

Invisible in Visual Effects: Understanding the Prevalence and Experiences of Women in the Field

November 2021

USC Annenberg
Inclusion Initiative



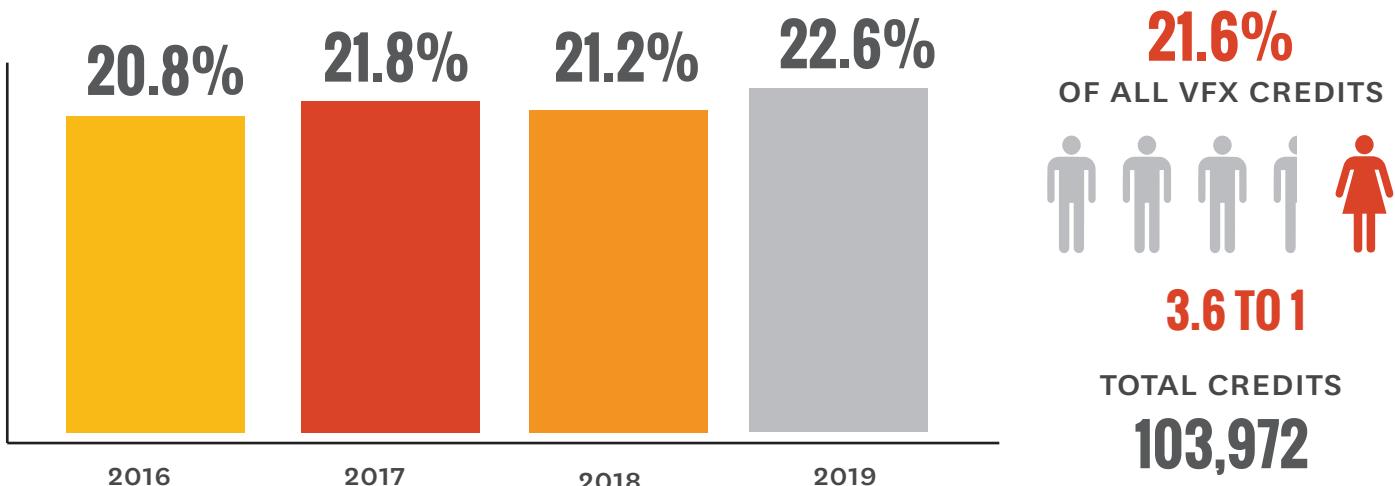
INVISIBLE IN VISUAL EFFECTS: UNDERSTANDING THE PREVALENCE AND EXPERIENCES OF WOMEN IN THE FIELD

USC ANNENBERG INCLUSION INITIATIVE



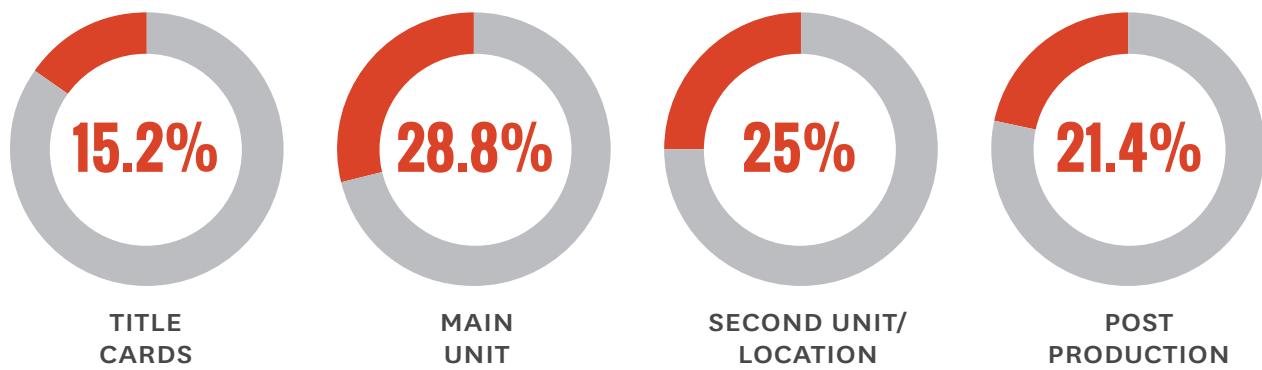
WOMEN IN VISUAL EFFECTS

Women receiving visual effects credits across 400 top movies, 2016-2019, in percentages



WOMEN ARE LEAST LIKELY TO APPEAR IN TITLE CREDITS

Percentage of women credited in each credit location across 400 top films, 2016-2019



A TOTAL OF 54 WOMEN RECEIVED A TITLE CARD CREDIT FOR VFX.

302 MEN RECEIVED TITLE CARD RECOGNITION.

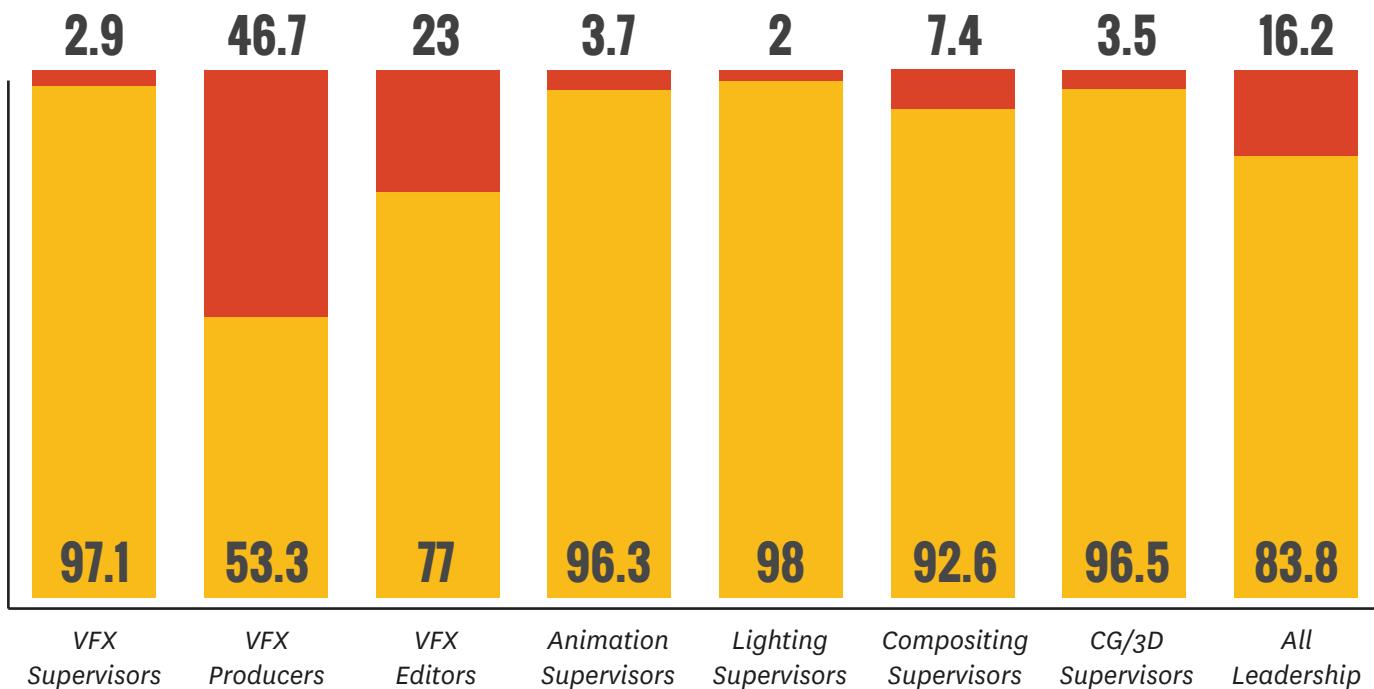
THIS IS A RATIO OF NEARLY 6 TO 1.

Title cards include standalone title cards and top-of-credits placement; main unit includes on-set credits; second unit includes location-based or additional unit credits; post-production credits were attributed to employees of companies providing VFX services.

GENDER GAPS IN VFX LEADERSHIP ROLES

Key Roles by gender across 400 top films, 2016-2019 in percentages

Women Men



Leadership roles include 5,515 credits spanning all listed positions, and appearing in any credit location.

WOMEN OF COLOR ARE NEARLY INVISIBLE IN LEADERSHIP

Women of color receiving credits in leadership roles across 400 top films, 2016-2019



0.5%

VFX SUPERVISORS

7 women of color

5.8%

VFX PRODUCERS

70 women of color

5.1%

VFX EDITORS

40 women of color

1%

OF OTHER LEADERSHIP

20 women of color

FROM 2016 (13.8%) TO 2019 (19%) THE PERCENTAGE OF WOMEN OF COLOR (OUT OF ALL WOMEN) IN LEADERSHIP ROLES INCREASED.

WOMEN OF COLOR ARE NEARLY INVISIBLE IN LEADERSHIP

Women of color receiving credits in leadership roles across 400 top films, 2016-2019

THE RATIO OF MEN TO WOMEN OF COLOR AS VFX SUPERVISORS ACROSS 400 POPULAR FILMS WAS

208 TO 1

WOMEN NOMINEES AND WINNERS OF TOP VES AWARDS

Percentage of women nominees and winners of top Visual Effects Society awards, 2016-2020

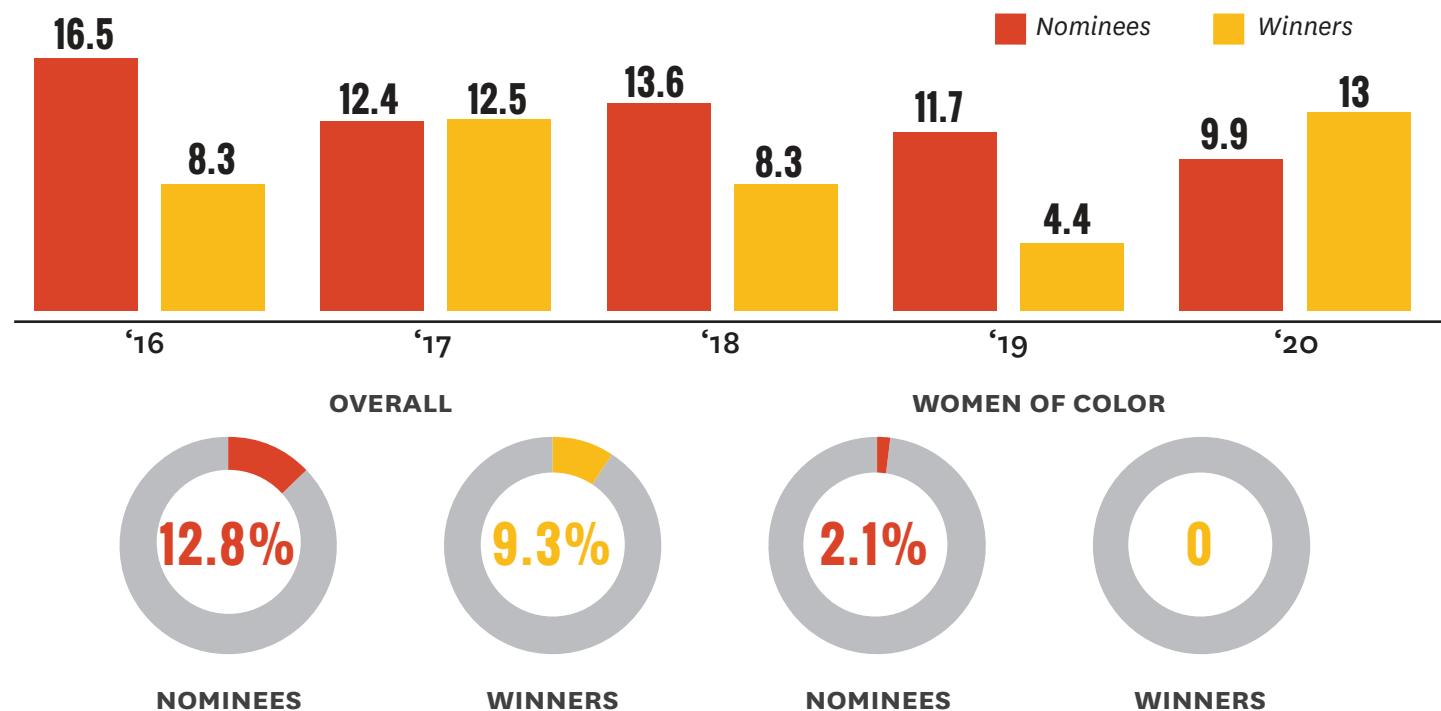


Chart includes information on nominees and winners of Visual Effects Society awards across 5 top categories.

Awards recognition at the Academy Awards® was also evaluated. Of the 211 nominees from 2010 to 2020, only 1 woman was nominated for and won an Academy Award® for Best Visual Effects.

EXECUTIVE RANKS AT VFX COMPANIES

Women in leadership positions across 60 VFX companies

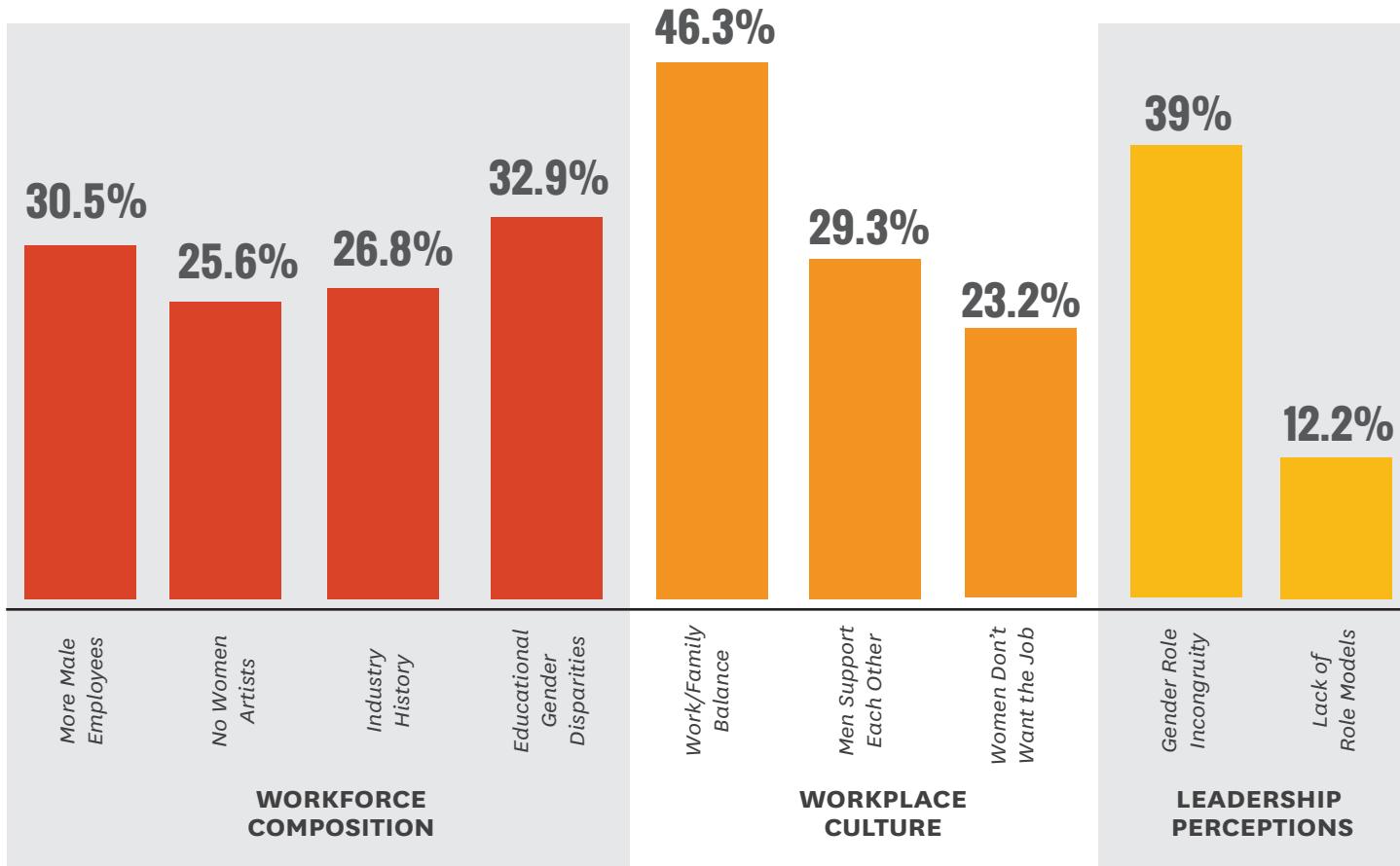
	ALL WOMEN	WOMEN OF COLOR
OVERALL		26.9%
TOP TIER		30%
MIDDLE TIER		24.8%
LOWEST TIER		21.4%
		5.5%
		6.2%
		4.8%
		4.8%

Analysis based on 416 executives at 60 global VFX companies working across 400 top-grossing films.

Tiers are based on number of credits across top films. Top=20 companies; Middle=18; Lowest=22

REASONS FOR THE LACK OF WOMEN IN VFX LEADERSHIP ROLES

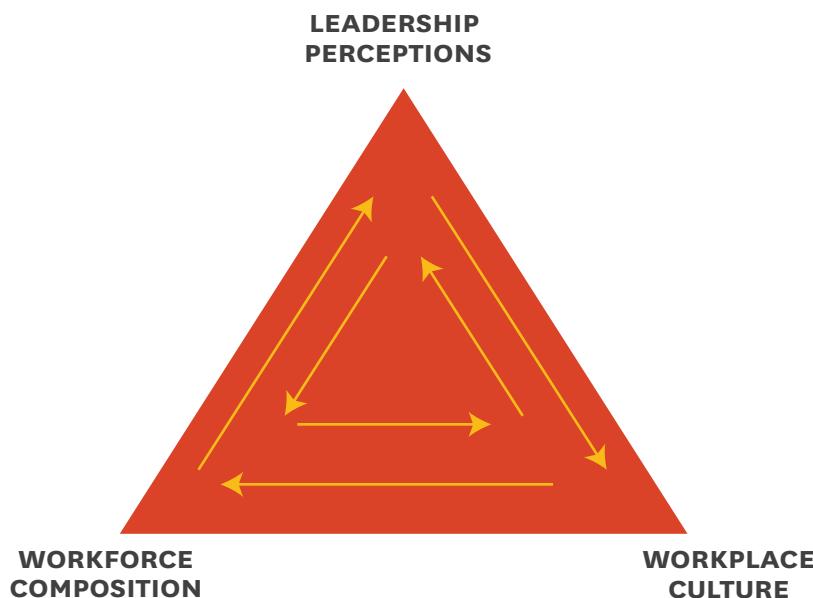
Responses from qualitative interviews with 51 women & 31 decision-makers



Sample includes 51 women: 43.1% from underrepresented racial/ethnic groups, 82.4% worked in creative/technical roles, 12.8 average years experience and 31 decision-makers: 61.3% men, 6.1% from underrepresented racial/ethnic groups, average age 44.1 years, 18.6 average years of experience.

BARRIERS IMPEDING WOMEN'S CAREER PROGRESS IN VFX

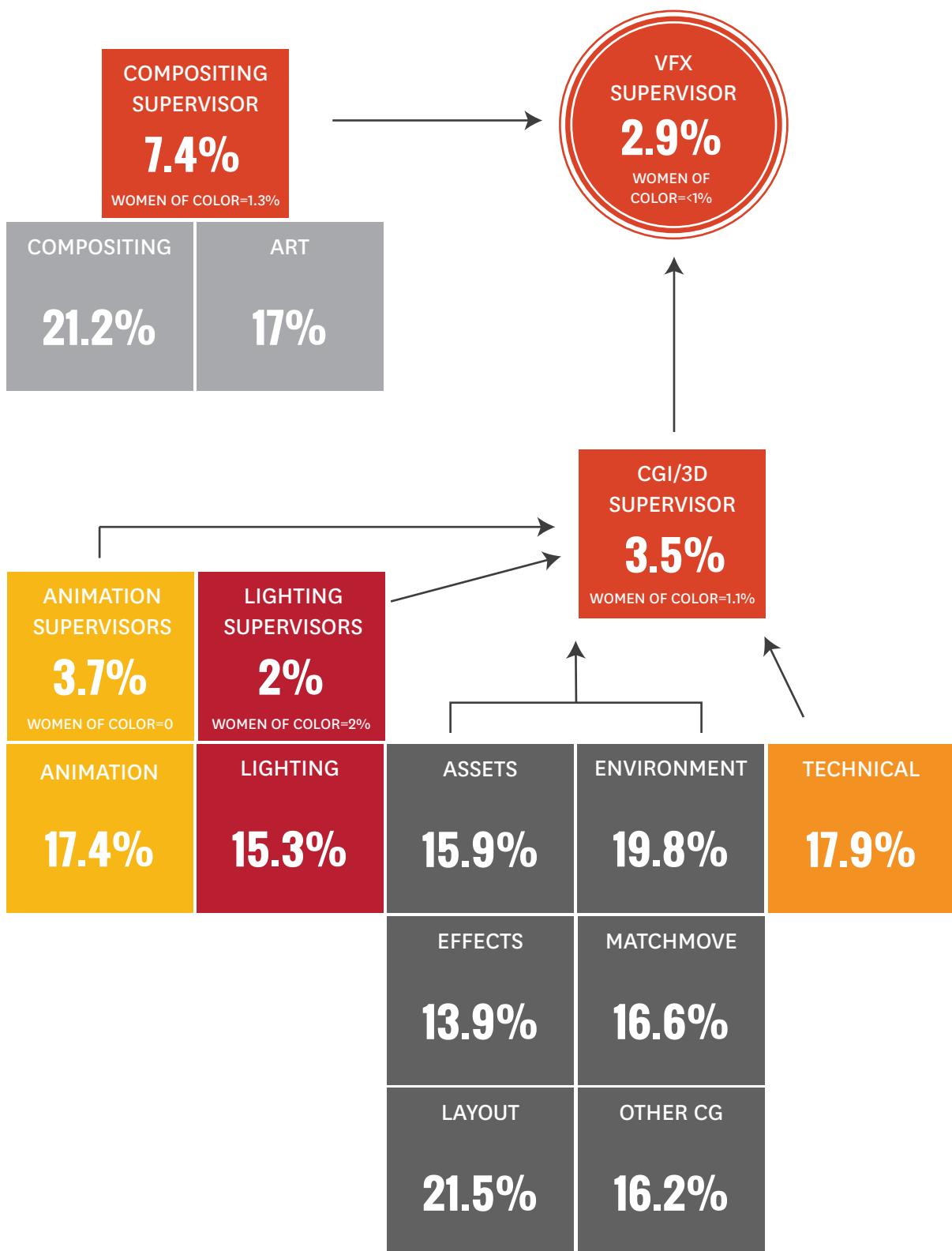
Based on qualitative interview responses from 51 women and 31 decision-makers



PARTICIPANTS DESCRIBED ISSUES THAT INDEPENDENTLY AND INTERACTIVELY PREVENT WOMEN FROM ASCENDING TO LEADERSHIP POSITIONS IN THE VFX INDUSTRY.

PIPELINE TO LEADERSHIP FOR WOMEN IN CREATIVE & TECH ROLES

Women's creative and technical credits by department across 400 films, 2016-2019



Creative and technical roles are those supporting the artistic and back-end tasks needed to create visual effects. Each department includes multiple positions. While different paths to seniority may be possible, this chart is intended to reflect the nature of the VFX hierarchy for films.

Producing credits and the production track are considered in a different infographic.

PIPELINE TO LEADERSHIP FOR WOMEN IN PRODUCTION

Women's production credits across 400 films, 2016-2019

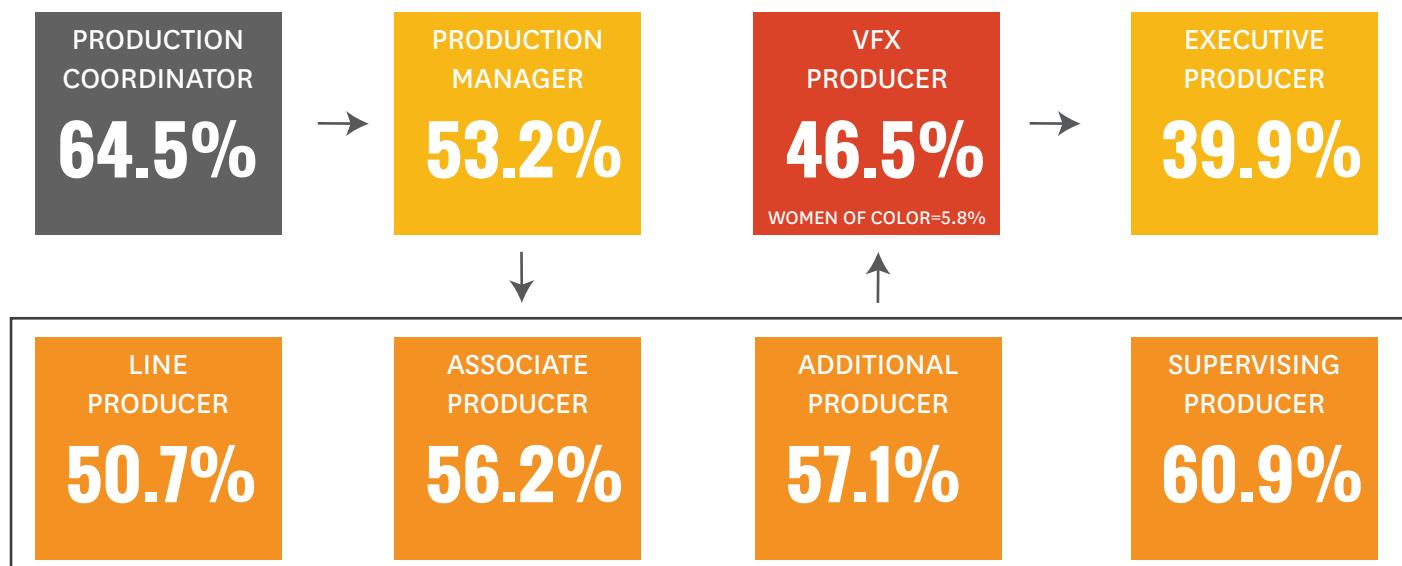


Chart reflects credits for VFX production across 400 top-grossing films. Various paths to seniority may exist and the second row is not intended to reflect a sequential progression of job titles. Creative and technical credits are included in a separate infographic.

SOLUTIONS TO INCREASE WOMEN'S PREVALENCE IN VFX

RAISE THE PROFILE OF VFX PRODUCERS

ESTABLISH EQUIVALENT PAY WITH SUPERVISORS & INCREASE VALUE OF CONTRIBUTIONS

MAKE VFX PRODUCERS ELIGIBLE FOR ACADEMY AWARDS & MEMBERSHIP

RECOGNIZE ACHIEVEMENTS ALONGSIDE SUPERVISORS

BOLSTER THE PIPELINE TO VFX SUPERVISOR

IDENTIFY AND NURTURE TALENT EARLY IN CAREERS & USE OBJECTIVE CRITERIA FOR PROMOTION

CREATE CULTURES THAT SUPPORT WOMEN OF COLOR

ENSURE THAT WOC HAVE ACCESS & OPPORTUNITY ACROSS COMPANIES AND POSITIONS

EXPAND OPTIONS FOR FLEXIBLE WORK AND JOB SHARING

PROVIDE OPPORTUNITIES FOR PEOPLE OF ALL GENDERS TO BALANCE WORK AND PERSONAL NEEDS

CREATE INCLUSION POLICIES THAT SPAN STUDIOS AND VFX HOUSES

USE SUPPLIER DIVERSITY PRACTICES TO GUIDE CONTRACTING AND SERVICES

Invisible in Visual Effects: Understanding the Prevalence and Experiences of Women in the Field

USC Annenberg Inclusion Initiative

Key Findings

The purpose of this study was to examine women's participation in the visual effects industry. The Annenberg Inclusion Initiative accomplished this task in several ways. From a quantitative perspective, we scrutinized the gender of individuals credited in VFX positions and leadership roles across the 400 top films from 2016-2019. Using this database, we also determined the 60 top companies retained for VFX across the 400-movie sample and the gender distribution of C-suite or equivalent positions at these firms. We also assessed gender in nominations and awards in VFX at the Academy Awards® (including the Scientific and Technical Awards) and the Visual Effects Society (VES) Awards. Our qualitative approach included using in-depth semi-structured qualitative interviews with women and decision-makers working in VFX to understand the impediments facing women in the VFX industry. Below, we present key findings from both the quantitative and qualitative investigations. Throughout the quantitative section, significant differences are noted when they reach 5 percentage points or greater. This is to avoid emphasizing trivial deviations (1-2%) which may be an artifact of large sample sizes.

Quantitative Findings—VFX Credits

VFX Credits Overall. A total of 103,972 individuals were credited for a variety of VFX positions across the 400 top films from 2016-2019. Of those, 21.6% ($n=22,489$) were women and 78.4% were men ($n=81,483$). The percentage of women working in VFX did not change over time.

Differences in credit placement by gender were examined. In title cards, 84.8% of VFX credits were assigned to men, compared to 15.2% to women. In the main unit, 71.2% of credits were held by men versus 28.8% by women. Three-quarters of credits in second units/locations went to men and 25% to women. Finally, 78.6% of post-production VFX credits were assigned to men and 21.4% to women.

Leadership Credits. A total of eight VFX positions were designated as leadership posts. A full 5,515 credits held in title cards, main units, second units/locations, and in post-production facilities were examined. Only 16.2% of leadership positions were filled by women.

Less than one-fifth of the women were from underrepresented racial/ethnic groups (15.9%), which increased meaningfully from 2016 (13.8%) to 2019 (19%). Overall, 2.5% of all leadership roles were held by women of color.

Of the total of 1,497 credits for *VFX supervisor* across the 400 movie sample, 97.1% were held by men and only 2.9% by women. Thirty-five of the women VFX supervisors were white and only 7 were from underrepresented racial/ethnic groups. Thus, the ratio of male VFX supervisors to women of color VFX supervisors is 208 to 1.

Across credits, a total of 1,217 *VFX producers* appeared across the 400 film sample. Of these producers, 53.3% were men and 46.7% were women. Only 70 women VFX producers were from underrepresented racial/ethnic groups. Here, the gender ratio is 9.3 men to every 1 woman of color working as a VFX producer.

Slightly more than three-quarters of *VFX editors* (77%) were men and 23% were women. Of the women VFX editors, 76.9% were white and 23.1% were women of color.

Of the 383 *animation supervisor* credits, the vast majority were held by men (96.3%). Put differently, only 14 or 3.7% of animation supervisors across 400 films were women. Not one was a woman of color.

A similarly male-dominated position was *lighting supervisor*. Nearly all (98%) of those credited in this position were men. Only one woman, from an underrepresented racial/ethnic group, was credited with this title.

A full 765 individuals held the *compositing supervisor* post, with 92.6% men and 7.4% women. Only 10 or 1.3% of compositing supervisors were women of color.

Few *3-D supervisors* were credited across the sample of 400 movies. All 6 were men. In contrast, 802 *CG supervisors* received credits in the films evaluated. Of these, 96.5% of CG supervisors were men and 3.5% were women; 19 of these women were white (2.4% of CG supervisors) and only 9 were women of color (1.1% of CG supervisors).

Pipeline Positions. Beginning with roles that lead to *compositing supervisor*, women were credited in 21.2% of *compositing* roles and 17% of *art* positions. Yet, only 7.4% of all *compositing supervisors* were women, and a mere 1.3% were women of color. This demonstrates anywhere from a 9.6 to 13.8 percentage point decline in women's participation to this leadership role.

Moving to roles that lead to *CG supervisor*, a similar pattern emerged. Of the 16,127 credits in these jobs, women filled anywhere from 13.9% to 21.5% of credits across *environment*, *lighting*, *layout*, *effects*, *animation*, *assets*, and *matchmove* positions. As noted earlier, 3.7% of *animation supervisors* and 2% of *lighting supervisors* were women. This suggests that the initial drop off for women comes as they move into departmental supervision roles, as only 3.5% of *CG supervisors* were women, with 1.1% of these credits earned by women of color. Women earned 17.9% of all *technical* credits (e.g., software development, technology & research, technical support).

Nearly two-thirds (64.5%) of production coordinators were women, while 53.2% of production manager credits were assigned to women. Additionally, 60.9% of supervising producers, 57.1% of additional producers, 56.2% of associate producers, and 50.7% of line producers were women. Among producing credits with the highest degree of prestige or authority, 46.5% of VFX producer credits went to women, as did 39.9% of executive producer credits.

Quantitative Findings--VFX Company Analysis

A total of 416 people were identified as belonging to the executive ranks across 60 VFX companies. Of those, 73.1% were men and 26.9% were women. Only 5.5% of all executives were women of color.

Of the 80 executives at the highest position across companies (e.g., CEO, President, Founder, etc.), 88.8% were men and 11.2% were women. Just one of these 9 women was a woman of color.

Of the 60 companies evaluated, 35% did not include a woman in an executive role. This figure increased to 75% when women of color were considered.

Companies were placed in three tiers based on the number of times they appeared in the 400-film sample: top (20 companies), middle (18 companies), and lowest (22 companies). Women were most likely to work in the executive ranks at the top VFX companies evaluated: 30% of the executives at the top 20 companies were women, compared to 24.8% at the middle tier and 21.4% in the lowest tier.

For underrepresented women, however, there was no difference by company tier. Fewer than 10% of executives were women of color across all three tiers: top tier (6.2%); middle tier (4.8%); lowest tier (4.8%).

Companies were sorted into three categories: those that were U.S.-only, those that operated only outside the U.S. (International), and those that operated both in the U.S. and internationally. Most companies operate both in the U.S. and internationally, and 28.4% of executives in these organizations were women. This was significantly more than companies that only operated internationally (22.5%), but not different than U.S.-only companies (30.4%).

Companies with both U.S. and international operations also employed the highest percentage of women of color in executive roles (6.7%), though this was not significantly greater than U.S.-only (4.4%) or International (2.7%) companies.

Quantitative Findings—VFX Awards

Academy Awards®. In the last 10 years, 211 individuals have been nominated for an Academy Award® for Best Visual Effects. Of those, 99.5% were men and 1 nominee was a white woman. This has been the only woman to win, as the remaining 42 winners (97.7%) were men.

Scientific and Technical Awards. Of the 366 recipients of a sci-tech award across the past 10 years, 98.9% were men, and 4 (1.1%) were women. All the women nominated were white women.

Visual Effects Society (VES) Awards. From 2010 to 2020, 4,617 people were nominated for a VES award across all categories. Of those, 89.1% were men, 10.9% were women, and 1 person was gender non-binary. Very few (1.8%) nominees were women of color across the 10-year sample.

Of the 1,058 people to win a VES Award between 2010 and 2020, 90.2% were men and 9.8% were women. Again, only 1.6% of winners were women of color.

The top awards categories from years 2016 to 2020 were also examined. The top awards chosen were: Outstanding Supporting Visual Effects in a Photoreal Episode; Outstanding Supporting Visual Effects in a Photoreal Feature; Outstanding Visual Effects in a Photoreal Episode; Outstanding Visual Effects in a Photoreal Feature; Outstanding Visual Effects in an Animated Feature. A total of 585 nominees were named across these 5 categories from 2016 to 2020. Of those, 87.2% were men and 12.8% were women. A total of 12 women of color were nominated across these awards in the last five years, representing 2% of all nominees.

Qualitative Study

The Annenberg Inclusion Initiative conducted a series of interviews with two groups. The first group consisted of 51 women working in the VFX industry. The second group was comprised of 31 industry decision-makers.

When asked about the lack of women working as VFX Supervisors, a total of 9 response categories aligned with 3 areas of focus. Below we summarize those areas and responses. Additionally, a set of responses regarding why there are more women in the role of VFX producers are included.

Workforce Composition. Participants provided four categories of responses that spoke to the lack of women in the VFX industry. Roughly one-third of answers stated that there are more men employees in VFX (30.5%) or that VFX draws from male-dominated fields of study (32.9%). One-quarter of participants claimed that women are not filling artist roles in VFX (25.6%) and that the history of the VFX industry favors men (26.8%).

In contrast to these responses, participants also indicated that there were more women producers because VFX production includes more women (14.6%) and that women are more prevalent in roles that lead to that of VFX producer (14.6%).

Workplace Culture. Three response categories comprised the next area of focus, that of the workplace culture that exists in the VFX industry. Nearly half of participants described the difficulty of navigating and balancing work and family needs (46.3%). Other responses in this category focused on a work culture results from male-dominated industry (29.3%), including that men support and encourage each other (19.5%) and that women are not encouraged or supported (12.2%). Finally, around one-fourth of participants noted that women are not interested in the role of VFX supervisor (23.2%).

Participants indicated that work in production roles provided more flexibility to balance work and career (13.4%). Additionally, participants stated that women were drawn to, tracked, or supported in production roles (31.7%).

Leadership Perceptions. The final area into which two response categories fell related to the perceptions of leadership within the VFX industry. Here, participants stated that women are viewed as incompatible with the perception of VFX supervisors (39%) and that women lack role models of women VFX supervisors (12.2%)

More than two-thirds (69.5%) of participants stated that women are more likely to embody the traits of successful VFX producers. Additionally, the comparative abundance of women in production was attributed to the lack of required technical skills for VFX producers (13.4%) and to the presence of women role models in production (7.3%).

Industry Solutions. Participants recounted several industry solutions that exist to address the lack of women in VFX. These included supporting women within organizations; improving the gender make-up of the industry via recruitment and hiring; and cultivating the next generation of candidates through education efforts.

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USC Annenberg Inclusion Initiative

One well-established fact is the lack of women in production roles in popular film. According to the Annenberg Inclusion Initiative, women comprised 3% of cinematographers, 15.5% of editors, and 18.3% of production designers on the 300 top feature films from 2016 to 2018. Women were also underrepresented in the top leadership job of director, as only 4% of top-grossing directors were women across 13 years and 1,300 films.

Beyond film, the tech industry more broadly lacks women in its ranks. The National Center for Women and Information Technology found that in 2017, women comprised 26% of the computing workforce.¹ Also akin to film, leadership positions remain the domain of male employees; among Fortune 500 Chief Information Officers, for example, just 25% were women in 2020.²

Given these figures, it is not surprising that anecdotal evidence suggests that women are largely absent in a field that sits at the nexus of technology and film production: visual effects. In 2020, not one woman was nominated for an Academy Award® in this discipline and the first woman to win in the visual effects category did so in 2016. In an era in which visual effects (VFX) are an increasingly important aspect of filmmaking, it is crucial to understand the role that women play in the industry. The purpose of the research reported was to investigate the prevalence of women working in VFX, the factors that impact women's ability to ascend to leadership roles, and perceptions of the field more broadly.

The Annenberg Inclusion Initiative accomplished these goals in two ways. First, we wanted to provide a baseline of women's involvement in VFX. Toward this goal, we scrutinized the gender of individuals credited in VFX positions across the 400 top films from 2016-2019.³ The focus here was to not only map leadership positions appearing on title cards but the larger VFX ecosystem of work credited in main and second units as well as the workforce listed at post-production facilities. Using this database, we also determined the 60 top companies retained for VFX across the 400-movie sample and the gender distribution of C-suite or equivalent positions at these firms. The section concludes by focusing on gender in nominations and awards in VFX at the Academy Awards® (including the Scientific and Technical Awards) and the Visual Effects Society (VES) Awards. Examining nominations and winners serves as a means of examining the degree of recognition women's work receives from the industry and their peers.

The second area of investigation probed the experiences of women working in VFX using in-depth semi-structured qualitative interviews. Here, the goal was to understand the impediments facing women in the VFX industry. In particular, it was important to examine the ways women have navigated the industry to reach leadership roles and how industry members explain the lack of women in key positions. Moreover, the research explored the ways that companies or the industry may have taken steps to hire, retain, or promote women in VFX roles.

The report first overviews the quantitative data and analyses, beginning with film credits and leadership roles, then moving to company analyses and awards data. Throughout the quantitative section, significant differences are noted when they reach 5 percentage points or greater. This is to avoid emphasizing trivial deviations (1-2%) which may be an artifact of large sample sizes. The report then

covers the results of the qualitative investigation. Finally an overall conclusion provides takeaways that emerged across all facets of the investigation.

Quantitative Analysis

The 400 top-grossing films from 2016 to 2019 were examined to understand the participation of women across the VFX industry. Every credit related to VFX was included in the study, according to specific parameters.⁴ The placement of credits was examined by creating four major groups that reflect the on-screen credit structure. First, title cards were examined, followed by credits within the main unit. Then, second units/locations (e.g., second unit, location-based credits, ocean or aerial units) were assessed. Finally, the post-production credits were scrutinized. Below, we first discuss overall percentages in all areas of credits before specifying differences by credit location.

VFX Credits Overall

A total of 103,972 individuals were credited for a variety of VFX positions across the 400 top films from 2016-2019.⁵ Just over a fifth (21.6%, $n=22,489$) of these individuals were women and 78.4% were men ($n=81,483$). The percentage of women working in VFX did not change over time (see Table 1). In 2019, 22.6% of VFX credits were held by women which was non-meaningfully different from 2018 (21.2%), 2017 (21.8%) or 2016 (20.8%).

Table 1
Gender Distribution of VFX Credits Across 400 Films: 2016-2019

Measure	2016	2017	2018	2019	Total
Men	79.2%	78.2%	78.8%	77.4%	78.4%
Women	20.8%	21.8%	21.2%	22.6%	21.6%
Total	23,160	25,120	26,284	29,408	103,972

Note: Gender was not determined for 461 out of the 104,433 individual credits. These were excluded from subsequent analyses and thus the total analyzed is 103,972.

We also examined how gender varied with regard to credit placement. This analysis allowed us to understand whether women were receiving credits that highlighted the importance of their work to the film (e.g., in a title card, before main cast scroll), that occurred on set or on location (e.g., main unit, second units/location), or if women were credited as an employee of a company providing VFX services (e.g., post-production). In title cards and top-of-film credits, 84.8% ($n=302$) of VFX credits were assigned to men, compared to 15.2% ($n=54$) to women.⁶ In the main unit, 71.2% ($n=2,003$) of credits were held by men versus 28.8% ($n=810$) by women. The breakdown by gender of credits in second units/locations was 75% ($n=733$) men and 25% ($n=244$) women. Finally, 78.6% ($n=78,445$) of post-production VFX credits were assigned to men and 21.4% ($n=21,381$) to women.

Leadership Credits

The above analyses are important but do not reveal the gender distribution across different types of VFX credits. To this end, we categorized eight VFX positions as leadership posts (see Table 2).⁷ These positions reflect the roles that have decision-making, supervisory, or critical authority over aspects of visual effects production, including finance and personnel. These are also positions that may appear in

title card positions or work on-set in production, a further reason to explore the placement of these credits. A full 5,515 credits held in title cards, main units, second units/locations, and in post-production facilities were examined. Only 16.2% ($n=896$) of leadership positions were filled with women. Under a fifth of the women were from underrepresented racial/ethnic groups (15.9%, $n=137$), which increased meaningfully from 2016 (13.8%, $n=26$) to 2019 (19%, $n=48$).

Table 2
Leadership VFX Positions in Film

VFX Supervisor	VFX Producer
VFX Editor	Animation Supervisor
Lighting Supervisor	Compositing Supervisor
3D Supervisor	CG Supervisor

The senior most position was **VFX supervisor**, with a total of 1,497 credits across the 400 movie sample. Nearly all of these jobs were held by men, 97.1% ($n=1,454$). Only 2.9% of all VFX supervisor credits were filled with women ($n=43$). Of these 43 women, 42 could be ascertained for race/ethnicity. Thirty-five of the women VFX supervisors were white and only 7 were from underrepresented racial/ethnic groups. Thus, the ratio of male VFX supervisors to women of color VFX supervisors is 208 to 1.

As noted above, credit placement may reflect the significance of an individual's contribution, ability to negotiate their credit, or provide an indication of what area of production the person worked on (e.g., on set, post-production) and whether the person is affiliated with a company. Thus, the distribution of credit placements for each leadership position was assessed. The top VFX supervisor position was listed on title cards at the beginning of films. Only 4 of 170 VFX supervising title credits were attributed to women (Jessica Norman, Kirstin Hall, Crystal Dowd, Sheena Duggal) spanning across 3 films (i.e., *Cats*, *Creed II*, *Venom*). VFX supervisor credits were most likely to appear in post-production credits (78.4%, $n=1,173$), followed by title cards (15%, $n=224$), with few VFX supervisors credited alongside the main unit (5.5%, $n=82$) or second units/locations (1.2%, $n=18$).

Next, the gender distribution of **VFX producers** was assessed. VFX producers are responsible for overseeing the creation of visual effects for a film, working with clients, and managing the delivery schedule.⁸ Across credits, a total of 1,217 VFX producers appeared across the 400 film sample. Of these producers, 53.3% ($n=649$) were men and 46.7% ($n=568$) were women. Race/ethnicity could be ascertained for 552 female producers, with the vast majority white women ($n=482$). Only 70 women were from underrepresented racial/ethnic groups. Here, the gender ratio is 9.3 men to every 1 woman of color working as a VFX producer. Few VFX producers were acknowledged in title cards (6.7%, $n=82$), with most credited in post-production (84.3%, $n=1,026$) facilities followed by production (8.9%, $n=108$) and second unit or location credits (<1%, $n=1$).

VFX editors were also evaluated. Seven hundred and ninety-one VFX editors were credited across the 400 film sample. Most of the editors were credited in post-production (64.8%, $n=513$), followed by the main unit (35.1%, $n=278$), with one VFX editor appearing in title cards. In terms of gender, just over three-quarters of VFX editors (77%, $n=609$) were men and 23% ($n=182$) were women. Overall, 17% ($n=133$) of VFX editors who could be ascertained for race/ethnicity were white women and 5.1% ($n=40$) were women from underrepresented racial/ethnic groups.

Animation supervisors were examined as well. Of the 383 credits, the vast majority were held by men (96.3%, $n=369$). Put differently, only 14 or 3.7% of animation supervisors across 400 films ($n=135$) were

women. Not one was a woman of color! Animation supervisor credits overwhelmingly occurred in post-production (91.6%, $n=351$), with a few (7.3%, $n=28$) appearing in title cards, and 4 credits (1%) appearing in the main unit section.

A similarly male-dominated position was ***lighting supervisor***. Nearly all (98%, $n=49$) of those credited in this position were men. Only one woman, from an underrepresented racial/ethnic group, was credited with this title. It is important to note that there were fewer credits attributed to lighting supervisors, with all but one credited in post-production. Where we see more credits, however, is in the ***compositing supervisor*** post. Here, a full 765 individuals held this title with 92.6% ($n=708$) men and 7.4% ($n=57$) women. Only 10 or 1.3% of compositing supervisors were women of color. Compositing supervisors were credited in nearly all cases (99.4%, $n=760$) in post-production, with 5 credits appearing in the main unit.

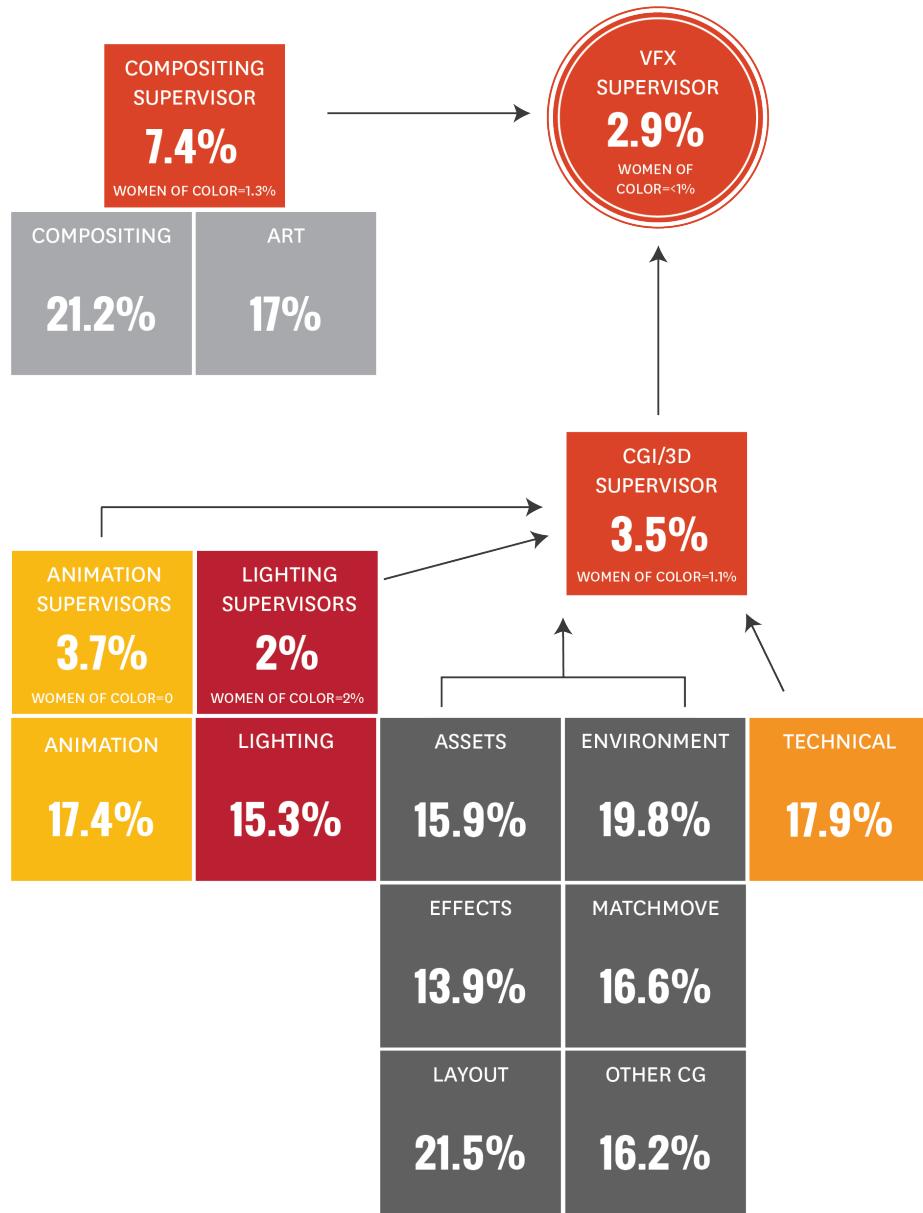
Few ***3-D supervisors*** were credited across the sample of 400 movies. All 6 were men and credited in post-production. In contrast, 802 ***CG supervisors*** received credits in the films evaluated. Of these, 96.5% ($n=774$) of CG supervisors were men and 3.5% ($n=28$) were women. Nineteen of these women were white (2.4% of CG supervisors) and only 9 were women of color (1.1% of CG supervisors). Most of the CG supervisors were credited in post-production (99.4%, $n=798$) while 5 credits appeared in the main unit.

The results here reveal two major trends. First, there are few women working across the VFX industry, particularly in leadership roles. While slightly more than one-fifth of all credits across 400 movies went to women, only a handful of supervisor credits (e.g., VFX, CG, compositing, animation, lighting, etc.) were held by women. Even fewer went to women of color. In contrast, women were more likely to hold roles as VFX producers. In the next section, we examine the gender breakdown of non-leadership positions in VFX. By doing so, we can answer two important questions. First, does a pipeline to leadership roles exist for women? Second, where does the pipeline crack or leak to prevent women from reaching these key roles?

Pipeline Positions

Given the lack of women in leadership roles, it was important to understand the pipeline to these positions. That is, are women filling jobs that can lead to intermediate leadership positions and ultimately the role of VFX supervisor? To answer this question, credits were examined and sorted into departments. Guided by insight from Screen Skills,⁹ we mapped out the hierarchy of credits and assessed the gender profile of each department. Figure 1 depicts the breakdown by gender of roles within major creative and technical departments.

Figure 1
Percentage of Women in VFX Creative Positions by Department



Creative and technical roles are those supporting the artistic and back-end tasks needed to create visual effects. Each department includes multiple positions. While different paths to seniority may be possible, this chart is intended to reflect the nature of the VFX hierarchy for films. Producing credits and the production track are considered in a different infographic.

Beginning with roles that lead to **compositing supervisor**, women were credited in 21.2% ($n=2,702$) of **compositing** roles and 17% ($n=334$) of **art** positions. Yet, only 7.4% of all **compositing supervisors** were women, and a mere 1.3% were women of color. Here, we can clearly see that the pipeline to leadership positions is broken or leaking as this demonstrates anywhere from a 9.6 to 13.8 percentage point decline in women's participation. See Footnote 9 for a breakdown of these credits by department and gender.

Moving to roles that lead to ***CG supervisor***, a similar pattern emerged. Of the 16,127 credits in these jobs, women filled anywhere from 13.9% to 21.5% of credits across *environment, lighting, layout, effects, animation, assets*, and *matchmove* positions. As noted earlier, 3.7% of *animation supervisors* and 2% of *lighting supervisors* were women. This suggests that the initial drop off for women comes as they move into departmental supervision roles, as only 3.5% of ***CG supervisors*** were women, with 1.1% of these credits earned by women of color. Even in the technical roles that lead to CG supervisor, women earned 17.9% of all *technical* credits (e.g., software development, technology & research, technical support). Footnote 10 contains all information regarding each department by gender.

In contrast to the pipeline issues faced by women in the creative and technical areas of VFX, for women in the production pipeline, there are more opportunities. Nearly two-thirds (64.5%, $n=541$) of production coordinators were women. Women's participation declined by 11.3 percentage points when production managers were considered. Slightly more than half (53.2%, $n=622$) of production manager credits were assigned to women. We further evaluated roles that serve an intermediate position between production manager and producer, focusing on roles that were credited a minimum of 20 times across the sample.¹⁰ Of those 60.9% ($n=14$) of supervising producers, 57.1% ($n=16$) of additional producers, 56.2% ($n=82$) of associate producers, and 50.7% ($n=139$) of line producers were women. Among producing credits with the highest degree of prestige or authority, 46.7% ($n=568$) of VFX producer credits went to women, as did 39.9% ($n=213$) of executive producer credits (see Figure 2).

Figure 2
Percentage of Women in VFX Production Positions

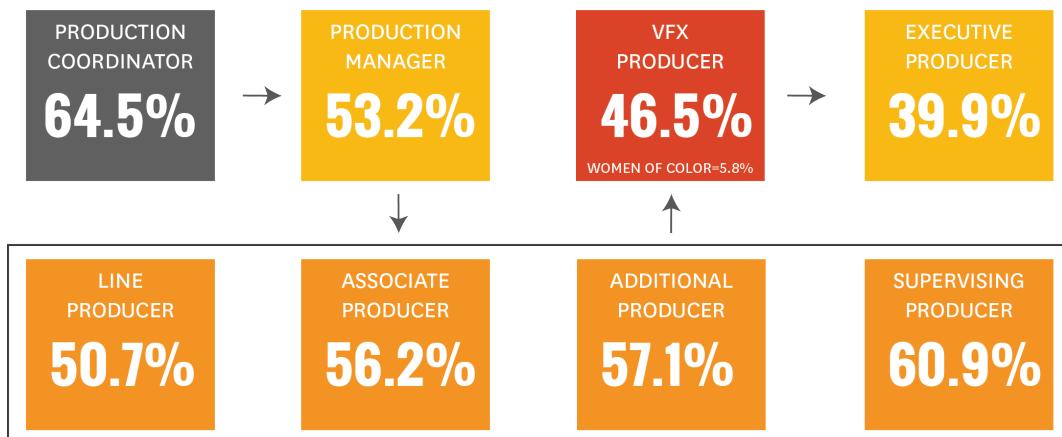


Chart reflects credits for VFX production across 400 top-grossing films. Various paths to seniority may exist and the second row is not intended to reflect a sequential progression of job titles. Creative and technical credits are included in a separate infographic.

While the percentages representing women's participation are very different depending on whether creative/technical roles or production positions are evaluated, there is one trend that applies to both areas. Women's participation declines as prestige and responsibility increase. While this may be more expected for creative and technical roles, it is a notable result in the production arena. Women outnumber men by nearly 2 to 1 as credited production coordinators. Yet, by the time they reach the role of producer, men have achieved equal prominence to women in this position. Thus, although the production side of VFX may be an entrance point for women, it is not without its own challenges for women who want to reach the highest echelons of the job. As the qualitative analysis will illuminate, the

stereotypes that may suggest that women are better suited for production roles still limit their ability to ascend to leadership positions.

In terms of credit location, credits by department were overwhelmingly found in the post-production section, and most were included by the company hired to provide VFX services. This indicates that the companies providing VFX services are the place where women's ascent to leadership roles are most impeded. Thus, it became important to focus on the leadership teams at major VFX companies to understand how the executive ranks of VFX providers may contribute to the lack of women working throughout the employee positions.

VFX Company Analysis

The top 60 companies working in VFX were obtained using the credits across the 400 movies included in the sample. The top company was credited 59 times, while the least-mentioned companies received 7 credits. Thus, these companies reflect a broad cross-section of the major VFX providers for top-grossing movies. Moreover, these entities represent the global VFX industry as they are headquartered across countries. Below, we examine the overall distribution of women and women of color as executives across companies.

A total of 416 people were identified as belonging to the executive ranks across these 60 companies.¹¹ Of those, 73.1% ($n=304$) were men and 26.9% ($n=112$) were women. Only 5.5% ($n=23$) of all executives were women of color. We further examined the gender distribution of executives at the highest position across companies (e.g., CEO, President, Founder, etc.). Of the 80 individuals in this position, 88.8% ($n=71$) were men and 11.2% ($n=9$) were women. Just one of these 9 women was a woman of color.

We also assessed the number and percentage of companies without any women or women of color in their leadership ranks. Of the 60 companies evaluated, 35% ($n=21$) did not include a woman in an executive role. This figure increased to 75% ($n=45$) when women of color were considered.

The distribution of women in the executive ranks by company rank was also examined. Companies were ranked by the number of times they appeared in the 400-film sample. The top tier consisted of 20 companies (credited 20 to 59 times), the middle tier featured 18 companies (credited 11 to 19 times), and the lowest tier featured 22 companies (credited 7 to 10 times). See Table 3.

Table 3
Gender of VFX Company Leadership, by 3 Tiers of Rank

Gender	Top Tier	Middle Tier	Lowest Tier
Men	70% ($n=159$)	75.2% ($n=79$)	78.6% ($n=66$)
Women	30% ($n=68$)	24.8% ($n=26$)	21.4% ($n=18$)
Total	227	105	84

Note: The top tier consists of 20 companies, the middle tier of 18 companies, and the lowest tier 22 companies.

Women were most likely to work in the executive ranks at the top VFX companies evaluated. Thirty percent ($n=68$) of the executives at the top 20 companies were women, compared to 24.8% ($n=26$) at the middle tier and 21.4% ($n=18$) in the lowest tier. This suggests that women have more opportunities

to lead at some of the biggest or most-often utilized VFX companies. For underrepresented women, however, there was no difference by company tier. Fewer than 10% of executives were women of color across all three tiers: top tier (6.2%, $n=14$); middle tier (4.8%, $n=5$); lowest tier (4.8%, $n=4$).

Looking to the apex of leadership roles across the tiers, few women run VFX companies. Only 1 woman (4.4%) was responsible for overseeing a VFX company in the top tier, compared to 15.4% ($n=4$) in the middle tier, and 12.9% ($n=4$) at the lowest tier. Only 1 woman of color held the top leadership position across the sample, at a company at the lowest tier of leadership.

Given the global nature of the VFX industry, we were also curious whether differences existed for women executives in the U.S. or in international locations. Companies were sorted into three categories: those that were U.S.-only, those that operated only outside the U.S. (International), and those that operated both in the U.S. and internationally.

As shown in Table 4, most companies operate both in the U.S. and internationally, and 28.4% ($n=80$) of executives in these organizations were women. This was significantly more than companies that only operated internationally (22.5%, $n=25$), but not different than U.S.-only companies (30.4%, $n=7$). Companies with both U.S. and international operations also employed the highest percentage of women of color in executive roles (6.7%, $n=19$), though this was not significantly greater than U.S.-only (4.4%, $n=1$) or International (2.7%, $n=3$) companies. Looking the numeric differences, however, it is clear that women of color have the greatest opportunity to lead in large, transnational organizations.

Table 4
Gender of VFX Company Leadership by Region

Gender	US Only	International	US & International
Men	69.6% ($n=16$)	77.5% ($n=86$)	71.6% ($n=202$)
Women	30.4% ($n=7$)	22.5% ($n=25$)	28.4% ($n=80$)
Total	23	111	282

Note: Based on the location of each office reported per company, each organization was classified as operating in the U.S. only, Internationally or outside of the U.S., or both in the U.S. and Internationally.

Organizations that operated across international borders (U.S. & International, 10.8%, $n=4$) and those that operate internationally (14.8%, $n=4$) were more likely to have women at the pinnacle of leadership, compared to U.S.-based companies (6.2%, $n=1$). Only one woman of color held this top position, however, at an international VFX company.

Overall, fewer than one-third of all executives at top VFX companies are women. While the most-utilized VFX providers were slightly more likely to have women leaders in their ranks, there is still a drought of women at the top of organizations. This deficit mirrors the percentage of women working in the industry overall. However, company leadership may be one place that potential employees look to as a gauge of an organization's attitude toward women within their ranks. In the next section, we explore another arena that may serve as a window into the industry's value for women: top awards.

VFX Awards

In addition to exploring women's participation in top-grossing films, we also explored how awards recognition varied by gender.¹² Recognition not only communicates the value of a person's work but indicates in a public-facing way how inclusive an industry might be. Across the VFX industry, the nominees and winners at two major contests were examined. First, we focused on the Academy Awards®, including the Scientific and Technology Awards. Second, we examined awards given by the Visual Effects Society. In both cases, we examined awards and nominations over a 10-year period, from 2010 to 2020.

Academy Awards® & Scientific and Technology Awards

The Academy Award® for Best Visual Effects is potentially the designation that is most recognizable to the average consumer. In the last 10 years, 211 individuals have been nominated for this distinction. Of those, 99.5% ($n=210$) were men and 1 nominee (0.5%) was a white woman. This lone woman nominated in 2016 was successful in her bid for a statuette, however, while the remaining 42 winners (97.7%) were men.

Turning to the Academy's Scientific and Technology Awards, 366 people were recipients of a Sci-Tech award across the past 10 years. Nearly all (98.9%, $n=362$) were men, and 4 (1.1%) were women. All the women nominated were white women. Looking more closely at the awards these four women received, they included one scientific and engineering award (2018) and three technical achievement awards (2015, 2017, 2018).

Table 5
Gender of Sci-Tech Awards Recipients by Category Overall

Gender	Academy Award® of Merit	Scientific and Engineering Award	Technical Achievement Award	Honorary Awards	Total
Men	100% ($n=5$)	99.3% ($n=145$)	98.5% ($n=200$)	100% ($n=12$)	98.9% ($n=362$)
Women	0	<1% ($n=1$)	1.5% ($n=3$)	0	1.1% ($n=4$)
Total	5	146	203	12	366

It is clear from these analyses that while the Academy of Motion Picture Arts & Sciences has made steps to diversify its membership base, this has had little impact on the nominees or award recipients in the arena of VFX. Only 1 woman has been nominated for the major VFX award, and 4 have received Sci-Tech designations. In its bid to ensure inclusion across its membership and awards, AMPAS has room to improve in the area of visual effects.

Visual Effects Society Awards

From 2010 to 2020, 4,617 people were nominated for a VES award across all categories. Of those, 89.1% ($n=4,112$) were men, 10.9% ($n=504$) were women, and 1 person was gender non-binary. Very few (1.8%, $n=85$) nominees were women of color across the 10-year sample. Turning to award winners, of the 1,058 people awarded, 90.2% ($n=954$) were men and 9.8% ($n=104$) were women. Again, only 1.6% ($n=17$) of winners were women of color.

Table 6
Gender of VES Award Nominees and Winners by Year

Year	Nominees			Winners		
	Men	Women	Total	Men	Women	Total
2010	86.2% (n=301)	13.8% (n=48)	349	85.4% (n=76)	14.6% (n=13)	89
2011	86.6% (n=344)	13.4% (n=53)	397	89.3% (n=83)	10.8% (n=10)	93
2012	87.6% (n=340)	12.4% (n=48)	388	87.9% (n=80)	12.1% (n=11)	91
2013	90.5% (n=361)	9.5% (n=38)	399	89.2% (n=83)	10.8% (n=10)	93
2014	89.4% (n=379)	10.6% (n=45)	424	94.8% (n=91)	5.2% (n=5)	96
2015	90.6% (n=374)	9.4% (n=39)	413	89.4% (n=84)	10.6% (n=10)	94
2016	88.2% (n=373)	11.8% (n=50)	423	91.3% (n=84)	8.7% (n=8)	92
2017	89% (n=395)	11% (n=49)	444	89.1% (n=90)	10.9% (n=11)	101
2018	90.9% (n=426)	9.2% (n=43)	469	94% (n=94)	6% (n=6)	100
2019	89.5% (n=401)	10.3% (n=46)	448	91.3% (n=94)	8.7% (n=9)	103
2020	90.3% (n=418)	9.7% (n=45)	463	89.6% (n=95)	10.4% (n=11)	106
Total	89.1% (n=4,112)	10.9% (n=504)	4,617	90.2% (n=954)	9.8% (n=104)	1,058

Note: 1 individual nominee in 2019 was gender non-binary.

Due to small sample sizes, analyses by year were not possible for our examination of Academy Awards® or Sci-Tech Awards. For the VES Awards, however, it was possible to do so. Table 6 shows the distribution of women nominees for the VES awards by year. Again, there is little variability from year-to-year, with the high point in 2010 when 13.8% of nominees were women. The low of 9.2% occurred in 2018. Similarly, women won the highest percentage of awards in 2010 (14.6%), and but the lowest in 2014 (5.2%). Notably, the percentage of women winners each year was only significantly different from the percentage of women nominated in 2014 (10.6% vs. 5.2%). This indicates that when women are nominated, their work is typically of such quality that it goes on to win awards. One explanation for the differences between the Academy Awards® and the VES Awards is that producers are included in VES nominations. Given that women were most likely to work as producers across film credits, the inclusion of this position may allow for greater recognition of women's contributions.

Table 7
Women Nominees by Underrepresented Status and Year

Year	UR Women	White Women	Total
2010	17.4% (<i>n</i> =8)	82.6% (<i>n</i> =38)	46
2011	6.5% (<i>n</i> =3)	93.5% (<i>n</i> =43)	46
2012	17% (<i>n</i> =8)	83% (<i>n</i> =39)	47
2013	14.3% (<i>n</i> =5)	85.7% (<i>n</i> =30)	35
2014	18.2% (<i>n</i> =8)	81.8% (<i>n</i> =36)	44
2015	19.4% (<i>n</i> =7)	80.6% (<i>n</i> =29)	36
2016	20.8% (<i>n</i> =10)	79.2% (<i>n</i> =38)	48
2017	31.2% (<i>n</i> =15)	68.8% (<i>n</i> =33)	48
2018	14% (<i>n</i> =6)	86% (<i>n</i> =37)	43
2019	21.7% (<i>n</i> =10)	78.3% (<i>n</i> =36)	46
2020	11.6% (<i>n</i> =5)	88.4% (<i>n</i> =38)	43
Total	17.6% (<i>n</i>=85)	82.4% (<i>n</i>=397)	482

How many women of color were nominated for VES awards? As shown in Table 7, women of color (17.6%, *n*=85) were less likely to be nominated than white women (82.4%, *n*=397) for awards across the last decade. There were, however, differences by year. Women of color were most likely to be nominated in 2017, when they comprised 31.2% (*n*=15) of all women nominated. In 2011, however, only 3 women of color were nominated, which was 6.5% of all women nominees that year. Over the course of the sample, 17 women of color won a VES award. Examining this by year, in 2011 and 2014 there were no women of color who won a VES award, while in 2010, 4 women of color were winners. Three women of color won in 2017 and 2020, 2 in 2013, and 1 woman of color won a VES award in 2012, 2015, 2016, 2018, and 2019.

Because the VES Awards span multiple categories, including film, television, commercials, and student awards, we elected to examine the top awards categories from years 2016 to 2020. This shorter time frame was chosen to account for changes in the awards given in years prior to 2016. The top awards chosen were: Outstanding Supporting Visual Effects in a Photoreal Episode; Outstanding Supporting Visual Effects in a Photoreal Feature; Outstanding Visual Effects in a Photoreal Episode; Outstanding Visual Effects in a Photoreal Feature; Outstanding Visual Effects in an Animated Feature. A total of 585 nominees were named across these 5 categories from 2016 to 2020. Of those, 87.2% (*n*=510) were men and 12.8% (*n*=75) were women.

Differences by year are shown in Table 8. Significantly more women were nominated for top awards in 2016 (16.5%, *n*=19) than in 2020 (9.9%, *n*=12), though the change over time was not linear.

Table 8
Gender across Top VES Awards by Year, 2016-2020

Gender	2016	2017	2018	2019	2020	Total
Men	83.5% (n=96)	87.6% (n=99)	86.4% (n=108)	88.3% (n=98)	90.1% (n=109)	87.2% (n=510)
Women	16.5% (n=19)	12.4% (n=14)	13.6% (n=17)	11.7% (n=13)	9.9% (n=12)	12.8% (n=75)
Total	115	113	125	111	121	585

A total of 12 women of color were nominated across these awards in the last five years, representing 2% of all nominees. There was no difference by year, with the highest percentage of women nominated in 2017 (3.5%, n=4) and the lowest in 2020 (<1%, n=1). In 2018 and 2019, 2 women of color were nominated, while 3 women of color were nominated in 2016.

Table 9
Nominees across Top VES Awards by Category, 2016-2020

Gender	Photoreal Episode (Supporting)	Photoreal Feature (Supporting)	Photoreal Episode	Photoreal Feature	Animated Feature	Total
Men	85.2% (n=104)	84.8% (n=100)	88.9% (n=104)	87.9% (n=109)	89.4% (n=93)	87.2% (n=510)
Women	14.8% (n=18)	15.2% (n=18)	11.1% (n=13)	12.1% (n=15)	10.6% (n=11)	12.8% (n=75)

As shown in Table 9, there were no significant differences in the percentage of women nominated by category. The highest percentage of women nominees appeared in the category of Outstanding Supporting Visual Effects in a Photoreal Feature, while women were least likely to be nominated for Outstanding Visual Effects in an Animated Feature. Notably, none of the nominees in the category of Outstanding Visual Effects in a Photoreal Feature were women of color, although five of the 12 women of color nominees were nominated in the Outstanding Supporting Visual Effects in a Photoreal Episode category.

Summing up, women's achievements have rarely been recognized in major awards. Only one woman has been nominated and won an Academy Award®, while four have been distinguished by the Scientific and Technical Awards. None of these women were women of color. While women have seen more success at the VES awards, they still represent roughly 10% of winners and nominees across the last decade. Women of color also fare slightly better, but fewer than 20% of women nominated were women of color in the last 10 years. Despite this, one positive finding across the quantitative studies is that women at the VES awards appear to be recognized above their percentage in the wider field. This suggests that the quality of work provided by women in visual effects is such that it merits recognition and accolades from their industry peers.

Qualitative Study

While the quantitative data presented above demonstrate that women and women of color fill fewer roles and fewer leadership positions in the VFX industry, the question remaining is: *why?* To answer this

query, we conducted a qualitative study to understand three central issues. First, what prevents more women from rising to the position of VFX supervisor? A second related question was: what are the barriers facing women in the VFX industry? Third and finally, what efforts have companies undertaken to address the obstacles that may hamper women's career progress? Each of these areas are discussed below.

To answer these questions, the Annenberg Inclusion Initiative conducted a series of interviews with two groups. The first group consisted of 51 women working in the VFX industry (12.8 average years of experience, 43.1% from underrepresented racial/ethnic groups, 82.4% in creative/technical roles).¹³ The second group was industry decision-makers (61.3% men, 16.1% underrepresented, average age=44.1 years, 18.6 average years of experience).¹⁴ Two major questions were asked of participants. The first, after presenting individuals with data that 6% of VFX supervisors of top films were women was: *why do you think this is the case?*¹⁵ This was followed by noting that women comprised a larger percentage of VFX producers and asking: *why do you think there are more women working as VFX producers than as VFX supervisors?*

The responses from the interview participants were analyzed, and grouped into one of three spaces that describe the areas of challenge within the industry: workforce composition, workplace culture, and leadership perceptions. Each of these arenas is discussed below, followed by an analysis that draws on theoretical and empirical explanations as to why barriers in these areas might impede women's progress in the industry.

Workforce Composition

Participants mentioned that there were few women VFX supervisors because the composition of the workforce in the VFX industry was male-dominated, an answer that manifested in four ways. First were general mentions of the ***predominance of men as employees*** from 30.5% of participants (25.5% of women, 38.7% of decision-makers). Second, 26.8% of participants, including 19.6% of women and 38.7% of decision-makers indicated that the ***historical roots*** of the VFX industry resulted in men moving into leadership positions. Third, 25.6% of respondents (27.4% of women, 22.6% of decision-makers) stated that ***women were lacking in the artist roles*** that are a prerequisite to working as a VFX supervisor. Finally, 32.9% of participants (33.3% of women; 32.3% of decision-makers) stated that ***VFX draws from male-dominated fields of study***.

While the perception of those interviewed for the study is not incorrect—there are, in fact, a larger percentage of men working at all levels of the VFX industry—numerical discrepancies alone cannot account for the lack of women at the highest tier of VFX work. The decline from artists to supervisor roles demonstrates that there is a pipeline issue facing women in VFX work, and in particular, women of color.

As a point of contrast, 14.6% (15.7% of women, 12.9% of decision-makers) of participants described how the ***production side of VFX work was one that included many more women***. An additional 14.6% (11.8% of women, 19.4% of decision-makers) stated that ***women were specifically more prevalent in the roles that precede the VFX producer title***. The implication was that because more women work at all levels on the production side of the business, women are more likely to reach the leadership role of VFX producer. Though we did find that women hold a larger percentage of production roles at earlier stages of career (64.5% of production coordinators and 53.2% of production managers), 46.7% of VFX producers across our sample of top films were women. As we noted earlier, although women

outnumber men nearly 2:1 as production coordinators, more than half of jobs (53.3%) at the highest tier of VFX production go to men. Clearly the pipeline is more likely to reward men in these roles. These results demonstrate that even when they are a numerical majority, women still do not ascend to a majority of leadership roles.

What should we make of this data? Certainly it is important for women to be included in the ranks of VFX artists and in the pipeline to leadership roles across technical, creative, and production positions so that there will be more women in positions of influence. However, workforce disparities do not provide a sufficient explanation for the lack of career progress for women. The career barriers facing women are not due merely to the *lack of women*, but because through women's exclusion, their perspectives and needs remain unmet, a circumstance described in the next section.

Workplace Culture

One of the major challenges facing women in the VFX industry is the ***difficulty of navigating the demands of work and those of caring for family needs***. This was cited by 46.3% of participants overall, including 41.2% of women and 54.8% of decision-makers.¹⁶ When asked specifically about whether the difficulty of balancing work and family life plays a role, 86.6% of all respondents (84.3% of women, 90.3% of decision-makers) answered that it was a factor they experienced directly or that impacted women generally.¹⁷

The reality is that the current structure of the VFX industry is not hospitable to mothers or fathers. Participants described requirements to work overtime, travel to international filming locations, and to be available to clients or facilities on opposite sides of the globe. The demands of the VFX supervisor position—and the knock-on effects for those lower in the hierarchy of work—were such that women had difficulty envisioning a way to be competitive in this role while also remaining present in children's lives. Yet it is not only women who might wish to be active participants in nurturing the next generation. Fathers who are expected to work the same hours and meet these standards might also hope to spend more time with partners and children, and are just as unable to do so. However, as some participants also noted, it is women who most often bear the cultural, personal, and professional burden of managing family life.

In a male-dominated work environment, such as the VFX industry, it is easy to see why the needs of women with regard to managing childcare and work responsibilities may remain unmet. Even as companies implement policies to allow women a path to senior leadership that offers greater flexibility, it is important to question two things. First, do these policies provide women the time that they need not only for leave, but for ongoing flexibility as children mature? Second, do women feel able to make use of these policies and does the wider workplace culture support and value employees who do so? The existence of a policy alone will do little to advance women if they feel penalized for taking leave, flex time, or using other accommodations. Additionally, if the perception women hold of the field is of an industry that severely restricts one's ability to raise children, this may limit women's aspirations before they even enter VFX companies.

In slight contrast, the role of ***VFX producer was viewed as giving women greater flexibility*** to balance the demands of career and childcare by 13.4% of participants overall. However, some participants noted that the workload and hours required of VFX producers still posed obstacles for women and one individual noted that the difficulty of identifying senior-level producers could be related to women opting out of the field in order to have children. Of the women working in VFX production who

participated in the study, 22.2% ($n=2$) indicated that work and family balance created a personal career barrier. Additionally, 33.3% ($n=14$) of women in the study who identified their work as part of the creative or technical side of VFX stated that work/family balance was a challenge for them or for others. Clearly, navigating the pressures of a career in VFX while also caring for family is a challenge for women throughout the industry.

Importantly, the challenges of 2020, in which parents working in the VFX industry absorbed responsibility as teachers and playmates above their regular caregiving roles and were required to work from home or manage teams remotely may offer guidance. The choices that companies made as they navigated the pandemic may provide insight into what women in the course of non-pandemic years may need to negotiate the demands of caregiving and career. Allowing women and men more flexibility to account for personal needs is not only an important way to create avenues for women to succeed, but to improve employee morale and well-being overall.

In addition to work/family considerations, ***the work culture that results from a male-dominated industry*** was mentioned by 29.3% of participants (37.2% of women, 16.1% of decision-makers). This category was comprised of responses in two major areas. First, that ***men support and encourage each other*** in the profession (19.5%). Second, that ***women are not encouraged or supported*** to move up through the ranks of the industry (12.2%).

The first idea—that men support each other—is not a new idea or explanation for inequality. What researchers call *homophily* and what is commonly referred to as a “like me” bias is commonly reported as a barrier facing women in entertainment.¹⁸ We have heard this explanation regarding the lack of women working as directors in live-action and animation, and as songwriters and producers in the music industry.¹⁹ In the VFX industry, participants focused on the relationships that were formed both within companies and between film directors and VFX supervisors as benefiting men.

For women of color, the VFX industry does not only cultivate a culture that excludes women, but creates spaces that are particularly difficult. When asked directly about challenges they faced, more than half of non-white women (55%, $n=11$) who participated in the interviews indicated that their racial/ethnic background contributed to difficulties in their work in visual effects.²⁰ The negative experiences described by the respondents included feeling isolated or like an “outsider” in the industry as well as receiving unfair treatment by others. This included personal attacks such as teasing or displaying a “patronizing attitude” and facing stalled career advancement as a result of not being taken seriously, having their contributions ignored, and being overlooked for promotions.

The second aspect of the male-dominated workplace culture that participants noted impedes women’s progress is that women are not encouraged in creative roles. Moreover, women may be actively discouraged or blocked from ascending to leadership positions. Coupled with these statements were responses from 23.2% of participants (25.5% of women; 19.4% of decision-makers) that ***women do not want or are not interested in the position of VFX supervisor*** or in pursuing a trajectory that would lead to the role. Here, participants described the long hours, male-dominated workforce, political nature of the job, and lack of overall interest in technical work as reasons why women might opt to pursue a different track.

These two sets of responses offer a circular picture of women’s motivations and the VFX industry’s receptiveness to their presence. On one side, participants noted that the industry itself does not

welcome women into a culture that is built on men supporting each other. On the other, individuals commented that women may be averse to joining such an environment.

Participants offered a different perspective on the reasons why women work on the production side of VFX. Participants explained that ***more women are VFX producers because they are drawn to, tracked, or supported in production roles.*** This response was provided by 31.7% of respondents, including 37.2% of women and 22.6% of decision-makers.

Yet, while these answers suggested that opportunities abound for women in production, they also illuminated that women's choices to pursue work as producers may be somewhat constrained.

Participants noted that in some cases women were "hoarded," "forced," "fell into," or "pushed" into the production track. Others noted that women might have seen that jobs in production were available to them and selected to pursue those. Finally, some participants stated that as runners entering the industry, women might be encouraged to move into production jobs versus technical positions.

The impression that these responses regarding production provide, coupled with the statements made about the masculine culture of technical and creative work, present a troubling picture of the encouragement women receive in the VFX industry. When they *are* encouraged, it is into roles that are less technical or creative, and which have less prestige and possibly even lower pay. This bifurcation of women's opportunity can be explained by the third set of factors that emerged from the interview responses: perceptions of leadership.

Leadership Perceptions

The previous two areas dealt with numerical imbalances and workplace culture as explanations for the lack of women as VFX supervisors. This final section explores the divergent expectations surrounding women's leadership in the VFX industry. Beginning with VFX supervisors, participants stated that ***women were viewed as incompatible with the perception of VFX supervisors.*** Comments in this vein were shared by 39% of participants, including 43.1% of women, and 32.3% of decision-makers.

How can an entire gender be thought of as unfit to fill a professional role? Participants stated that women were viewed as being less technically capable, less assertive or aggressive in leadership, that they weren't trusted or taken seriously, and that overall there was a lack of "fit" between what people within the VFX industry and clients expect a VFX supervisor to be.

The responses in this category reflect not only a specific view of women in VFX but a global perception of women in leadership. Scholars have written extensively and theorized that the attributes ascribed to leaders overlap considerably with traditionally masculine traits. In contrast, leadership traits are incongruous with traditionally feminine traits.²¹

Two primary consequences result from this cognitive bias. First, women are unlikely to be seen as viable leaders because they are viewed as lacking the qualities that leadership requires—which the responses from participants in this study bear out. A second consequence occurs when women embody the traits of a leader. In this case, they may be punished for failing to fulfill expectations of their gender.²² Participants noted this as well, stating for example that women were "too rough" or "too difficult" in the role of VFX supervisor.

The perceptions and expectations of VFX supervisors create a career barrier for women who want to move into these roles. Yet, why is the role of VFX producer one that is more open to women? According to our study participants, the image of a VFX producers is one that is more feminine in nature.

More than two-thirds (69.5%) of participants (72.6% of women, 64.5% of decision-makers) stated that **women are more likely to embody the traits that make VFX producers successful**. This included statements that compared the role to that of a secretary, heralded the need for relational and communication skills, and most strikingly, recounted the need for organizational skills among producers and the supposedly innate ability of women to exemplify that trait. Others likened the role to that of a “babysitter,” “mothering,” and stated that producers were often seen supporting male supervisors.

These responses about the nature of producing strongly align the role not just with feminine traits but essentially with *being a woman*. The result is that the industry bifurcates the opportunities open to women who enter the field. They can fulfill expected gender roles as producers, or they can attempt to succeed in a role that not only places them in a masculine culture but that requires them to take on masculine attributes. The limited number of women who have achieved a leadership role in the VFX industry reflects the difficulty of navigating these divergent options.

Two other factors were noted as reasons for the greater accessibility of the VFX producer role. The first was that **VFX producers are not required to have the technical skills** that the role of supervisor requires. These responses, indicated by 13.4% of participants (17.6% of women, 6.4% of decision-makers), described the role as one that was more open to women who did not receive specialized training or who became VFX producers after working in similar roles across the entertainment industry. Indeed, as a way to involve more women in VFX organizations, particularly as a remedy to a classroom to career pipeline that lacks women as students, the producer position may serve an important role to diversify companies with regard to gender.

The second factor that participants noted as a reason for the greater participation of women as VFX producers was the **abundance of role models** in the job. Only a few participants provided this response (7.3%; 7.8% of women; 6.4% of decision-makers), but it stands in contrast to the 12.2% of participants (9.8% of women; 16.1% of decision-makers) who stated that **women lack role models of women VFX supervisors**. As we will discuss below, representation is not always sufficient to generate interest or perceived success in a given domain.²³ However, employing women at all levels of the industry is important for both the perceptions of those entering the field and for those who would benefit from mentorship and support within companies.

Industry Solutions

Given the challenges outlined above, what solutions exist to bring more women into the field of VFX and to increase the percentage of women in leadership roles? As part of the interview process, we asked participants about industry approaches to addressing gender imbalances that they have seen.²⁴ Many participants, including the women we talked to who have already dedicated immeasurable time and effort to navigating the industry, indicated that there are ways that their companies and the industry as whole are attempting to facilitate inclusion. These efforts fell into three primary categories. The first was supporting women within organizations. Examples of these solutions include hosting forums to acknowledge International Women’s Day, inviting guest speakers to address issues pertaining to diversity. The strategies detailed by participants may be a key way to increase women’s feelings of belonging in the workplace.

A second set of answers addressed the gender make-up of the industry. According to the respondents, the creation of diversity committees at their companies has been one such strategy. In an effort to change hiring practices, few mentioned that the recruiting of women has increased to welcome more women into the field at the beginning stages of their career. Others stated that mentorship within visual effects companies and through outside initiatives such as Women in Animation and the Visual Effects Society has been encouraged. However, with the obvious pipeline problem that exists even for women in production, companies must focus on eliminating the obstacles on the track to promotion by setting hiring goals at all levels. By recognizing women at lower levels for promotion and offering training programs to women at the company to hone their skills, companies can fill in gaps where women have been left behind.

Finally, participants, mostly those in decision-making roles, acknowledged the industry's attempts to look toward the future by cultivating a more inclusive pool of candidates, with a focus on young girls and women. Efforts include programs created to encourage girls to get involved in STEM in early education and bring awareness about the various career paths that are available in the industry to women in higher education. Providing guidance to women aspiring to enter the industry about the types of degree programs they should pursue in schools could help equip women with the skills necessary to be prepared to enter the industry. That said, efforts must be intersectional. If education promotion efforts do not reach both college age women and young girls of color they will continue to perpetuate a field that has little in the way of racial/ethnic diversity.

Conclusion

The set of responses described above illuminate how workforce composition, workplace culture, and leadership perceptions contribute independently and interactively to the lack of women working as VFX supervisors and the larger percentage of women working as VFX producers. A workplace with more men contributes to a workplace culture in which men support each other and the policies and practices surrounding caregiving within companies have not been set up to enable women to make career progress after having children—which undoubtedly leads to a perception by women of an unwelcoming and inhospitable industry and decreases their interest in the field.

Both of these factors have contributed to the industry perception that leaders in VFX, namely VFX supervisors, are those who embody masculine traits or are, by virtue of the field's history, men. The result is an industry that mirrors a traditional heteronormative romantic relationship: women work in supportive roles and are viewed as the primary caregivers while men are seen as providing leadership, vision, and encouraged to focus exclusively on work.

This vision of women's role in an industry is not new and plagues many male-dominated sectors. As noted earlier, the very traits that are seen as necessary for successful leaders are also those associated with traditional masculinity.²⁵ For women to embody these traits is to ask them to encounter punishment or repercussions for acting counter to notions of traditional femininity. In hierarchical settings where masculinity is more associated with success, it may be even more difficult for women to ascend to positions of leadership.²⁶

To counter this vision of women as lacking skills, temperament, or necessary attributes of leadership, VFX companies and those that retain their services must embrace methods that allow for unbiased estimates of women's talents and suitability for the role of VFX supervisor (or other work in the pipeline

to this role). We have drawn on other scholars' work and written elsewhere about the need to develop and utilize criteria in a manner that eliminates the possibility of a sliding scale or preferential treatment of male candidates.²⁷ The same solution is appropriate for the VFX industry. Ensuring that women's competence, leadership abilities, creative vision, and technical skills are not evaluated against their male counterparts or some unknown ideal is imperative. Instead, examining each candidate's skills and abilities against robust, independent, and pre-established criteria is one step that can eliminate bias.

Companies must also take into account the environments they cultivate for their employees. Evidence exists that women encountering stereotypically masculine environments or role models may report less interest and lower perceived success in an industry.²⁸ Moreover, priming stereotypes about women that are personally relevant may lead women to underperform in the stereotypical domain.²⁹ Participants in the study described how the VFX industry is steeped in a "nerdy" historical context, which undoubtedly continues to shape current perceptions of the field. However, for more women to feel interested, comfortable, and to believe they can be successful in technical and creative roles, nurturing a new image is essential.

Finally, the industry must address the caregiving needs of all of its employees. While the practices that the COVID-19 pandemic made possible may be one place to start, it is also important for both VFX companies and major studios to recognize that the current workflow harms the long-term sustainability of the industry's workforce—for both men and women. VFX companies are undoubtedly hampered by the client-driven nature of their business, including the small profit margins and inflexibility of deadlines. However, major studios and production companies must also recognize that the production schedules they demand of employees throughout physical and post production have consequences for the overall diversity of their workforce. As the industry evolves in a post-pandemic world, looking holistically at the nature of production with an eye toward the well-being of *all* employees is a critical step. Companies must ensure that film production does not reset to a normal that excludes women, people of color, those with disabilities, and both single or partnered parents, but instead cultivates new opportunities for historically marginalized people.

Overall Conclusion

The purpose of this investigation was to assess women's participation in the VFX industry, and to understand the reasons for the lack of women working in the field. To that end, we conducted a quantitative investigation that spanned 400 films, 60 companies, and 10 years of awards data. Additionally, through 82 qualitative interviews with women working in VFX and industry decision-makers, we examined the barriers facing women in the field and the industry solutions that have been attempted. Three primary findings have emerged as a result of the investigation.

VFX has a Leadership Problem

The data on the percentage of women in top leadership roles—VFX supervisor, CG supervisor, compositing supervisor—as well as other decision-making positions reflect that there are few women who hold responsibility for VFX on top films. Not only are there few women overall, women of color working in these roles were nearly invisible. These findings were mirrored in the executive ranks of top VFX companies, where fewer than one-third of all top jobs were held by women.

The responses from the qualitative investigation reveal at least one reason why women are less likely than men to reach positions of authority in the VFX industry. The perception of successful leadership

within VFX is one that draws on traditionally masculine stereotypes. Participants recounted how VFX supervisors served as the overall creative authority on a movie, interpreting the vision of a (typically male) director. The result is an industry that lionizes male-typed attributes as critical to achievement and that sees female-typed traits as playing a supporting role. Until the perception of leadership evolves, the industry will continue to replicate its current existence and will lose the talent and skills of women who lead differently.

VFX has a Pipeline Problem

The second major finding that became apparent was that VFX has a pipeline problem. While qualitative participants told us that there are few women in artist roles that lead to supervisory positions, the quantitative data tells a slightly different story. As we have said before, though there may be *fewer* women in creative or technical roles, there are not *few*. Women comprised between roughly 14% and 22% of positions within the very departments that lead to CG or compositing supervisor jobs. Yet, the percentage of women who make it to these roles drops precipitously to less than 5% of animation or lighting supervisors, while 7.4% of compositing and 3.5% of CG supervisor roles went to women. Once again, women of color were virtually absent from these jobs.

Nowhere is the pipeline problem more clear than in production. The responses from our qualitative participants that stated that production was welcoming to women, and that women had more opportunities to ascend the ladder in production. The quantitative numbers illuminated a key issue with this assertion, however. Although there were many more women at the lower ranks of producing in roles such as production coordinator and production manager, at the producer level, men received this credit in equal measure to women. This result may still seem to suggest that women have more opportunity in production—but it also demonstrates that men who work in these positions are able to reach key decision-making positions more often than women.

VFX has a Culture Problem

The last major finding, which both the qualitative and quantitative investigations reveal, is that VFX has a culture problem. Participants told us that the male-dominated nature of the industry results in men supporting each other, not encouraging women, and ultimately, creating an environment in which women find it difficult to balance work and family considerations. This environment may have developed in response to the peculiar nature of VFX as a service industry that meets the needs of studios eager to spend as little as possible in pursuit of high-impact entertainment. Or, it may exist because of the evolution of the business. No matter its roots, the culture is one that seems to hold little value for women, and in particular that women of color find more punishing to navigate.

Additional evidence for the lack of value given to women is evidenced in lack of women whose work has been lauded through awards. Only one woman has been nominated and received an Academy Award®, and only 4 have received Scientific and Technical Awards. While the VES Awards provided more opportunities and accolades to women across the last decade, only around 10% of winners and nominees were women. Once again, it is notable that when women *are* nominated, they typically go on to see their work win. This suggests that if women were to receive more nominations, their work might fare similarly—something that may also be applicable to those who evaluate women’s work within VFX companies and determine whether they should be promoted.

Limitations

As with all investigations, a few limitations must be noted. First, the quantitative study relied upon film credits to understand the makeup of the industry. While we understand that credits may not reflect the entire workforce of a film due to space issues, choices made by the studio, and other factors, this method still represents one accurate means of obtaining information about individuals who contributed to a film's creation. Additionally, while the study focuses on top films, it may not fully encapsulate information regarding visual effects in episodic content. Given the stability of results across the VES awards between features and episodic content, however, were more work on episodic content to be included, we would expect minor deviations in the findings. Finally, although the qualitative study reflects a broad cross-section of the VFX industry, the participants in the investigation were those who agreed to participate. With a different sample we may have heard slightly different insights on the industry. However, we do believe that the perspectives we solicited and the information reported reflect the challenges facing women in the industry as it currently exists.

Ultimately, the transformation of the VFX industry into one that encourages women's (and men's) participation across all facets is one that will take time and effort. Countering existing biases, perceptions, and behaviors is a necessary first step, as is embracing policies and practices that serve a diverse and inclusive workforce. As companies begin this journey, efforts should be informed by experts and evaluated for their success. Evolution is rarely simple, but it is possible, and the VFX industry can mobilize its resources, insights, and workforce to grow into a sector that is open to all.

Footnotes

1. National Center for Women in Information Technology (n.d.). *Fact Sheet*. Retrieved April 19, 2021 from <https://www.ncwit.org/ncwit-fact-sheet>
2. Sharon Gillenwater (August 19, 2020). The Inside Track – The state of women executives in 2020. Boardroom Insiders. <https://web.boardroominsiders.com/blog/the-inside-track-the-state-of-women-executives-in-2020>
3. The 100 top fictional films from each year between 2016 and 2019 were included in this sample based on domestic box office using Box Office Mojo by IMDbPro (<https://www.boxofficemojo.com/>). Films released within each year were ranked based on cumulative domestic box office across their theatrical release and documentaries were not included in the study.
4. The opening and end credits of each film in the sample were captured for access and checking. Additionally, we sought out and received text-based digital documents from studios that contained film credits. Using these resources, the credits of each film were scrutinized to collect the names and positions of all VFX-related credits across the sample. All credits with Visual Effects (VFX) in title or referenced by department or location were included. Per film, names and positions were entered into spreadsheets and checked for accuracy.

All credits were evaluated for association with VFX and *credit placement* (location of credit) using IndieFilmHustle.com as a guide: <https://indiefilmhustle.com/movie-credits-template/>. First, we designated credits that appeared on their own title card and/or before the full cast as ‘leadership roles’. Credits appearing after the cast and associated with a crew department were qualified as ‘main unit’. When credits were given in association with second units, special locations and places, or studio listings they were categorized as ‘secondary units’. Lastly, all post production VFX credits were classified as ‘post’.

Previsualization and postvisualization credits were included, however any crediting that was solely for digital intermediate, 3D conversion, Stereoscopic, cyberscanning, LIDAR, title or end credits, and motion capture were not included. Leadership roles were further scrutinized for the presence or absence of being on a ‘title card’ where only one role and one or more names were listed. Company names were included in data collection for the purpose of creating a sample for the VFX company analysis. Each credit was evaluated as referencing either an individual or an entity. In this way we excluded companies from demographic analyses.

5. Once all data were collected, all individual first names were processed for their association with ‘male names’ or ‘female names’ using the service at Gender-API.com (<https://gender-api.com/>). The strength of the association with each name and gender across thirteen countries was scrutinized using Gender-API data. Each name was associated with values reflecting the total number of samples and the percentage associated with or not with a gender (male, female), per territory.

We set a threshold of 70% probability that a first name was associated with a male or female identity before assigning gender to an individual. The service takes into account multiple samples for each name across 13 territories (United States, Canada, France, India, China, Japan, South Korea, Great Britain, Singapore, Germany, the Philippines, Australia, and New Zealand). All remaining individuals whose names were not included in the Gender-API database or were gender-neutral were then examined on a case-by-case basis to determine the gender identification of the individual.

Online sources such as LinkedIn, IMDbPro, Variety Insight, and Studio System were scoured for pronouns or visual information related to individuals’ apparent gender. When possible, individuals were contacted directly for information related to how they identify their gender. Excluding 1,724 companies, there were a total of 104,433 individuals credited across the 400-film sample. Of those, gender was not determined for 461 individuals (0.4%). These were excluded from all analyses thereby bringing the total included to 103,972 individuals analyzed.

6. Throughout the paper we refer to “title card” credits to include all credits that appear on standalone title cards or those that appear before the main cast scroll at the end of the film. Although these credits are combined for the analysis, separating standalone title cards from other credits would result in small changes to the data presented above. For example, overall, 85% ($n=187$) of standalone title card credits were awarded to men versus 15% ($n=33$) to women. For VFX Supervisors, 11.4% ($n=170$) of credits appear on a standalone title card compared to 3.6% ($n=54$) prior to the main cast scroll. A roughly equivalent percentage of VFX Producers received standalone title card credit (3%, $n=37$) or appeared before the main cast scroll (3.7%, $n=45$). Only 1 VFX Editor received a credit before the main cast scroll; none were on standalone title cards. Finally, 2.3% ($n=9$) of Animation Supervisors received standalone title card credit versus 5% ($n=19$) who appeared before the main cast scroll.

7. Leadership posts were determined by examining the location of each credit and title. All credits placed in the ‘leadership roles’ section of the credits (described above) were counted as ‘leadership posts’. All other credit titles were examined for the presence of the following 8 specific credits: ‘VFX (Visual Effects) supervisor’; ‘VFX producer’; ‘VFX editor’; ‘Animation supervisor’; ‘Lighting supervisor’; ‘Compositing supervisor’ (also 2D supervisor OR 2D Compositing supervisor); ‘3D supervisor’; or ‘CG (Computer Graphics) supervisor’ (also CG ‘&’ or ‘and’ Compositing supervisor). Any of the preceding titles were included in ‘leadership posts’. In some cases individuals were credited with multiple VFX leadership roles and were counted for each role held.

The word “Senior,” company names, locations, and an ‘on set’ designation could modify above titles and were thus included if present. The presence of one or more of the following modifiers would exclude the titles listed above from a leadership role: ‘second unit’, ‘additional’, ‘sequence’, ‘associate’, ‘assistant’, ‘co-’, ‘consulting’, ‘division’, ‘executive’, and ‘lead’. Department was not a factor in determining whether or not a credit was counted as a ‘leadership post’. One of the authors examined all credits to classify them as ‘leadership’ or not and another checked the accuracy of each possible credit.

Across the 5,517 credited individuals in leadership posts, the gender of 2 was not determined and thus these were excluded from analyses. For each female-identified leadership credit, research assistants collected racial/ethnic related information pertaining to the individual. Using industry sources and other information found online (e.g., interviews, familial background, profiles, imagery), the leadership team inferred and/or classified each female-identified leader as white or underrepresented (i.e., Black/African American, Hispanic/Latinx, Asian/Asian American, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, Middle Eastern/North African, and Multiracial/Multiethnic).

The majority (532 out of 896) of credits were inferred and inferred as white. Our research team has used a cross section of information to infer underrepresented status in previous research investigations and have calculated a .90 correlation between how we classify underrepresented status and the actual unrepresented status of individuals working in entertainment. When concrete or tangential information was insufficient, women in VFX leadership were contacted directly for information pertaining to how they identify their race/ethnicity. Of the 896 female-identified VFX leadership credits, 32 were unable to be determined for their underrepresented status (3.6%). Thus, there are 864 VFX female-identified leadership credits included in analyses for underrepresented status.

8. ScreenSkills (2021). Careers in VFX – ScreenSkills. Retrieved from: <https://www.screenskills.com/startng-your-career/job-profiles/visual-effects-vfx/>; <https://www.screenskills.com/media/3392/vfx-2020-web.pdf>

9. Using ScreenSkills as a guide and resource, each credit was classified into one of six departments: *Art*, *CG*, *Compositing*, *Production*, *Technical*, or *Visualization*. In conjunction, two members of the leadership research team used an iterative approach to sort credits. Categorization was guided by examples in the ScreenSkills website and other resources (e.g. Company websites, VFX industry websites, interviews, and other online sources).

Credits that did not fit any of the above groupings were sorted into ‘other’ and general or non-specific credits were categorized as ‘None specified’. When possible, credits in the CG department were further classified into one of

the following sub-departments: *Animation, Assets, Effects, Environment, Layout, Lighting, and Matchmove*. When credits were nonspecific, they were categorized as ‘CG General’.

See the below table for a breakdown of men and women by department across the 400-film sample, excluding leadership posts.

Table 10
Gender by Department Across 400 Film VFX Credits

Gender	Art	CG	Compositing	Production	Technical	Visualization	Other	None specified	Total
Men	83% (n=1,630)	83.7% (n=45,048)	78.8% (n=10,073)	77.4% (n=5,665)	64.8% (n=1,074)	52.2% (n=6,525)	82.1% (n=4,928)	78.8% (n=1,921)	78.1% (n=76,864)
Women	17% (n=334)	16.3% (n=8,761)	21.2% (n=2,702)	22.6% (n=1,761)	35.2% (n=584)	47.8% (n=5,969)	17.9% (n=1,075)	21.2% (n=517)	21.93% (n=21,593)
Total	1,964	53,809	12,775	7,316	1,658	12,494	6,003	2,438	98,457

See the following table for a breakdown of men and women across the groups within the CG department across the 400-film sample, excluding any leadership posts (e.g., Animation supervisor, CG supervisor).

Table 11
Gender by Specific CG Department Across 400 Film VFX Credits

Gender	Animation	Assets	Effects	Environment	Layout	Lighting	Match-move	CG General	Total
Men	82.6% (n=3,145)	84.1% (n=3,184)	86.1% (n=2,530)	80.2% (n=872)	78.5% (n=423)	84.7% (n=1,571)	83.4% (n=1,766)	83.8% (n=31,557)	83.7% (n=45,048)
Women	17.4% (n=664)	15.9% (n=600)	13.9% (n=407)	19.8% (n=215)	21.5% (n=116)	15.3% (n=283)	16.6% (n=351)	16.2% (n=6,125)	16.3% (n=8,761)
Total	3,809	3,784	2,937	1,087	539	1,854	2,117	37,682	53,809

10. Leadership roles were analyzed separately and thus any “VFX producer” credit with or without ‘Senior’ as a modifier was not included in these production department analyses. Credited individuals in the ‘production department’ were scrutinized for the presence of any ‘Production Coordinator’ and ‘Production Manager’ credits or very similar designation (e.g. ‘Prod. Manager’). Additionally, all ‘producer’ credits regardless of the presence of any modifier (e.g., ‘Division Producer’, ‘Associate Producer’) were organized into a ‘producer’ grouping.

One member of the leadership team examined each of the producing related credits in the ‘Production’ department and organized them into similar categories based on the language of the credit. Location (e.g., Italy Additional Producer, 2nd unit Associate Producer) and VFX subdepartments (e.g., Animation Producer, Sequence Line Producer) were not used as part of the classification. Rather, only those modifiers that reflect hierarchy or type of producing were considered. The classes of producing credits that were most frequent and thus reported upon are as follows: executive producer, line producer, associate producer, producer (without a modifier), additional producer, and supervising producer. Of the 51 remaining producing credits, 23 were women (45.1%).

See below for the percentages and numbers of men and women across select VFX ‘production department’ credits.

Table 12
Gender for Select VFX Production Department Credits

Gender	Production Coordinator	Production Manager	Line Producer	Associate Producer	Additional Producer	Supervising Producer	Executive Producer
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Men	35.5% (n=2,980)	46.8% (n=546)	49.3% (n=135)	43.8% (n=64)	42.9% (n=12)	39.1% (n=9)	60.1% (n=321)
Women	64.5% (n=541)	53.2% (n=622)	50.7% (n=139)	56.2% (n=82)	57.1% (n=16)	60.9% (n=14)	39.9% (n=213)
Total	839	1,168	274	146	28	23	534

11. Using the VFX credits database generated for the overall analysis, a list was pulled of every company credited for VFX work across the 400-film sample. Frequency of mention was tabulated and companies were ordered from the highest frequency to lowest frequency of credit. From this ranking, the 60 most frequently credited VFX companies were sampled and evaluated for their company leadership. The company with the most credits was the Moving Picture Company (n=59). Eleven companies tied for 60th with 7 credits each across the sample.

For each company in the sample, a list of executives was generated based on available information from the company's website (typically in the 'about' section designated by the word 'leadership' or equivalent) or other sources (Studio System, IMDbPro, or Variety Insight). Each company was emailed a request to confirm the executives comprising the company leadership. A total of 23 of the 60 companies confirmed the information or corrected what was provided.

For the remaining 27 companies, two of the study's authors in conjunction with members of the research team, determined the executive leadership positions based on rank and size of the company and the titles included in the study. For each organization, the individual(s) with the highest position and executive authority was categorized as the 'Top' or 'Highest Position' in the company based on direct information or online sources referencing the company leadership, structure, or founding.

Gender and the underrepresented status of women working in the executive leadership ranks of the VFX companies was researched and evaluated in the same manner as previous sections of the report. The gender and underrepresented status for women was determined in each case across this sample. The underrepresented status was inferred for the majority (80 of the 112) of women and all 80 were inferred as white.

12. Using the Academy of Motion Picture Arts and Sciences' official Academy Awards® database (<http://awardsdatabase.oscars.org/Search/>) the winners of the Scientific and Technical Awards from 2010 to 2019 as well as the nominees and winners of the Academy Award® for Best Visual Effects from 2010 to 2020 were aggregated. In addition, the Visual Effects Society database (<https://www.visualeffectssociety.com/awards/previous-awards/>) was sourced for all winners and nominees from 2010 to 2020 across all categories.

From the list, all individuals were categorized by ceremony, award name, year, and presence of a win if applicable. Honorary or lifetime achievement awards designated by a special or unique name or achievement were collectively categorized as 'honorary awards'. The method by which gender of all and underrepresented status of female-identified individuals was collected matches procedures referenced above.

Across the 5,201 individuals and excluding 14 companies nominated or awarded, a total of 7 individuals were not able to be determined for gender. Sixteen individuals were inferred for gender based on their first name – all male. One individual across the sample identified as non-binary and was inferred as white. In terms of underrepresented status, the majority of the 509 women were inferred (n=329) and inferred as white. Twenty-two women (4.3%) were unable to be determined for underrepresented status and thus excluded from any related analyses.

13. The first group of participants interviewed for this study consisted of 51 female-identified individuals working in the visual effects film and television industries in the early to mid-stages of their career according to both their position or title description and in terms of number of years working in the industry. All participants were identified using a variety of sources including film credits, online databases, and social media sites like LinkedIn.com. All participants were recruited to participate in the study via email. Additional recruitment included recommendations from several individuals within the visual effects industry. Of the 51 women participants

interviewed, 52.9% ($n=27$) identified their racial and/or ethnic background as white with 43.1% ($n=22$) identifying as another or of multiple racial/ethnic origins. Two participants did not disclose their racial/ethnic background. Across this group, the sample had an average age of 38 years.

Each interview was conducted over the phone or via video conference call by one of three Annenberg Inclusion Initiative staff members. Participants were asked a series of roughly twelve questions, some of which included follow up prompts when necessary. The interviews focused on experiences of individuals working in visual effects. All responses were transcribed from audio recordings, checked for accuracy, aggregated by members of the research team, and analyzed by the study authors. Coding of qualitative interviews focused on frequently occurring themes and theoretically relevant information from the interview questions, including all relevant follow-ups. The unit of analysis is an individual's response to a single question. Thus, answers range in length by question and by respondent, and may fit into multiple categories. Responses to additional interview questions are included in discussions of each career impediment when relevant.

14. The second group of participants interviewed for this study consisted of 31 individuals from the visual effects film and television industries who were identified to be in decision-making roles including at the Visual Effects supervisor or hiring level. The same methods used to identify and recruit the individuals in the first group of participants were used for this group of decision-makers. This group consisted of both women (38.7%, $n=12$) and men (61.3%, $n=19$) respondents. The majority of the sample in this group identified their racial and/or ethnic background as white (83.9%, $n=26$), with 16.1% ($n=5$) identifying as another or multiple racial/ethnic origins, which reflects the demographic profile of decision-makers identified by the quantitative study. Across this group, the sample had an average age of 44 years. In order to gauge their level of experience, each individual in this group was also asked: *How long have you been working in the VFX industry?* Based on the responses to this question, the average number of years calculated for this sample was 18.6. The eleven questions posed to these individuals focused on industry perceptions and current decision-making processes surrounding key roles in the visual effects industry. The interviews were conducted and analyzed in the same manner described above.

15. Both groups of respondents —women in the visual effects industry and decision-makers—were presented with data on women in specific roles in visual effects and asked for their insights. Data provided to all participants included the percentage of female VFX Supervisors across the last 250 top-grossing films of 2019 (6%). Data presented on VFX Supervisors was sourced from: Lauzen, M. M. (2020). The Celluloid Ceiling: Behind-the-Scenes Employment of Women on the Top 100, 250, and 500 Films of 2019. Center for the Study of Women in Film and Television, San Diego State University. https://womenintvfilm.sdsu.edu/wp-content/uploads/2020/01/2019_Celluloid_Ceiling_Report.pdf

16. All responses focused on the demands of the VFX Supervisor role in terms of time and/or travel, and the difficulty women might have balancing family demands in this role were included.

17. Participants in the first group of respondents of 51 women working in the visual effects industry were asked: *To what extent is balancing your work and family life an issue in your career?* Participants in the second group of respondents of 31 decision-makers in the VFX industry were asked: *What role does balancing work and family lives play in women's careers?*

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20. The 51 participants in the first group— women in the visual effects industry – were asked to answer a question regarding their own career trajectories. All 51 participants were asked: *What challenges have you personally faced as a woman working in visual effects?*

Twenty of the 22 participants in this sample who identified as any racial/ethnic group other than white were asked a follow-up prompt regarding their career trajectory: *Are there any unique challenges you have faced as a woman of color in visual effect?* Responses to the follow-up question were analyzed separately and are described in the text.

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24. Participants were asked: *Have you seen any effort by your company, other companies, or the broader animation industry to increase inclusion for women in the workplace?* If they responded positively they were asked two additional follow-up prompts. First: *What have you seen?* And second: *Does it seem to be working?* When participants indicated that they had not seen any efforts they were asked: *What accounts for the lack of industry action?*

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