'19	2019	\$876
153	Black Panther	US	2010-'19	2018	\$728
154	Jurassic World	US	2010-'19	2015	\$717
155	The Avengers	US	2010-'19	2012	\$711
156	Avengers: Infinity War	US	2010-'19	2018	\$706
157	Star Wars: Episode VIII - The Last Jedi	US	2010-'19	2017	\$657
158	Rogue One: A Star Wars Story	US	2010-'19	2016	\$580
159	Beauty and the Beast	US	2010-'19	2017	\$534
160	Star Wars: Episode IX - The Rise of Skywalker	US	2010-'19	2019	\$526
161	The Dark Knight Rises	US	2010-'19	2012	\$511
162	Avengers: Age of Ultron	US	2010-'19	2015	\$505
163	The Hunger Games: Catching Fire	US	2010-'19	2013	\$476
164	The Hunger Games	US	2010-'19	2012	\$465
165	Iron Man 3	US	2010-'19	2013	\$458
166	Harry Potter and the Deathly Hallows: Part 2	US	2010-'19	2011	\$446
167	Harry Potter and the Deathly Hallows: Part 2	US	2010-'19	2011	\$446
168	Captain America: Civil War	US	2010-'19	2016	\$445
169	Wonder Woman	US	2010-'19	2017	\$437
170	Captain Marvel	US	2010-'19	2019	\$435
171	Jurassic World: Fallen Kingdom	US	2010-'19	2018	\$434
172	Jumanji: Welcome to the Jungle	US	2010-'19	2017	\$429
173	Guardians of the Galaxy Vol. 2	US	2010-'19	2017	\$413
174	Transformers: Dark of the Moon	US	2010-'19	2011	\$412
175	Spider-Man: Far from Home	US	2010-'19	2019	\$398
176	Alice in Wonderland	US	2010-'19	2010	\$398
177	The Jungle Book	US	2010-'19	2016	\$397
178	Deadpool	US	2010-'19	2016	\$396
179	Furious 7	US	2010-'19	2015	\$388
180	American Sniper	US	2010-'19	2014	\$385
181	Iron Man 2	US	2010-'19	2010	\$372
182	The Hunger Games: Mockingjay - Part 1	US	2010-'19	2014	\$371
183	Guardians of the Galaxy	US	2010-'19	2014	\$366
184	Aladdin	US	2010-'19	2019	\$363
185	Batman v Superman: Dawn of Justice	US	2010-'19	2016	\$360
186	The Twilight Saga: Eclipse	US	2010-'19	2010	\$358
187	Suicide Squad	US	2010-'19	2016	\$354
188	Spider-Man: Homecoming	US	2010-'19	2017	\$354
189	Harry Potter and the Deathly Hallows: Part 1	US	2010-'19	2010	\$352
190	Aquaman	US	2010-'19	2018	\$348
191	Inception	US	2010-'19	2010	\$348

No.	Film Title	Country of Origin	Box Office Decade	Box Office Year	Gross Revenue* (millions of USD)
192	It	US	2010-'19	2017	\$347
193	Skyfall	US	2010-'19	2012	\$347
194	The Hobbit: An Unexpected Journey	US	2010-'19	2012	\$345
195	Joker	US	2010-'19	2019	\$342
196	Thor: Ragnarok	US	2010-'19	2017	\$334
197	The Twilight Saga: Breaking Dawn - Part 2	US	2010-'19	2012	\$333
198	Deadpool 2	US	2010-'19	2018	\$331
199	Jumanji: The Next Level	US	2010-'19	2019	\$327
200	Man of Steel	US	2010-'19	2013	\$326
201	3 Idiots	India	2000-'09	2009	\$53
202	Ghajini	India	2000-'09	2008	\$42
203	Welcome	India	2000-'09	2007	\$37
204	Dhoom 2	India	2000-'09	2006	\$35
205	Om Shanti Om	India	2000-'09	2007	\$34
206	Rab Ne Bana Di Jodi	India	2000-'09	2008	\$30
207	Singh Is King	India	2000-'09	2008	\$27
208	Guru	India	2000-'09	2007	\$26
209	Race	India	2000-'09	2008	\$25
210	Jodhaa Akbar	India	2000-'09	2008	\$25
211	Like Stars on Earth	India	2000-'09	2007	\$25
212	Let's Go! India	India	2000-'09	2007	\$24
213	Jaane Tu... Ya Jaane Na	India	2000-'09	2008	\$23
214	Baahubali 2: The Conclusion	India	2010-'19	2017	\$223
215	Dangal	India	2010-'19	2016	\$84
216	Tiger Lives	India	2010-'19	2017	\$71
217	Sultan	India	2010-'19	2016	\$68
218	Bajrangi Bhaijaan	India	2010-'19	2015	\$68
219	Sanju	India	2010-'19	2018	\$64
220	War	India	2010-'19	2019	\$55
221	Prem Ratan Dhan Payo	India	2010-'19	2015	\$46
222	Simmba	India	2010-'19	2018	\$43
223	Kick	India	2010-'19	2014	\$43
224	Sarileru Neekevvaru	India	2010-'19	2019	\$36
225	Uri: The Surgical Strike	India	2010-'19	2019	\$34
226	Raajneeti	India	2010-'19	2010	\$32
227	Bodyguard	India	2010-'19	2011	\$31
228	Rowdy Rathore	India	2010-'19	2012	\$31
229	Baaghi 2	India	2010-'19	2018	\$30
230	Bol Bachchan	India	2010-'19	2012	\$29
231	M.S. Dhoni: The Untold Story	India	2010-'19	2016	\$28

No.	Film Title	Country of Origin	Box Office Decade	Box Office Year	Gross Revenue* (millions of USD)
232	Ala Vaikunthapurramuloo	India	2010-'19	2019	\$28
233	2	India	2010-'19	2018	\$27
234	Judwaa 2	India	2010-'19	2017	\$27
235	Thugs of Hindostan	India	2010-'19	2018	\$26
236	Ready	India	2010-'19	2011	\$26
237	Bharat	India	2010-'19	2019	\$26
238	Agneepath	India	2010-'19	2012	\$26
239	Badhaai Ho	India	2010-'19	2018	\$25
240	Ae Dil Hai Mushkil	India	2010-'19	2016	\$25
241	Badrinath Ki Dulhania	India	2010-'19	2017	\$24
242	Housefull 2	India	2010-'19	2012	\$24
243	Total Dhamaal	India	2010-'19	2019	\$23
244	Stree	India	2010-'19	2018	\$22
245	Jolly LLB 2	India	2010-'19	2017	\$22
246	Welcome Back	India	2010-'19	2015	\$22
247	Super 30	India	2010-'19	2019	\$21
248	2 States	India	2010-'19	2014	\$21
249	Singh Is Bliing	India	2010-'19	2015	\$20
250	Gully Boy	India	2010-'19	2019	\$20

* Adjusted for inflation relative to 2020