

# **Quantifying Art Historical Narratives**

Holland Stam

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# Abstract

My project surveys the development of *Janson's History of Art* across its eight editions as well as *Gardner's Art Through the Ages* through its sixteen editions, looking particularly at the change in artist demographic through time. Additionally, this paper investigates which external variables such as artist gender, race, ethnicity, nationality, number of exhibitions at the Museum of Modern Art, and number of exhibitions at The Whitney if any, help to infer the magnitude of an artist's inclusion in art history survey texts. I conduct data analysis to assess the demographic representation of artists through editions of *Janson's History of Art* and *Gardner's Art Through the Ages*, a proxy for the art history survey. I compare artist demographics through editions of Janson and Gardner. My findings indicate that coverage of minority artists (defined as non-white and/or from Hispanic or Latino origin and/or female) increases across editions of *Janson's History of Art* and *Gardner's Art Through the Ages*, but remains negligible compared to white male artists not from Hispanic or Latino origin. Moreover, in *Janson's History of Art* through all editions, the percentage of artists who are white is 97.37%, the percentage of artists that are male is 89.99%, and the percentage of artists that are not from Hispanic or Latino origin is 95.82%. In *Gardner's Art Through the Ages*, through all editions, the percentage of artists who are white is 90.02%, the percentage of artists that are male is 85.69%, and the percentage of artists that are not from Hispanic or Latino origin is 91.51%. Both texts display a narrative of the history of art as being predominantly white, male, non-Hispanic or Latinx. Regarding nationality, in Janson, 78.51% of the artists are American, British, French, German, and Spanish, which is very similar to Gardner's 76.58% of those five same nationalities. I have chosen to run a linear mixed-effects model with a random effect of the artist's name, to infer the magnitude of the space given to a particular artist divided by the area of the page of the given edition (total space ratio per page), in *Janson's History of Art* and *Gardner's Art Through the Ages*, using the potential predictor variables: artist gender, race, ethnicity, nationality, the count to year of the number of exhibitions an artist has at the MoMA, and the count to year of the number of exhibitions an artist has at The Whitney. The model with the best AIC, and best explains the variance in the total space ratio per page per artist per edition uses artist nationality and the count to year of the number of exhibitions an artist has in the MoMA as well as the interaction between those two variables. With a log transformation applied to the outcome variable as it is heavily right-skewed, my linear mixed-effects model yields a conditional  $r^2$  of 53.23%. Such denotes that 53.23% of the variance of total space ratio per page given to an artist in a given edition can be explained by the model.

**JEL Numbers:** C80, Y10, Z11

**Key Words:** Cultural Economics, Art History, Statistics, Historiography, Data Collection Methodology, Linear Mixed-Effects Modeling.

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## 2 Introduction and Context

### 2.1 Inspiration for Research

Heading into the second semester of my junior year in January of 2021, I scheduled a zoom meeting with my now undergraduate thesis advisor, Prof. Hans van Miegroet, to ask a few questions about my aspirations after college. He had been my professor for his course, “History of Art Markets,” a learning experience at Duke that has permanently altered my worldview. The meeting began with me expressing my enjoyment of the course, and the appreciation of the discussion of transparency in the buying and selling of art. I asked his opinion on whether I should stick to studying architectural history with hopes of going to architecture school, or to pivot to do further research under him in his graduate course, “Arts and Markets” that I had enrolled in for that spring. Towards the end of the meeting, he asked me what I found most interesting about art, to which I replied, “Ever since I took my first Art History course, I’ve always been curious as to why I am introduced to the works I am. Who is choosing what I study versus what I don’t study?” I had initially learned the story of art through Marilyn Stokstad’s, *Art History* my final year of high school. At the end of that school year, my art history teacher, Carolyn Paczkowska, held space for the discussion of the question, “Why are we studying the works that we have?” The class noted that there were gatekeepers of art and information and later ended in the conclusion of uncertainty. Prof. van Miegroet looked at me through the computer screen and stated I had found my research question for my Undergraduate Honors Thesis, that I had found my why.

My research began solely looking at how art history textbooks changed through time, then developed into looking at using a linear mixed-effect model with a log transformation on my outcome variable to infer which external variables would if at all work to predict the magnitude of space (of text and of the figure of their work or works) given to an artist in a given book.

### 2.2 Why *Gardner’s Art Through the Ages*

First published in 1926 by Helen Gardner, *Gardner’s History of Art* is widely considered the first single-volume survey of the world’s art.<sup>1</sup> Previously, there had been no comparable single-volume art history text in English. Her introductory survey text far surpassed other available

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<sup>1</sup>Themina Kader, “The Bible of Art History: Gardner’s Art through the Ages.” *Studies in Art Education* 41, no. 2 (Winter, 2000): 167.



works in readability, breadth of coverage, and wealth of illustration. The latest edition, the sixteen, of the art history survey text, was published in 2020. *Gardner's Art Through the Ages* has the longest publishing history and evolution that displays the changing nature of an art history survey text.

Gardner's initial success can be quantified by the statistic that the first two editions, published a decade apart, as stated by an art education researcher from Pennsylvania State University in 2000 Kader Themina, "sold 260,000 copies, a testimony to the popularity of her book."<sup>2</sup> Since then, in a 2007 publication by art history professor Barbara Jaffee at Northern Illinois University, this statistic has been updated, "'the book went through three editions and thirty-nine printings between 1926 and 1948 for a total of 446,479 copies...'"<sup>3</sup> She cites this information as being from Gardner's devoted student, Harold Allen. By 1973, as stated by associate professor at York College, Patricia Hills, "according to an in-house survey by another publisher which has contemplated entering the market, ... Gardner's fifth edition held 24 percent of the market" of art history texts.<sup>4</sup> *Gardner's Art Through the Ages* ranks second at that time to *Janson's History of Art*. By 2001, *Gardner's* 11th edition won both the Textbook Excellence Award and the McGuffey Longevity Award. *Gardner's* was the first books to win both prizes in a single year. Such statistic is not sales information but does underscore the importance and dominance of the text through time.

Additionally, as highlighted by two professors and a library assistant at Purdue in a footnote of their publication in 2020, Frank Hill of Cengage emailed the authors with partial but recent sales data:

A preliminary analysis conducted on November 8, 2019, showed that the week before, Amazon sales ranking of *Gardner's Art through the Ages: A Global History* 16th edition was 55,003... While only partial, such data show that the current edition is selling well (analysis conducted using salesrankexpress.com). In addition, an information request to Cengage revealed that the sixteenth edition has been adopted by 1,325 institutions of higher education across the United States.<sup>5</sup>

*Gardner's* has a clear foothold in the story of art history that is still present and relative today. In a footnote in that same publication, an unnamed art historian, in an email to the authors, states "*Gardner's Art Through the Ages* is, by a wide margin, the best-selling introduction to the history of art in the English language and the number one test in North American high school and university courses."<sup>6</sup> Though it is unclear where this information is coming from,

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<sup>2</sup>Kader, "The Bible of Art History," 171.

<sup>3</sup>Barbara Jaffee, "9. 'Gardner' Variety Formalism: Helen Gardner and Art through the Ages", in *Partisan Canons* edited by Anna Brzyski (New York: Duke University Press, 2007): 204. <https://doi.org/10.1515/9780822390374-010>.

<sup>4</sup>Patricia Hills. "Art History Textbooks: The Hidden Persuaders," *Artforum* 14 (Summer 1976): 58, ProQuest.

<sup>5</sup>Jean-Pierre V.M. Hérubel, Benjamin R. Sloan, and Matthew N. Hannah, "Evolution of a Canonical Art History Textbook: Charting Bibliographic Elements in *Gardner's Art through the Ages*," *Art Documentation: Journal of the Art Libraries Society of North America* 39, no. 1 (2020): 23, The University of Chicago Press Journals.

<sup>6</sup>Hérubel, "Evolution of a Canonical Art History Textbook," 15.

this information is consist with what Hill of Cengage highlights. Ideally, I would be able to have comprehensive sales information from 1926-2020 on how the book sold through editions, but such information in the aggregate remains opaque.

With that said, *Gardner's Art Through the Ages* is a phenomenal proxy of how the overall narrative of the history of art is changing through time. Jaffee argues that though *Gardner's Art Through the Ages* has changed through time, its reputation as a textbook at the core of the story of the history of art has remained constant.<sup>7</sup>

Table 2.1 displays information for each of the sixteen editions published through time. Most notably, in 2009, the title was revised to *Gardner's Art Through the Ages: A Global History*, emphasizes the claim that the book displays artists from diverse backgrounds. Additionally, authorship has turned over myriad times through the years.

Table 2.1: Edition Number, Year of Publication (as listed per Edition), Title, Authorship, and Publisher Over Time of All Cataloged Editions of *Gardner's Art Through the Ages*.

Edition	Year	Author(s)	Title	Publisher
1	1926	Helen Gardner	<i>Art Through the Ages; An Introduction to Its History and Significance</i>	New York, Brace, Harcourt
2	1936	Helen Gardner	<i>Art Through the Ages; An Introduction to Its History and Significance</i>	New York, Brace, Harcourt
3	1948	Helen Gardner	<i>Art Through the Ages</i>	New York, Brace, Harcourt
4	1959	Helen Gardner; revised by Sumner M. Crosby and the Dept. of the History of Art, Yale University	<i>Art Through the Ages</i>	New York, Harcourt, Brace
5	1970	Helen Gardner; Revised by Horst de la Croix, Richard G. Tansey	<i>Gardner's Art Through the Ages</i>	New York, Harcourt, Brace
6	1975	Helen Gardner; revised by Horst de la Croix, Richard G. Tansey	<i>Gardner's Art Through the Ages</i>	New York: Harcourt Brace Jovanovich
7	1980	Helen Gardner; revised by Horst de la Croix, Richard G. Tansey	<i>Gardner's Art Through the Ages</i>	Harcourt Brace Jovanovich, New York

<sup>7</sup>Jaffee, "9. 'Gardner' Variety Formalism," 205.

Edition	Year	Author(s)	Title	Publisher
8	1986	Horst de la Croix, Richard G. Tansey	<i>Gardner's Art Through the Ages</i>	Harcourt Brace Jovanovich, San Diego, CA
9	1991	Horst de la Croix, Richard G. Tansey, Diane Kirkpatrick	<i>Gardner's Art Through the Ages</i>	San Diego: Harcourt Brace Jovanovich
10	1996	Richard G. Tansey, Fred S. Kleiner	<i>Gardner's Art Through the Ages</i>	Fort Worth, TX: Harcourt Brace
11	2001	Fred S. Kleiner, Christin J. Mamiya, Richard G. Tansey	<i>Gardner's Art Through the Ages</i>	Fort Worth TX: Harcourt College Publishers
12	2005	Fred S. Kleiner, Christin J. Mamiya	<i>Gardner's Art Through the Ages</i>	Thomson/Wadsworth, Belmont, CA
13	2009	Fred S. Kleiner	<i>Gardner's Art Through the Ages: A Global History</i>	Boston, Thomson/Wadsworth
14	2013	Fred S. Kleiner	<i>Gardner's Art Through the Ages: A Global History</i>	Australia ; United States : Wadsworth, Cengage Learning
15	2016	Fred S. Kleiner	<i>Gardner's Art Through the Ages: A Global History</i>	Boston, MA : Cengage Learning
16	2020	Fred S. Kleiner	<i>Gardner's Art Through the Ages: A Global History</i>	Boston, MA, US : Cengage Learning

## 2.2.1 Discourse of Authorship

Helen Gardner wrote the first three editions of *Gardner's Art Through the Ages*. She was born in 1878 in Manchester, New Hampshire to father Charles Frederick Gardner, a tailor, and mother Martha W. Cunningham.<sup>8</sup> When she was thirteen, her family moved to Chicago. In high school, she studied Greek and Latin. In the spring of 1897, she entered the University of Chicago on a scholarship. She graduated in 1901 with an A.B. degree with honors in Latin and Greek. She taught at Brooks Classical school in Chicago, serving as an assistant principal as her sister was principal between 1905 to 1910.<sup>9</sup> In 1915, she returned to the University of Chicago as a graduate student at the age of 35 to study Italian and Art. She graduated with an M.A. in 1917 and between 1917 and 1918 she was awarded a fellowship. In 1919, she

<sup>8</sup>Lee Sorensen, ed. "Gardner, Helen," Dictionary of Art Historians, accessed April 7, 2022, <https://arthistorians.info/gardnerh>.

<sup>9</sup>Lee Sorensen, "Gardner, Helen."

was appointed head of the photograph and slide collection at the Ryerson Libraries of the Art Institute of Chicago. In the fall of 1920, she led an art history lecture course called “Survey of Art” at the School of the Art Institute of Chicago. During this period at the Ryerson Library, the beginnings of her first book published in 1926 developed.

Her newly created survey text, one of the first of its kind, brought her national recognition and lectureships at the University of California at Los Angeles in 1927. She was appointed full professor at the Art Institute of Chicago and the department chair in 1934. Shortly thereafter in 1936, she published a revised second, expanded edition of *Art Through the Ages* appeared which newly included a section regarding modern art.<sup>10</sup> She taught art history at the Art Institute of Chicago for 27 years. She led the art history department with a tenure that lasted until 1943. In February of 1944, she fell ill with breast cancer. Gardner completed the text for a third edition before she died of complications of bronchopneumonia in Chicago in June of 1946.<sup>11</sup> The book was published in 1948 posthumously. Gardner was claimed to be a pioneer as she included non-western art in her text. Her third edition is the most diverse in terms of ethnicity and nationality with the scope of two-dimensional works after c. 1750 compared to the 24 other textbooks I cataloged. Additionally, as early as the first edition in 1926, there were non-white artists, and as early as the second edition in 1936 there were female artists included.

Table 2.2 provides a brief biography of the authors through time of *Gardner’s Art Through the Ages* as well as highlighting the edition and year of publication in which they were involved in authorship.

Table 2.2: Authors of *Gardner’s Art Through the Ages*

Author	Edition (Year)	Description
Sumner McKnight Crosby (1909-1982)	4 (1959)	Sumner McKnight Crosby was an American Medievalist architectural historian. He was the principal scholar of St-Denis and chair of the Department of Art History, Yale University, 1947-1953. <sup>12</sup>
Horst de la Croix	5 (1970), 6 (1975), 7 (1980), 8 (1986), 9 (1991)	An Art Historian and professor at San Jose State University from 1957 until his retirement in the early 1980s. He was born in Berlin and came to the U.S. in 1935. He obtained his B.A., M.A., and Ph.D. in Art History from the University of California, Berkeley. <sup>13</sup>

<sup>10</sup>Lee Sorensen, “Gardner, Helen.”

<sup>11</sup>Kader, “The Bible of Art History,” 164-166.

Author	Edition (Year)	Description
Richard G. Tansey (1919-1998)	5 (1970), 6 (1975), 7 (1980), 8 (1986), 9 (1991), 10 (1995)	An Art Historian and professor at San Jose State University from 1947-1961. He then taught at UCLA for a year, only to return to San Jose State University from 1962-1980. He received his B.A., M.A., and Ph.D. from Harvard. <sup>14</sup>
Diane Kirkpatrick (1933 - present)	9 (1991)	She received her B.A. from Vassar College in 1955, her MA and Ph.D. in Art History from the University of Michigan in 1965 and 1969. She joined the faculty at the University of Michigan in 1968 and retired in May of 2000. <sup>15</sup>
Fred S. Kleiner	10 (1995), 11 (2001), 12 (2005), 13 (2009), 14 (2013), 15 (2016), 16 (2020)	He received his B.A. from the University of Pennsylvania, then his M.A. and Ph.D. in Art History from Columbia University. He was a professor of the History of Art and Architecture and Archaeology at Boston University. <sup>16</sup>
Christin J. Mamiya	11 (2001), 12 (2005)	She received her B.A. from Yale University, and her M.A. and Ph.D degrees in Art History from UCLA. She was a professor at the University of Nebraska-Lincoln from 1987-2019. <sup>17</sup>

## 2.3 Why *Janson's History of Art*

*Gardner's Art Through the Ages* may hold claim to impressive longevity, but *Janson's History of Art* is claimed to be the most influential art history survey through time by myriad art

<sup>12</sup>Lee Sorensen, ed. "Crosby, Sumner McKnight," Dictionary of Art Historians, accessed April 7, 2022, <https://arthistorians.info/crosbys>.

<sup>13</sup>Mercury News Staff Report, "H. de la Croix, SJS Professor of Art History," *San Jose Mercury News (CA)*, March 5, 1992: 3B, NewsBank: America's News – Historical and Current.

<sup>14</sup>"Tansey, Richard G. (1919-1998)," Emeritus and Retired Faculty Biographies, S.J.S.U Scholar Works, last modified October 24, 2019, [https://scholarworks.sjsu.edu/erfa\\_bios/240/](https://scholarworks.sjsu.edu/erfa_bios/240/).

<sup>15</sup>"Memoir: Diane M. Kirkpatrick," Faculty History Project, University of Michigan, accessed April 7, 2022, <http://faculty-history.dc.umich.edu/faculty/diane-m-kirkpatrick/memoir>.

<sup>16</sup>"Fred S. Kleiner: Professor Emeritus of History of Art and Architecture and Archaeology," Boston University Arts & Sciences: Archaeology, accessed April 7, 2022, <https://www.bu.edu/archaeology/profile/kleiner/>.

<sup>17</sup>"Christin Mamiya: Emeritus Faculty 2019," University of Nebraska-Lincoln, accessed April 7, 2022, <https://arts.unl.edu/art/faculty/christin-mamiya>.

historians such as Jeffery Wiedman, Zoë Ingalls, John Russell, Alexandra Peers, Elizabeth Sears and Charlotte Schoell-Glass to name a few. Alexandra Peers in her publication for *ARTnews.com* in February of 2006, claims that “it was Janson who, more than any other art historian, pioneers the ‘in and out’ celebrity model of art history. There were artists who matter, he argued, and those who didn’t.”<sup>18</sup> Janson’s formation of his history of art is not only arguably the most dominant art history survey over time, but also he holds a reputation of being a gatekeeper of art history. He states at the end of his introduction in the first and second editions that after having read his text, one “shall have joined the active minority that participates directly in shaping the course of art in our time.”<sup>19</sup> He recognizes his role as an individual who shapes the narrative of the history of art while convincing the reader that after having read his text, one has the agency to be a gatekeeper alongside him. Such agency is only granted once one understands his digestion of the most important works and artists through time.

It would be most comprehensive if we were to have access to the total number of sales per edition of *Janson’s History of Art*, to use as tangible data to show the relevance and importance of the text through time. Both publishers, Harry N. Abrams and Prentice Hall (now Pearson Prentice-Hall) have declined to share sales information in the aggregate. By leafing through various scholarly publications, there is imperfect data of sale information worth noting when discussing the dominance of *Janson’s History of Art* through time. The text was at its height of sales between when it was initially released in 1962 through H. W. “Peter” Janson’s death in 1982 (refer to Table 2.1 for complete information on each edition). Art historian, Patricia Hills cites in her publication in *Artforum*, “in 1973 the Janson text had 46% of the market, while Gardner’s 5th edition had 24%, followed by Gombrich’s, 8.5%, Cleaver with 3% and miscellaneous ‘other’ with 18.5%.”<sup>20</sup> At the time such a report had been made, the first edition (1962), the first edition revised and enlarged (1969) had been released. Additionally, it was written by John Russell of the *New York Times* in October 1982 that “well over two million copies have been sold.”<sup>21</sup> Russell does not specify whether these sales numbers are solely the first edition of *Janson’s History of Art*, or the first edition as well as the first edition revised and enlarged and the second edition (1977). He also added that the text had been “translated in 14 languages and is widely regarded as both an essential teaching instrument and a book that can be read and looked at with continuous enjoyment.”<sup>22</sup> Here, Russell perpetuates the significance of Janson’s survey, as well as provides information about the breadth of Janson’s text, reaching more than solely English-reading audiences.

Conversely, Zoë Ingalls in a publication in August of 1995 discussing Janson’s relevance through

<sup>18</sup>Alexandra Peers, “Canon Fodder,” *ARTnews.com*, February 1, 2006, <https://www.artnews.com/art-news/news/canon-fodder-135/>.

<sup>19</sup>H. W. Janson and Dora Jane Janson, *History of Art: A Survey of the Major Visual Arts from the Dawn of History to the Present Day*, First Edition, Second Printing (New York: Harry N. Abrams, 1963), 17.

<sup>20</sup>Patricia Hills, “Art History Textbooks,” 58.

<sup>21</sup>John Russell, “Prof H. W Janson is Dead at 68; Wrote Best-Selling ‘History of Art,’” *New York Times*, October 3, 1982, <https://www.nytimes.com/1982/10/03/nyregion/prof-h-w-janson-is-dead-at-68-wrote-best-selling-history-of-art.html>.

<sup>22</sup>Russell, “Prof H. W Janson is Dead at 68.”

time, cites that “the first edition sold more than a million copies.”<sup>23</sup> Though there are informational discrepancies, it is clear that Janson’s History of Art was prolific as a survey text of art for over 20 years. The narrative remained significant from the third (1986) through the fifth edition (1995), which were all revised by Anthony “Tony” F. Janson, son of Peter and Dora Jane. Ingalls states that “the fourth edition, published in 1991, sold 21,000 copies the first year and an average of 11,000 copies a year in the past four years. The new fifth edition has sold more than 13,000 copies since its March release.”<sup>24</sup> She continues, “Although its sales have been eclipsed over the last 10 years by another perennial favorite, R.H. Gardner’s Art Through the Ages, Janson is still the standard in many people’s minds.”<sup>25</sup> Notably, she does not mention any total sales information about Gardner’s survey text, just that over the past decade (1985-1995), its sales trumped that of Janson’s.

After the sixth edition (2001) and the sixth edition revised (2004) the last with authorship by Tony Janson, Harry N. Abrams and Prentice-Hall were unsatisfied with the total sales, as well as the overall structure and content of the text as they were criticized for having lost touch with young readers.<sup>26</sup> At the same moment, Harry N. Abrams sold all rights to the newly formed Pearson Prentice Hall, who recruited new authorship of six various art historians across the United States: Penelope J. E. Davies, Walter B. Denny, Frima Fox Hofrichter, Joseph Jacobs, Ann M. Roberts, and David L. Simon (refer to Table 2.3). Such change was received negatively by art historians, which is reflected in the text’s further decline in sales.<sup>27</sup> It has been estimated by Bookauthority.com (a cite whose source for this information is very unclear) that the eighth edition revised, published in 2015 has had 2,000 total copies sold while competing art historical narratives such as Marilyn Stokstad and Micheal W. Cothren’s History of Art Vol. 1 has had an estimated 10,000 copies sold since its release in 2017.<sup>28</sup> Such has left *Janson’s History of Art* as a minor player in art historical narratives today.

Table 2.3: Edition Number, Year of Publication, Title, Authorship, and Publisher Over (as listed per Edition) Time of All Cataloged Editions of Janson’s History of Art.

Edition	Year	Authors	Title	Publisher <sup>29</sup>
1	1963 <sup>30</sup>	H.W. Janson with Dora Jane Janson <sup>31</sup>	<i>History of Art: A Survey of the Major Visual Arts from the Dawn of History to the Present Day</i>	Harry N. Abrams, Inc., New York

<sup>23</sup>Zoë Ingalls, “A Son Revises His Father’s Classic Art-History Textbook,” *The Chronicle of Higher Education*, August 11, 1995, <https://www.chronicle.com/article/a-son-revises-his-fathers-classic-art-history-textbook/>.

<sup>24</sup>Ingalls, “A Son Revises His Father’s Classic Art-History Textbook.”

<sup>25</sup>Ingalls, “A Son Revises His Father’s Classic Art-History Textbook.”

<sup>26</sup>Peers, “Canon Fodder.”

<sup>27</sup>Jeffrey Weidman, “Many Are Culled but Few Are Chosen: Janson’s History of Art, Its Reception, Emulators, Legacy, and Current Demise,” *Journal of Scholarly Publishing* 38, no. 2 (January 2007): 96, Project MUSE.

<sup>28</sup>“100 Best-Selling Art History Books of All Time,” Book Authority, <https://bookauthority.org/books/best-selling-art-history-books>.

Edition	Year	Authors	Title	Publisher
1 (Revised and Enlarged)	1969	H. W. Janson with Dora Jane Janson	<i>History of Art: A Survey of the Major Visual Arts from the Dawn of History to the Present Day</i>	Prentice-Hall Inc., Englewood Cliffs, New Jersey and Harry N. Abrams, Inc., New York.
2	1977	H. W. Janson with Dora Jane Janson	<i>History of Art: A Survey of the Major Visual Arts from the Dawn of History to the Present Day</i>	Harry N. Abrams, Inc., New York.
3	1986	H. W. Janson; Revised and Expanded by Anthony F. Janson	<i>History of Art</i>	Harry N. Abrams, Inc., New York and Prentice-Hall Inc., Englewood Cliffs, New Jersey.
4	1991	H. W. Janson; Revised and Expanded by Anthony F. Janson	<i>History of Art</i>	Harry N. Abrams, Inc., New York.
5	1995	H. W. Janson; Revised and Expanded by Anthony F. Janson	<i>History of Art</i>	Harry N. Abrams, Inc., New York.
6	2001	H. W. Janson and Anthony F. Janson	<i>History of Art</i>	Harry N. Abrams, Inc., New York.
7	2007	Penelope J. E. Davies, Walter B. Denny, Frima Fox Hofrichter, Joseph Jacobs, Ann M. Roberts, David L. Simon	<i>Janson's History of Art: The Western Tradition</i>	Pearson Prentice Hall, Upper Saddle River, New Jersey.
8	2011	Penelope J. E. Davies, Walter B. Denny, Frima Fox Hofrichter, Joseph Jacobs, Ann M. Roberts, David L. Simon	<i>Janson's History of Art: The Western Tradition</i>	Pearson Prentice Hall, Upper Saddle River, New Jersey.

<sup>29</sup>There are discrepancies through the first and sixth editions of only Harry N. Abrams being listed as the publisher on the book itself and Harry N. Abrams and Prentice-Hall both being listed. Harry N. Abrams was the primary publisher through the first sixth editions as Prentice-Hall was their distributor.

<sup>30</sup>I cataloged the first edition, second printing, published in 1963, but the first edition, first printing was published in 1962. There is no different between printings.

<sup>31</sup>Dora Jane Janson is only listed upon opening the book to the title page. She is not listed anywhere on the exterior of the Janson's History of Art across the first edition, second printing, first edition (revised and enlarged) fourteenth printing, nor the second edition.



### 2.3.1 Discourse of Authorship Through Editions

The primary author through the first six editions of Janson's History of Art is Horace Waldemar Janson (1913-1982), colloquially referred to as Peter. He was born in 1913 in St. Petersburg, Russia to parents who were of Swedish and Latvian descent.<sup>32</sup> The family moved to Hamburg, Germany after the Russian Revolution. Janson studied at Munich and then at the University in Hamburg where he was a student of Erwin Panofsky, a prolific art historian known for his contributions to the studies of symbols and iconography in art.<sup>33</sup> In 1935, at the suggestion of his advisor, Janson fled Germany under the sponsorship of Alfred Barr, director of the Museum of Modern Art in New York. Janson studied at Harvard between 1935 and 1942, completing a Ph.D. in art history. His most significant professorial position began in 1949 when he was appointed professor and later chairman of the department of art at New York University. He remained in such a role for 25 years as he grew the department's prestige, solidifying its reputation as one of the most conservative art history programs in the country. A decade later, in 1959, Janson issued a book titled, *Key Monuments of the History of Art*, in an effort to aid his undergraduates in their study of art as the availability of good personal study images were not easily accessible.<sup>34</sup> Such publication sparked Janson's History of Art released in 1962, a survey of art written with his wife, Dora Jane Janson.

Born Dora Jane Heineberg (1916-2002) in Philadelphia in 1916, she shared a passion for art with Peter. The two met in Cambridge, Massachusetts as she attended Radcliffe College as an undergraduate student while Janson was studying at Harvard.<sup>35</sup> Dora Jane Janson worked with her husband on many publications, but her most notable achievement came in 1971 when she wrote an exhibition catalog for the Nasher Museum of Art at Duke on Art Nouveau jewelry, titled *From Slave to Siren: The Victorian Woman and Her Jewelry from Neoclassic to Art Nouveau*.<sup>36</sup> Authorship of Janson's History of Art was handed over to one of the couple's four children, Anthony F. Janson, after the sudden passing of Peter Janson in 1982.

Anthony Frederick "Tony" Janson was born March 30th, 1943 in St. Louis, Missouri. The Jansons moved to New York in 1949, and Tony Janson frequently visited the city's museums as a child and teenager. In 1954, the Jansons spent a year in Europe. In an interview, Tony Janson describes his attitude upon the family's return to New York as one of "total rebellion" eventually causing his parents to search for a school that would engage him better academically.<sup>37</sup> Janson details how he rediscovered a love for learning after enrolling at Riverdale Country School on a full scholarship, and it is at this time that he began to study art history.

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<sup>32</sup>Lee Sorensen, ed. "Janson, Horst, Woldemar," Dictionary of Art Historians, accessed April 7, 2022, <https://arthistorians.info/jansonh>.

<sup>33</sup>Lee Sorensen, "Janson, Horst, Woldemar."

<sup>34</sup>Lee Sorensen, "Janson, Horst, Woldemar."

<sup>35</sup>Lee Sorensen, ed. "Janson, Dora Jane," Dictionary of Art Historians, accessed April 7, 2022, <https://arthistorians.info/jansond>.

<sup>36</sup>Lee Sorensen, "Janson, Dora Jane."

<sup>37</sup>Anthony Janson, "Interview with Anthony F. Janson, March 15/19, 2007," interview by Sherman Hayes, *University of North Carolina Wilmington Archives and Special Collections*, March 15-19, 2007, 11.

Janson experimented as an artist himself and cited his early affection for photography as the reason he was the first to add that medium to a survey textbook of art history.<sup>38</sup> Educated at Columbia and Harvard, Janson was asked to continue the work of his father as author of Janson's History of Art. Unable to revise the entire textbook in time, Janson "added women, which was long overdue."<sup>39</sup> and photography to the textbook for the third edition. After returning from the Vietnam War, Janson earned his Ph.D. in art history from Harvard and went to teach at the College of Charleston before transitioning to a career as chief curator of the Indianapolis Museum of Art. In 1984 Janson moved to the Ringling Museum of Art in Sarasota, Florida, and then he was Chief Curator of the North Carolina Museum of Art from 1989 to 1993. Janson spent the rest of his career at UNC Wilmington and retired in 2002. The last edition of Janson's History of Art that he worked on was the sixth revised, and he viewed his revisions of Janson's History of Art as more in line with his father's approach than the rest of his own scholarship.

The seventh and eighth editions were rewritten by a group of art historians across the United States: Penelope J. E. Davies, Walter B. Denny, Frima Fox Hofrichter, Joseph Jacobs, Ann M. Roberts, and David L. Simon. In Table 2, each author's name, gender, ethnicity and nationality are listed, with question marks next to Frima Fox Hofrichter and Ann M. Roberts' nationality and Joseph Jacob's ethnicity as such information could not be found with full certainty. We observe here a desire to diversify authorship in efforts by the publisher to cater to young readership, and increase sales. Notably, there is gender diversity, with a fifty-fifty split of male to female authorship, though a complete lack of racial diversity, which is a notion reflected additionally in the text itself. Since the Janson name has left the book's authorship, the text has declined significantly from being the most dominant art historical survey.<sup>40</sup>

Table 2.4: Authors of the Seventh and Eighth Editions of Janson's History of Art.

Author	Description (As listed by Publisher)
Penelope J. E. Davies	Associate Professor at the University of Texas, Austin. She is a scholar of Greek and Roman art and architecture as well as a field archaeologist. She is an author of <i>Death and the Emperor: Roman Imperial Funerary Monuments from Augustus to Marcus Aurelius</i> , and winner of the Vasari Award.
Walter B. Denny	Professor of Art History at the University of Massachusetts at Amherst. In addition to exhibition catalogues, his publications include books on Ottoman Turkish carpets, textiles, and ceramics, and articles on miniature painting, architecture and architectural decoration.

<sup>38</sup>Janson, "Interview with Anthony F. Janson," 7.

<sup>39</sup>Janson, "Interview with Anthony F. Janson," 9.

<sup>40</sup>Weidman, "Many are Culled but Few Are Chosen," 94.

Author	Description (As listed by Publisher)
Frima Fox Hofrichter	Professor and former Chair of the History of Art and Design department at Pratt Institute. She is the author of <i>Judith Leyster, A Dutch Artist in Holland's Golden Age</i> , which received CAA's Millard Meiss Publication Fund Award.
Joseph Jacobs	An independent scholar, critic, and art historian of modern art in New York City. He was the curator of modern art at the John and Mable Ringling Museum of Art in Sarasota, Florida, director of the Oklahoma City Art Museum, and curator of American art at The Newark Museum, Newark, New Jersey.
Ann M. Roberts	Professor of Art at Lake Forest College, she has published essays, articles and reviews on both Northern and Italian Renaissance topics. Her research focuses on women in the Renaissance, and her most recent publication is entitled <i>Dominican Women and Renaissance Art: The Convent of San Domenico of Pisa</i> .
David L. Simon	Jetté Professor of Art at Colby College where he received the Basset Teaching Award in 2005. Among his publications is the catalogue of Spanish and southern French Romanesque sculpture in the Metropolitan Museum of Art and <i>The Cloisters</i> .

## 2.4 Literature Review

### Many are Culled but Few are Chosen: Janson's History of Art, Its Reception, Emulators, Legacy, and Current Demise

The publication by art historian Jeffrey Weidman, released in January 2007 in the *Journal of Scholarly Publishing* begins by reviewing in detail the lineage of English-language art history surveys in America, and the Jansons' text therein; discusses in detail the various reviews of the Jansons' and other survey texts, namely Helen Gardner's *Art Through the Ages*, and Marilyn Stokstad et al.'s *Art History*. He concludes that Janson's History of Art functioned as the dominant art history survey through time. Secondly, Weidman discusses the changes in Janson's History of Art between the sixth edition revised, the last edition written by Peter and Tony Janson, and the seventh edition written by the six various art historians (Table 2.4). He believes that the seventh edition is a disgrace to Janson's text, and the beauty of Janson's analytically writing has been completely stripped in the seventh edition. He also discusses, yet only through a handful of examples, artists, and works that were taken out as well as added between the sixth edition revised and the seventh. Notably, such publication does not discuss data in the aggregate when looking at who is included and excluded, and rather only looks in detail at the changes between the sixth edition revised and the seventh edition.

### Revising Art History's Big Book: Who's In and Who Comes Out?

This article published by Randy Kennedy in March of 2006 in the New York Times, also discusses the change between the sixth edition revised and the seventh edition of Janson's *History of Art*.<sup>41</sup> Kennedy looks at only a few artists and works who leave and are added, particularly baffled by the exclusion of *James Abbot McNeill Whistler's Arrangement in Black and Gray: The Artist's Mother*. He interviews Sarah Touburg, an editor of the seventh edition who claims that upwards of 25% of the book's content had been altered between the sixth edition revised and the seventh edition. Interestingly, Kennedy claims that the new book adds more women and it uses art much more as a way to discuss race, class, and gender. This publication also discusses the dominance and influence that Janson's *History of Art* has had over time, as well as its decline as the best-selling art survey in recent years. Kennedy states that a shift in authorship was done in an effort to revitalize Janson's relevance to younger audiences. Though this publication discusses the change between the two editions, Kennedy does not do so in the aggregate.

#### Discussions and Depictions of Women in H. W. Janson's History of Art, Fourth Edition

Art historian Paul E. Bolin discusses gender inequality through the first four editions of *Janson's History of Art*.<sup>42</sup> He states that a primary criticism of Janson's text is its lack of attention given to the importance of the work of women artists. The first two editions did not include any women, then there was an influx of female artists when Tony Janson claimed primary authorship for the publication of the third edition in 1986. Bolin argues that even with the edition of female artists in the third and fourth editions, there is still not enough representation and that additionally the fashion in which Tony discusses female artists is apologetic and at times problematic. Bolin uses simple statistics in his discourse, having counted a total of 9 out of the 28 new artists added to the fourth edition as female. Bolin does not discuss racial discrimination, nor does he use complete data in the aggregate when looking at gender discrimination.

#### Evolution of a Canonical Art History Textbook: Charting Bibliographic Elements in *Gardner's Art Through the Ages*

Written by researchers at Purdue Libraries and School of Information Studies: Jean-Pierre V. M. Hérubel, professor, Benjamin R. Sloan, a library assistant, and Matthew N. Hannah, an assistant professor and published in 2020, this text highlights the change in the book of *Gardner's Art Through the Ages*. The three of them use statistical analysis to look at how the length of the book changes through time, how the type of image changes through time, how the percent of color images changes through time, and how the number of suggested readings changes through time. They randomly selected the first edition, the fifth edition, the twelfth,

<sup>41</sup>Randy Kennedy, "Revising Art History's Big Book: Who's In and Who Comes Out?" New York Times, (March 7, 2006), <https://www.nytimes.com/2006/03/07/arts/design/revising-art-historys-big-book-whos-in-and-who-comes-out.html>.

<sup>42</sup>Paul E. Bolin, "Discussions and Depictions of Women in H. W. Janson's History of Art, Fourth Edition," *Journal of Social Theory in Art Education*, Vol. 15.(1996), pp. 146-159. <https://core.ac.uk/download/pdf/51288476.pdf>.

and the sixteenth to demonstrate how the book itself evolves. They use purely illustrative visualizations and descriptive analysis.

## 2.5 Significance of Research

There has not been any research done in the aggregate, quantitatively analyzing the change over time specifically regarding artist demographic in *Janson's History of Art* nor *Gardner's Art Through the Ages*. My research is significant as it efficiently shows the gaps in representation in terms of gender, race, ethnicity, and nationality that have not been deeply touched on by previous scholars. As mentioned in my literature review of publications that discuss *Gardner's Art Through the Ages*, the closest research I have found to my own was published by The University of Chicago Press Journals in 2020 in which two professors and library assistant out of Purdue University, randomly selected and cataloged information from the first, fifth, twelfth and sixteenth edition. They were focused on how the length of the book changes through time, how the type of image changes through time, how the percent of color images changes through time, and how the number of suggested readings changes through time. My research has more breadth, as I scraped information from all 16 editions of *Gardner's Art Through the Ages*, as well as 9 books of *Janson's History of Art*, and working less with how the book itself was changing, but more so on how the artists included changes through time.

Secondly, my research looks at how the area given to particular artists changes through time and which, if any, external variables can help account for the variance of such. As mentioned in my abstract, I use a linear mixed-effects model with a random effect of the artist's name, to infer the magnitude of the space given to a particular artist divided by the area of the page of the given edition (total space ratio per page), in *Janson's History of Art* and *Gardner's Art Through the Ages*, using the potential predictor variables: artist gender, race, ethnicity, nationality, the count to year of the number of exhibitions an artist has at the MoMA, and the count to year of the number of exhibitions an artist has at The Whitney. The model that best explains the variance in the total space ratio per page per artist per edition uses artist nationality and the count through time of the number of exhibitions an artist has in the MoMA as well as the interaction between those two variables. With a log transformation applied to the outcome variable of the as it is heavily right-skewed, my linear mixed-effects model yields a conditional  $r^2$  of 53.23%. Such denotes that 53.23% of the variance of total space ratio per page given to an artist in a given edition can be explained by the artist's nationality and the count through time of the number of exhibitions an artist has at the MoMA. This type of statistical analysis as far as I am aware has not been done in regards to looking at how art historical survey texts evolve. My research works to explain how the authors of *Janson's History of Art* and *Gardner's Art Through the Ages*, operate while choosing which artists are given any particular amount of space in their publications.

## 2.6 Research Questions

1. What are the demographics (artist gender, race, ethnicity, nationality) of artists included in each edition of Janson's History of Art (from 1962-2011) and Gardner's Art Through the Ages (from 1926-2020) looking at two-dimensional works after c. 1750?

Hypothesis: *Janson's History of Art* and *Gardner's Art Through the Ages* will include more female, non-white, artists of Hispanic or Latino origin over time; however, these artists will still be dramatically underrepresented compared to white male artists not from Hispanic or Latino origin. Moreover, race and ethnicity will be more of a limiting factor than gender.

2. Which variables (artist gender, race, ethnicity, nationality, number of exhibitions at the MoMA or The Whitney) if any, infer the magnitude of an artist's inclusion in art history survey texts (*Janson's History of Art* and *Gardner's Art Through the Ages*)?

Hypothesis: I hypothesize demographic information per artist will play a large role in accounting for the total variance in total space ratio per page per artist per edition. The type of gender, race, nationality, and ethnicity of an artist in theory highly impacts how much they are highlighted and discussed in introductory art history texts. Additionally, I hypothesize that if a given artist has many exhibitions in the MoMA or The Whitney, such would additionally account for variance in the outcome variable total space ratio per page. The notion behind such a hypothesis is that if an artist is being put on exhibition, they are likely to be discussed more in introductory art history texts.

## 3 Methodology

### 3.1 Data Collection

#### 3.1.1 Textbook data

##### 3.1.1.1 Scope

I collected data from 25 different books. I cataloged 9 different books of *Janson's History of Art*, spanning from 1963 to 2011. Additionally, I cataloged 16 different books of *Gardner's Art Through the Ages*, spanning from 1929 to 2020. I used the particular scope of works produced after c. 1750 that were two-dimensional. This scope allowed me to collect information more quickly to understand how the books were changing over time. Across all 25 books, there are a total of 3162 observations, which is the sum of the count of artists in every book. In the finalized, gardnerjanson\_museums data set, there are 14 different variables cataloged (for further information about each variable, reference the Data Dictionary). There are a total of 414 unique artists.

**3.1.1.1.1 Outcome Variable:** Total Space Ratio per Page = I measured with a ruler with centimeters, the length and width of text per work per artist. If the area of text was not a rectangle, I additionally collected the length and width of any extra text. I then used excel to calculate the total area of the text per work per artist. Then I additionally measured the length and width of the figure in the book of the work itself. Again, using excel, I calculated the area of the figure of the work. I then added together the area of figure of a work with the area of text written about the work, to create a variable of total space given to a work. In order to achieve a ratio between total space and the area of a page is in a respective book, as they are inconsistent, I divided the total area of a page from a respective book with the total space given to a work by an artist in a respective book.

**3.1.1.1.2 Demographic Variables:** **Artist Gender** = I recorded the gender of the artist as listed by the text. In the case the gender of the artist was not listed, I would do a quick google search to further research their gender. If I couldn't find their gender, I listed such as N/A.

**Artist Nationality** = I recorded the nationality of the artist as listed by the text. In the case the nationality of the artist was not listed, I would do a quick google search to further research their nationality. If I couldn't find their nationality, I listed such as N/A.

**Artist Race** = I recorded the race of the artist as listed by the text. I categorized race based on the guidelines of the US Census.<sup>1</sup> In the case the race of the artist was not listed, I would do a quick google search to further research their race. If I couldn't find their race, I listed such as N/A.

**Artist Ethnicity** = I recorded the ethnicity of the artist as listed by the text. Similarly to race, I categorized ethnicity based on the guidelines of the US Census.<sup>2</sup> In the case the ethnicity of the artist was not listed, I would do a quick google search to further research their ethnicity. If I couldn't find their ethnicity, I listed such as N/A.

**3.1.1.1.3 Identifying Variables: Artist Name** = The name of the artist as listed by the respective book. At times, each book would spell names slightly differently, so I standardized names across editions as well as across museum exhibition data for the MoMA and The Whitney.

**Year** = I recorded the year of publication of each book.

**Edition Number** = I recorded the edition number of each book.

**Book** = I recorded which book, either Gardner or Janson, the work was mentioned.

### 3.1.1.2 Selection

As argued in the Introduction and Context, *Janson's History of Art* and *Gardner's Art Through the Ages*, are the two most renowned and significant art history introductory texts through roughly the last century.

### 3.1.1.3 Limitations

I have limited my data collecting in *Janson's History of Art* and *Gardner's Art Through the Ages* to only including two-dimensional art made after c. 1750. This omits sculpture and architecture and how the story of art changes from the beginning of time to c. 1750. I did such as I am most interested in how the diversity of artists changes through editions, and because it only took roughly 1/5 of the time to catalog as I was only cataloging roughly 1/5 of each book. Additionally, two-dimensional works are more frequently included in museum

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<sup>1</sup>"U.S. Census Bureau Definitions of Race and Ethnicity," United States Census Bureau, last modified July 2014, <https://www.mobap.edu/wp-content/uploads/2013/01/US-Census-Bureau-Definitions-of-Race-and-Ethnicity.pdf>.

<sup>2</sup>United States Census Bureau, "U.S. Census Bureau Definitions of Race and Ethnicity."



exhibitions spaces than works of sculpture and architecture. My research would be more robust and complete had I cataloged every work in every edition. I am fully aware of this limitation, yet I believe my conclusions are significant within my scope.

### **3.1.2 Museum data**

#### **3.1.2.1 Scope**

My second research question is looking at if and or how an artist's inclusion in museums exhibitions impacts the amount of total area an artist is given in a particular book. I initially began this research as a group project for a class titled, "Art Markets." In order to collect information regarding museum exhibitions, my colleague, David Smoot ('21), web scraped the MoMA's website for the entirety of its catalog history from when its doors first opened in 1929 through the date he scraped the MoMA's website which was March 14th, 2021. He did the same thing with The Whitney's website and web scraped their exhibition history from 1933 through when he scraped the website, March 30th, 2021. There was a total of 10,630 observations in the MoMA data set and 13,736 at The Whitney. An observation is an appearance of an artist in an exhibition.

#### **3.1.2.2 Selection**

The Whitney and the MoMA were chosen as they are located in New York City, arguably the center of the art world as we know it, and because of the relative accessibility of historic exhibition data.

#### **3.1.2.3 Limitations**

The inclusion of more museums both domestically and internationally would lend the museum data sets greater power to provide context, and an independent metric for the importance of the exhibition, such as press coverage, would be more useful as a comparison to the total space ratio per page in the textbook than the number of exhibitions. The Whitney also is a museum of only American art, meaning they only include artists who are in *Janson's History of Art* or *Gardner's Art Through the Ages* who are also American. Due to this, Whitney most likely will not be a strong predictor of the amount of area a given artist has as only about 30% of the artists in Janson and Gardner are American. Also, The Whitney appears to only list their annual shows on their website prior to 1997, so only the MoMA has complete data.

### 3.1.3 Overview of Data Collection

I finished my data collection process with four separate data sets. I had one in which I collected demographic and total space information for the nine books of *Janson's History of Art*, and a second doing the same for the sixteen books of *Gardner's Art Through the Ages*. I then had a data set of the MoMA's exhibition history from 1929-March 14th, 2021 and lastly a data set of The Whitney's exhibition history from 1933-March 30th, 2021.

## 3.2 Data Preparation

In order to create one data set, I went through a number of steps to join data from all four in R Studio. I began with binding the rows from the Janson data set and the Gardner data set. I then created a new variable of Artist Unique ID in which I assigned a number to each artist in alphabetical order across all editions of both books. In some cases, there are artists with multiple works cataloged in a particular edition. I was able to sum the total space per work such that an artist's name would only show up once per edition with a total space ratio per page value in centimeters squared.

Pivoting to joining The Whitney's catalog history and the MoMA's catalog history with the data set I just created with both Janson and Gardner observations, I had to create a variable called Whitney Count to Year and MoMA Count to Year respectively. This is because as the publication year of books changes through time, the amount of exhibitions that are given to an artist has the possibility to change through time as well.

### 3.2.0.1 Museum Exhibitions Count Variables:

**Whitney Count to Year** = The count of exhibitions held by The Whitney of a particular artist at a particular moment of time, as highlighted by year.

**MoMA Count to Year** = The count of exhibitions held by the Museum of Modern Art (MoMA) of a particular artist at a particular moment of time, as highlighted by year.

## 3.3 Model Selection

### 3.3.1 Data Preparation for Modeling Purposes

In order to prepare my data further for the purposes of regression, I had to re-categorize the variable of artist nationality and artist race. Firstly, since there are myriad nationalities recorded through all 25 books, I had to condense artist nationality to artist nationality other such that I would only receive five varying betas rather than more than thirty.

**Artist Nationality Other** = The nationality of the artist. Of the total count of artists through all editions of *Janson's History of Art* and *Gardner's Art Through the Ages*, 77.32% account for American, French, British, German, and Spanish. Therefore, the categorical strings of this variable are American, French, British, German, Spanish, and Other.

In regard to artist race, there are so few observations of artists who are non-white that when running a regression with a categorizing non-white even further into their respective cataloged races with only a handful of data points is not statistically sufficient nor informative. The buckets of information at the respective race-level were too small and therefore rank deficient. Therefore I created the variable artist race non-white indicator (artist race nwi).

**Artist Race NWI** = The non-white indicator for artist race, meaning if an artist's race is denoted as either white or non-white.

Lastly, I relevelled my data such that the baseline demographic of an artist reflects the most common category across an artist's gender, race, ethnicity, and nationality, which is male, white, of Hispanic or Latino origin, and American respectively.

### 3.3.2 Linear Mixed-Effects Model

I chose to use a linear mixed-effects model as the data contains a random effect at the artist level as multiple observations in the data can be by the same artist. Using a linear mixed-effects model with artist name as the random effect accounts for the dependence between observations of the same artist, therefore allowing independence to be satisfied for our model. Additionally, I chose to log transform the outcome variable, as the total space ratio per page is extremely right-skewed. Performing the log transformation allows for the residuals to have constant variance (homoscedasticity). In regards to choosing the combination of both main fixed effects and interaction fixed effects, I used a step-wise model selection methodology and chose a model that optimizes AIC.

## 4 Results

### 4.1 Descriptive Analysis: Research Question 1

#### 4.2 Overview:

As *Janson's History of Art* evolves through time, diversity of gender and race increases while the diversity of ethnicity decreases. The distribution of nationalities remains relatively constant through editions with American artists increasing through time and French artists decreasing.

As *Gardner's Art Through the Ages* evolves through time, diversity of gender and race increases while the diversity of ethnicity increases until the third edition in 1948, then decreases. The distribution of nationalities remains fairly constant through time, with an increase in American artists in the second edition in 1936, then a decrease until the fifth edition in 1970, then a continual increase until the latest edition in 2020. German artists enter the book in the third edition (1948) and increase through time. French artists decrease until the third edition, increase until the fifth, then decrease through the latest edition.

##### 4.2.1 Count Through Editions

In Figure 4.1, the shape of the overall count of works by artists in *Gardner's Art Through the Ages* is heavily left-skewed, multimodal, and asymmetrical. Such highlights how through time, more works are, on average, continually added to *Gardner's Art Through the Ages* that are two-dimensional and made after c. 1750. The first edition, published in 1926 by Helen Gardner, only has a total of 21 works. Edition 15, published in 2016 as well as edition 16, published in 2020, have 182 works respectively, which is the maximum amount of works through all editions.

In Figure 4.2, the shape of the overall count of works by artists in *Janson's History of Art* is left-skewed, unimodal and asymmetrical. Such highlights how through time, more works are added to *Janson's History of Art* that are two-dimensional and made after c. 1750. There is then a drop-off of works included in the seventh (published in 2007 with 163 works) and eighth (published in 2011 with 153 works) editions, when new authorship took over. Within edition five (published 1995) and edition six (published in 2001), both written by Anthony Janson, there are the same number of works, the maximum amount included in the text throughout

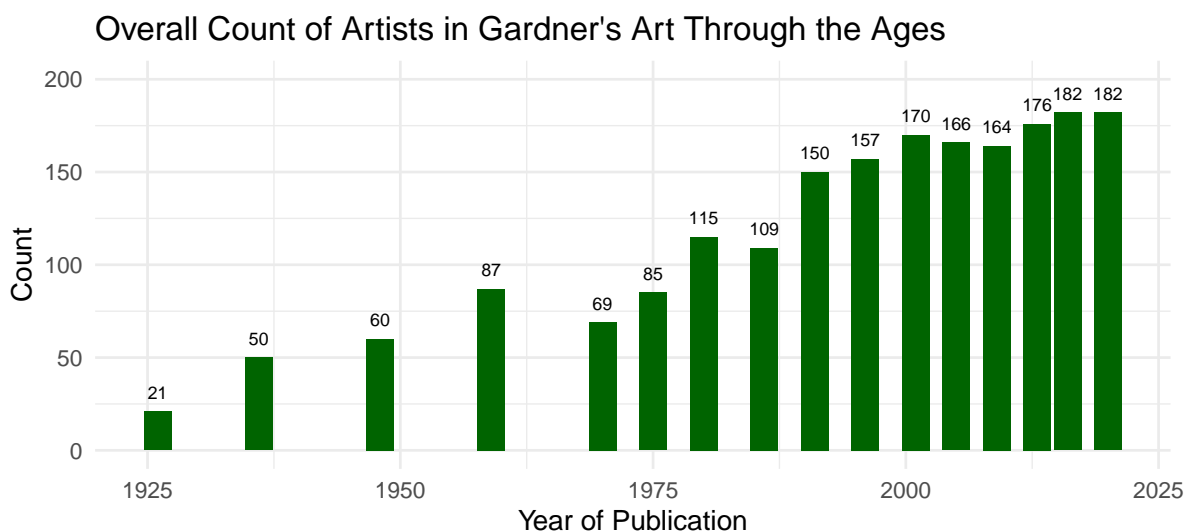


Figure 4.1: Overall Count of Artists in Gardner's Art Through the Ages,  $n = 2325$ . (Source: All two-dimensional works after c. 1750 through all editions of Gardner's Art Through the Ages, 1926-2020).

time, 185, as compared to the count of works in the first edition, first printing, 62, and first edition, second printing, 76.

#### 4.2.2 Gender Through Editions

In Figure 4.3, the breakdown of artists' gender through editions of *Gardner's Art Through the Ages*, is marginally more diverse in regard to gender, as the lowest threshold of male artists is just above 81%, which is denoted by the horizontal line. Additionally, this visualization shows that the first edition in 1926 contains no female artists in our scope, but that starting in the second edition in 1936, Helen Gardner began including female artists. *Gardner's History of Art* included female artists in the scope of two-dimensional works after c. 1750 50 years earlier than *Janson's History of Art*.

The overall percentage of male artists through all books of *Gardner's Art Through the Ages* is 85.69%, roughly a 4.5% increase in regard to gender diversity as compared to *Janson's History of Art*. Through time, gender becomes increasingly more diverse in *Gardner's Art Through the Ages*, yet there is still incredible underrepresentation of female artists.

The breakdown of artists' gender through editions of *Janson's History of Art*, has never dipped below 86% male, which is what the horizontal line denotes. Additionally, Figure 4.4 shows that the first two editions (the first three books cataloged: edition 1, first printing, edition 1, second printing, and edition 2) written by H. W. Janson and Dora Jane Janson, contain

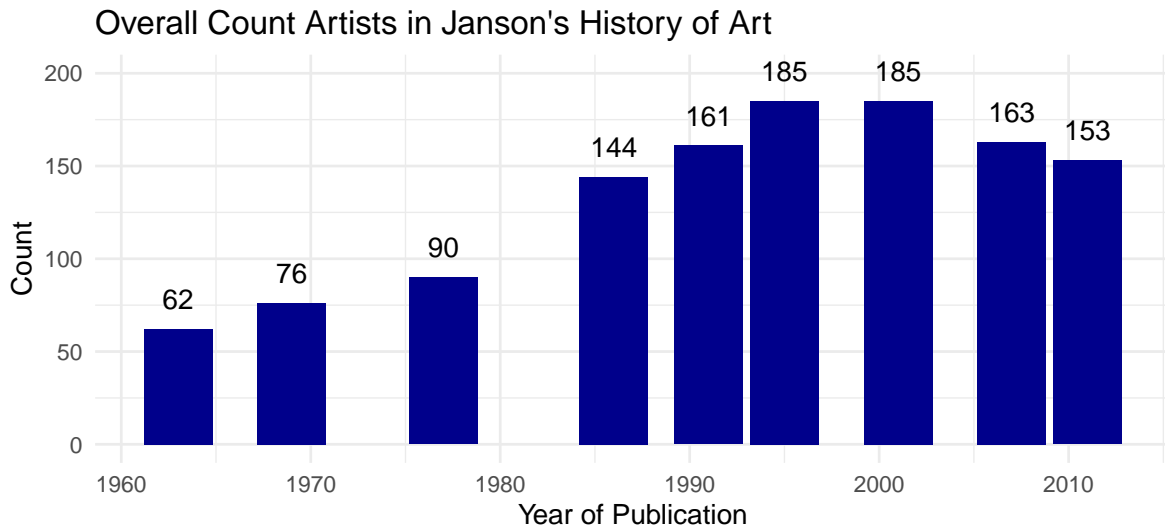


Figure 4.2: Overall Count of Artists in Janson's History of Art,  $n = 1634$ . (Source: All two-dimensional works after c. 1750 through all editions of Janson's History of Art, 1963-2011).

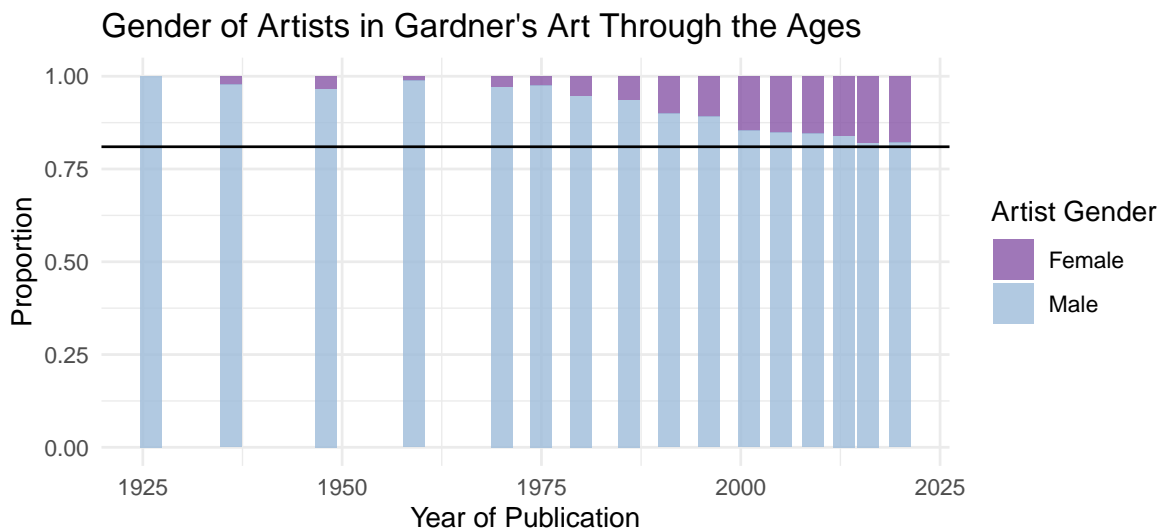


Figure 4.3: Gender of Artists in Gardner's Art Through the Ages,  $n = 2325$ . (Source: All two-dimensional works after c. 1750 through all editions of Gardner's Art Through the Ages, 1926-2020).

no women. Anthony Janson, who took over authorship for the third edition in 1986, began including discourse surrounding female artists. Notably, he was extremely proud of himself for diversifying his family’s art history survey text.<sup>1</sup>

The overall percentage of male artists through all books of *Janson’s History of Art* is 89.99%. Through time, gender diversity grows, yet remains stagnant at just above 86% male. Female artists are dramatically underrepresented in the story of art as told in *Janson’s History Art*.

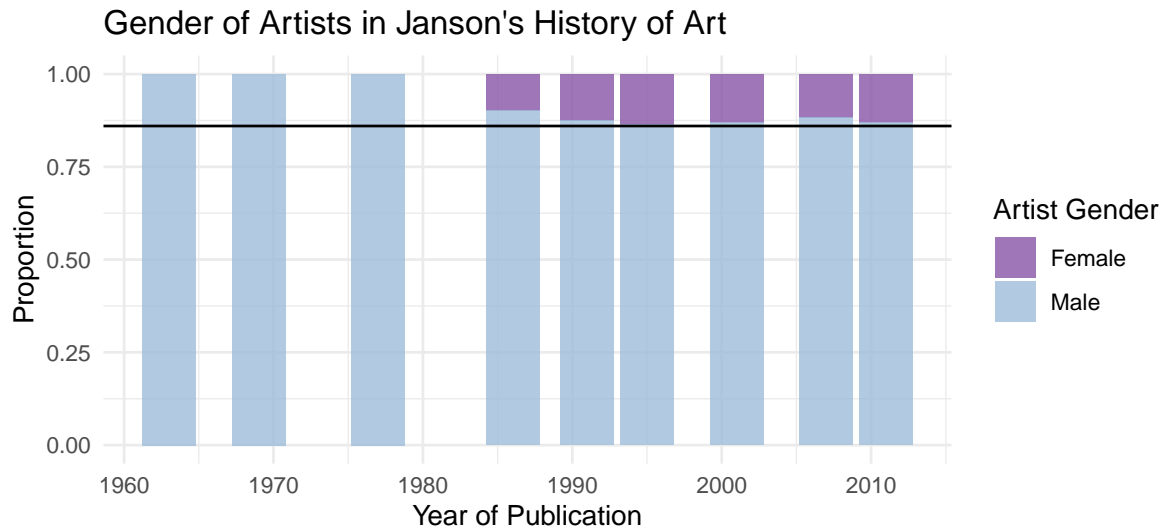


Figure 4.4: Gender of Artists in Janson’s History of Art, n= 1634. (Source: All two-dimensional works after c. 1750 through all editions of Janson’s History of Art, 1963-2011).

### 4.2.3 Race Through Editions

As seen in Figure 4.7, *Gardner’s Art Through the Ages* began with including more than just white artists, with the inclusion of Asian artists in the first edition. The most diverse a single edition has gotten thus far is just under 15% being non-white. Interestingly enough, the two editions that are least racially diverse are the seventh and eighth editions which were published in 1980 and 1986 respectively. There is a significant jump in black representation in the eleventh edition, as well as other non-white artists as the percentage of non-white artists goes from just under 4% in the tenth (1996) to close to 14% in the eleventh (2001).

Artist race through editions in *Gardner’s Art Through the Ages*, hovers at just around 95% white until the eleventh edition in 2001, where there was roughly a 10% increase in non-white artists. From the eleventh edition (2001) to the sixteenth (2020) the ratio of white artists to

<sup>1</sup>Janson, “Interview with Anthony F. Janson,” 9.

non-white artists remains fairly stagnant. The overall percentage of white artists through all editions of *Gardner's Art Through the Ages* is 90.02%.

The first named Asian artist in any edition of *Gardner's Art Through the Ages* was Suzuki Harunobu in the third in 1959. Figure 4.5 displays his work, *The Evening Glow of the Ando (Night Lantern)*. He remains within *Gardner's History of Art* through the latest 16th edition (2020).



Figure 4.5: Suzuki Harunobu. *The Evening Glow of the Ando (Night Lantern)*. 1765. Color woodblock print, 28.6 × 21.5 cm. Art Institute of Chicago, Chicago.

The first black artists who produced two-dimensional works after c.1750 were added in the ninth edition (1991). The only two black artists to be included in all editions from then on are Aaron Douglas and Henry Ossawa Tanner. Douglas' work *Noak's Ark* is highlighted in Figure 4.6, he incorporates African motifs and sculpture into Synthetic Cubism through the use of silhouettes and pushing the boundary of flatness. There is only one clause in the paragraph describing Douglas in Gardner's eleventh edition that comments on his demographic, "Encouraged by the German artist Winold Reiss to create art that would express the cultural history of his race..."<sup>2</sup> There is far less discourse about the artist as a minority but rather more regarding the artist and his work. Though *Gardner's* still discusses Douglas through the lens of a white male artist, Winold Reiss, *Gardner's* does comparably much better in regard to including as well as in regard to how they include in this particular example, black artists.

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<sup>2</sup>Fred S. Kleiner, Christin J. Mamiya and Richard G. Tansey, *Gardner's Art Through the Ages*, Eleventh Edition (Fort Worth: Harcourt College Publishers, 2001), 1030.





Figure 4.6: Aaron Douglas. Noah's Ark. c. 1927. Oil on masonite, 121.92 x 91.44 cm. Fisk University Galleries, Nashville, Tennessee.

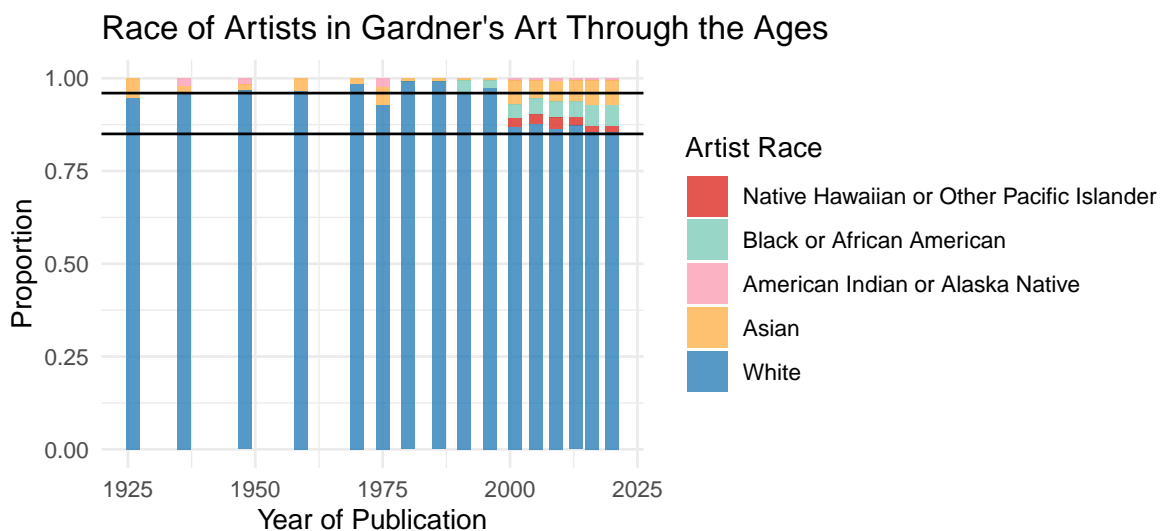


Figure 4.7: Race of Artists in Gardner's Art Through the Ages, n= 2325. (Source: All two-dimensional works after c. 1750 through all editions of Gardner's Art Through the Ages, 1926-2020).

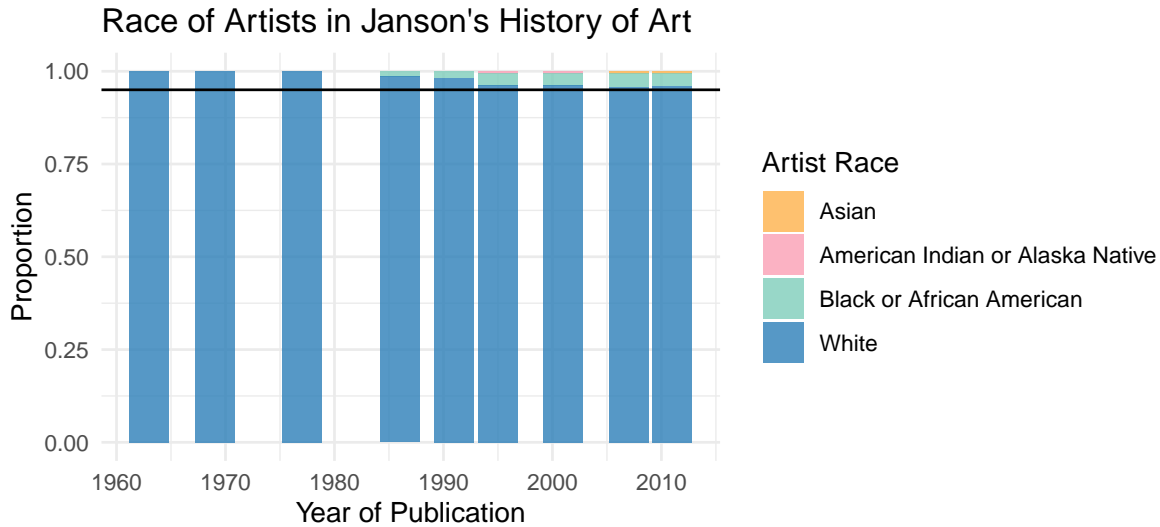


Figure 4.8: Race of Artists in Janson's History of Art, n= 1634. (Source: All two-dimensional works after c. 1750 through all editions of Janson's History of Art, 1963-2011).

Pivoting to looking at race diversity in *Janson's History of Art* through time, as highlighted by Figure 4.8, the first two editions (three books) written by H. W. Janson and Dora Jane Janson, there were only white artists included. Through time, race diversity does increase, but very minimally and remains stagnant through editions after the fifth (1995). The ratio of white artists to non-white artists per edition never dips below 95%, as denoted by the horizontal line. The overall percentage of white artists through all editions of *Janson's History of Art* is 97.37%. Race is the most limiting category of demographic statistically speaking in *Janson's History of Art*.

When Anthony Janson took over authorship, he included a handful of black artists, then in the fifth edition, he added an artist by the name of Kay Walkingstick (1935-present), who is a Native American woman. She was included through the sixth edition then removed when the group of six professors took over.

Anthony Janson states in the fifth edition that Walkingstick combines "Neo-Expressionism and Neo-Abstraction in a particularly fruitful way..."<sup>3</sup> The work in Figure 4.9 was brought forth after the death of her husband in 1989, as she outpours her grief onto the canvas. The left panel, as Janson writes, is "built up in thick coats of paint applied mainly by her hands," with a fan shape in the center which suggests a manmade feature in a primitive landscape and also acts as a sign, investing the canvas mysterious emblematic significance. The right half was painted in an Expressionist style and releases anger through the various layers of color.

<sup>3</sup>H. W. Janson, and Anthony F. Janson, *History of Art*, Fifth Edition (New York: Harry N. Abrams, New Jersey: Prentice Hall, 1995), 834.

Walkingstick's diptych display aspects of nature as a spiritual center, of calm contemplation, powerful emotion, and order in chaos. <sup>4</sup>



Figure 4.9: Kay WalkingStick, *On The Edge*, 1989. Acrylic and wax and oil on canvas, 81 x 162 ½ cm. Private collection.

Interestingly, the black artists who are included have frequent turnover. The only black artist that enters *Janson's History of Art* in the third edition (1986) and remains through the latest edition (2011) is painter Henry Ossawa Tanner (1859-1937). Notably, in the fifth edition by Anthony Janson, he begins his discourse on Tanner with,

Thanks in large part to [Thomas] Eakins' enlightened attitude, Philadelphia became the leading center of minority artists in the United States. Eakins encouraged women and blacks to study art seriously at a time when professional careers were closed to them. African-Americans has no chance to enter the arts before Emancipation, and after the Civil War the situation improved only gradually.<sup>5</sup>

Janson is seemingly distracted by Tanner's race and how Thomas Eakins provided space for him rather than beginning discourse directly about the aesthetics and significance of Tanner's work itself. He only mentions Tanner's name in the following sentence, allotting only half of the area of text to the history of the artist and the work itself.

In the fifth edition of Janson's *History of Art*, Anthony Janson chose to include, Figure 4.10 *The Banjo Lesson*, which he painted after he moved permanently to Paris, which "bears Eakins' unmistakable influence."<sup>6</sup> Tanner, who is described as the "first important black painter" is given space in the text, yet is not properly and independently discussed.

In the seventh and eighth editions, there was an Asian artist introduced, Ando Hiroshige, a Japanese male painter who was used as a reference when discussing Edgar Degas. In Janson's eighth edition, the group of six authors highlights the use of flatness in Hiroshige's composition

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<sup>4</sup>H. W. Janson, and Anthony F. Janson, *History of Art*, Fifth Edition, 835.

<sup>5</sup>H. W. Janson, and Anthony F. Janson, *History of Art*, Fifth Edition, 724.

<sup>6</sup>H. W. Janson, and Anthony F. Janson, *History of Art*, Fifth Edition, 724.



Figure 4.10: Henry Ossawa Tanner, *The Banjo Lesson*, c. 1893. Oil on canvas, 121.9 x 88.9 cm. Hampton University Museum, Hampton, Virginia.

as shown in Figure 4.11. The flatness he employs is used to discuss how the “spatial contraction of Japanese prints certainly influence Degas and Manet...”<sup>7</sup> Similarly to the example of Tanner, Hiroshige stands as another example of a minority artist included to be compared to the work of a white male artist.

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<sup>7</sup>Penelope J.E. Davies, Walter B. Denny, Frima Fox Hofrichter, Joseph F. Jacobs, Ann S. Roberts, David L. Simon, *Janson's History of Art*, Eighth Edition (New Jersey: Pearson Prentice Hall, 2011), 871.



Figure 4.11: Ando Hiroshige, Plum Estate, Kamiedo, from the series One Hundred Famous Views of Edo. 1857. Woodblock print, 34 x 22.6 cm. Brooklyn Museum of Art, New York.

#### 4.2.4 Ethnicity Through Editions

Helen Gardner's third edition published in 1959 was the most ethnically diverse of all 25 textbooks, as shown in Figure 4.12. This edition was published after her death, but she has passed with the intention of her book being a representation of the world's history of art. Her efforts are evident in the percentage of artists of Hispanic and Latino origin which is just under 22%. It is clear that her succeeding authors did not continue with such an ethnically diverse selection of artists, which has remained under 9% in every other publication. Artists of Hispanic or Latino origin increases until the third edition in 1959, then begin to decrease through time and remain stagnant at just under 7% through the latest edition published in 2020.

The overall percentage of artists who are not of Hispanic or Latino origin included in *Gardner's Art Through the Ages* is 91.51%.

Fascinatingly, Figure 4.13 displays in *Janson's History of Art*, the ratio of artists from Hispanic or Latino origin is the highest of all editions in the first edition, first printing. This may be because the overall count of artists was so few that having only a handful of artists from Hispanic or Latino origin accounted for just under 9% of the overall count of artists in the 1963 publication. The percentage of artists of Hispanic or Latino origin decreases through time until the sixth edition (2001), where the percentage begins to slowly increase in the seventh (2007) and eighth editions (2011).

The overall percentage of artists who are not of Hispanic or Latino origin included in *Janson's*

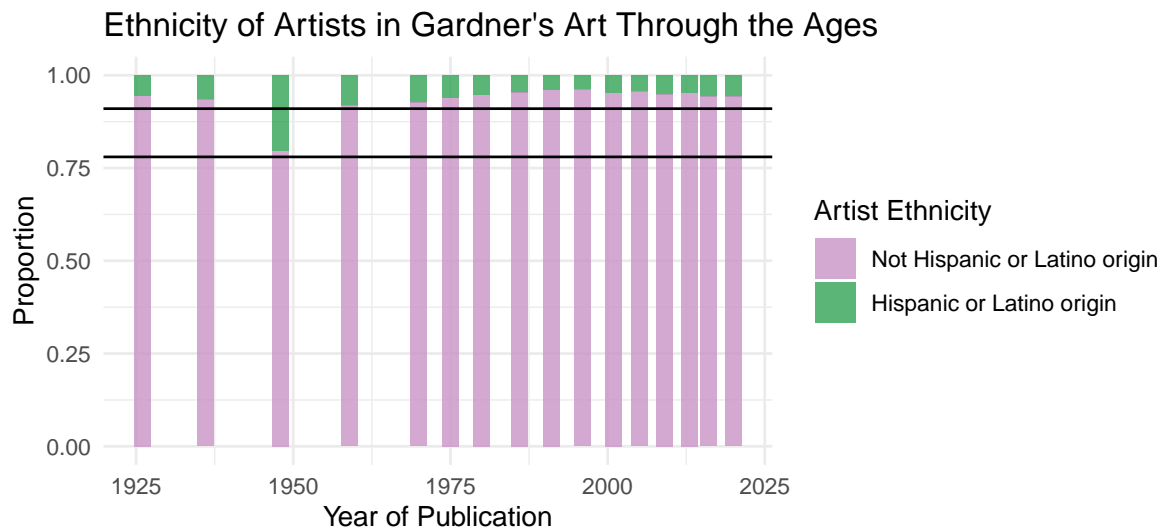


Figure 4.12: Ethnicity of Artists in Gardner's Art Through the Ages, n= 2325. (Source: All two-dimensional works after c. 1750 through all editions of Gardner's Art Through the Ages, 1926-2020).

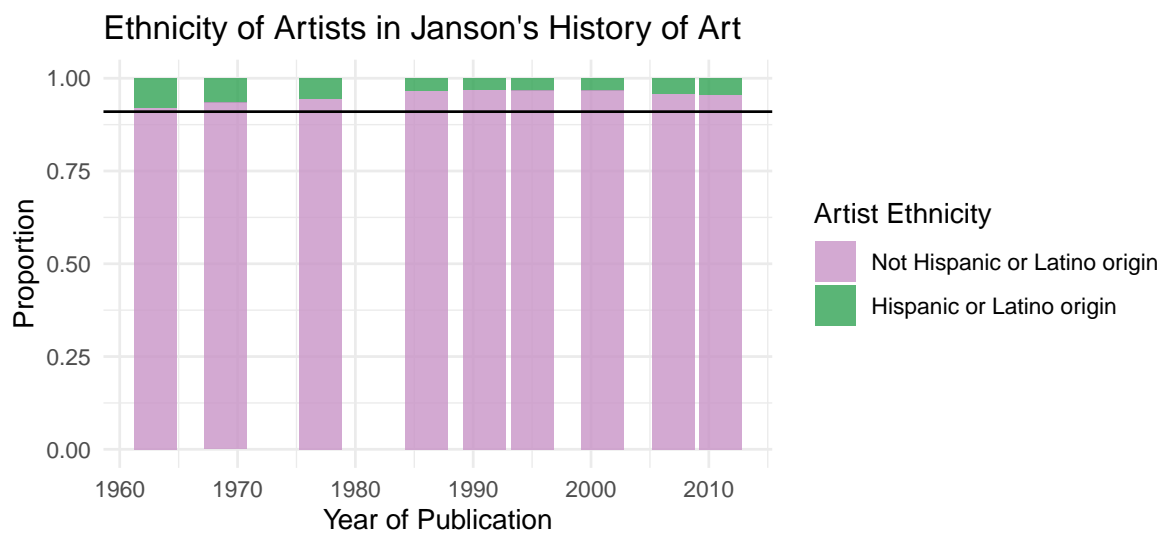


Figure 4.13: Ethnicity of Artists in Janson's History of Art, n= 1634. (Source: All two-dimensional works after c. 1750 through all editions of Janson's History of Art, 1963-2011).

*History of Art* is 95.82%.

#### 4.2.5 Nationality Through Editions

In the visualization above, Figure 4.14, the percentage of American artists spikes in 1936 in edition two, then begins to decrease until edition five (1970), in which the ratio of American artists hits a low of under 10%, then steadily begins to increase until the latest edition published in 2020. The percentage of French artists in the first edition in 1926 is roughly 40% which then decreases through edition three to roughly 25%. The ratio of French artists then begins to grow once more until the fifth edition (1970), which shows the percentage of French artists as roughly 50%. From the fifth edition, the ratio of French artists decreases through time. Notably, German artists only enter the book in the third edition in 1959 as roughly 2% of artists. Through time, the ratio of representation of German artists grows to about 10% and then remains stagnant.

The overall percentage of artists who are French, American, British, German, or Spanish through all editions of *Gardner's Art Through the Ages* is 76.58%. Given that just over 3/4th of the artists included who have made two-dimensional works after c. 1750 are from the western tradition of art, it is hard to conclude that *Gardner's Art Through the Ages* truly is a “*Global History*.”

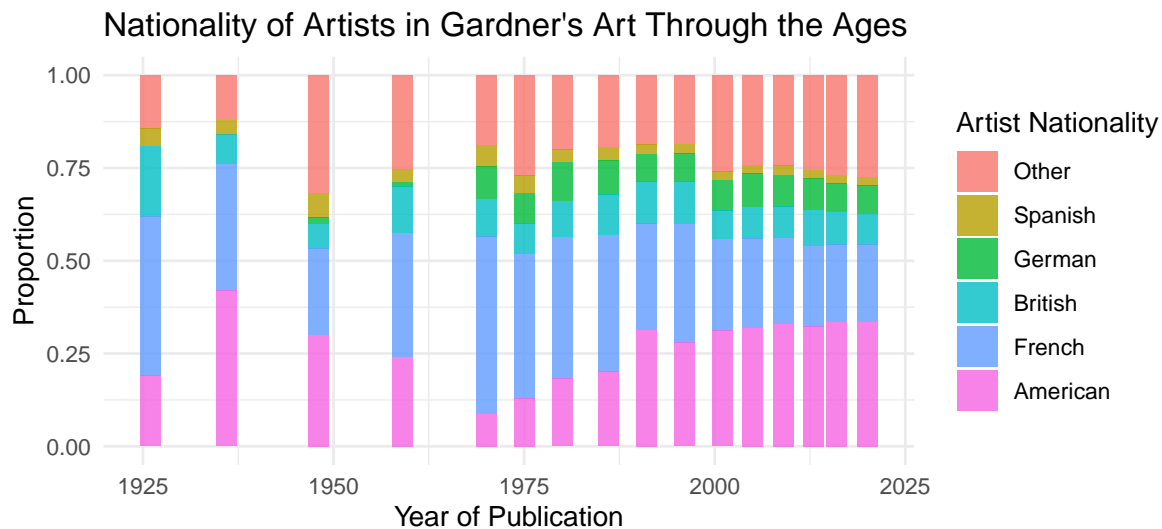


Figure 4.14: Nationality of Artists in Gardner's Art Through the Ages, n= 2325. (Source: All two-dimensional works after c. 1750 through all editions of Gardner's Art Through the Ages, 1926-2020).

It is clear that *Janson's History of Art* paints a western tradition through the visualization above, Figure 4.15, highlighting predominantly American, French, British, German, and Span-

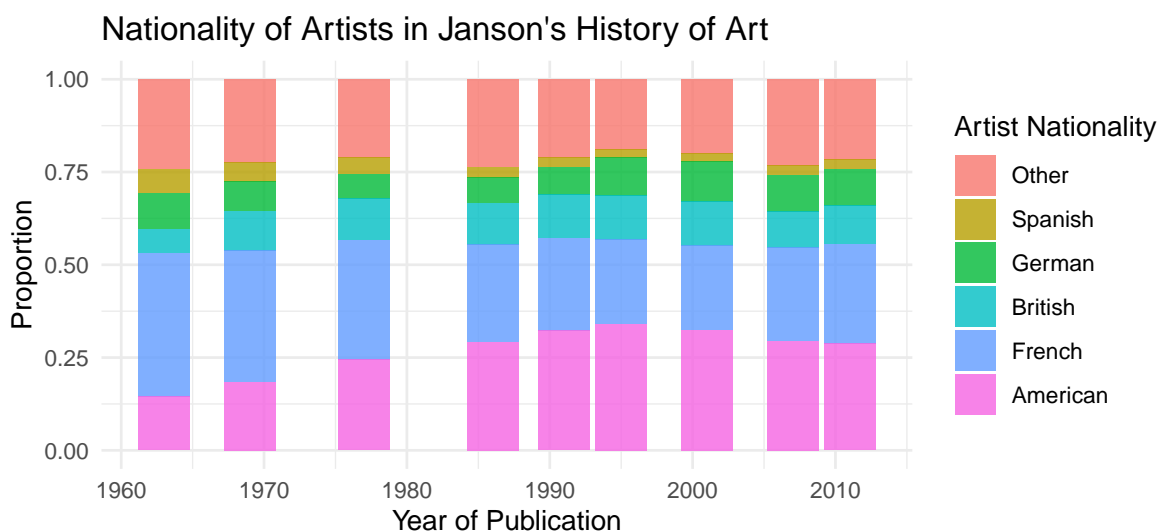


Figure 4.15: Nationality of Artists in Janson's History of Art, n= 1634. (Source: All two-dimensional works after c. 1750 through all editions of Janson's History of Art, 1963-2011).

ish artists. The percentage of American artists rises through time until the fifth edition in 1995, then begins to slightly decrease through the latest edition in 2011. The percentage of French artists through editions decreases until the sixth edition (2001), then slowly begins to increase through the latest edition. British, German, Spanish and Other Nationality maintain relatively similar ratios through editions.

The overall percentage of artists who are American, French, British, German or Spanish through all editions of *Janson's History of Art* is 78.51%. As noted in the introduction and context section, *Janson's History of Art* altered its name for the seventh and eighth editions to *Janson's History of Art: The Western Tradition*, which is a title change that accounts for the fact that 78.51% of artists included through all editions are American and European.

## 4.3 Exploratory Data Analysis: Research Question 2

### 4.3.1 Distribution of Total Space Ratio Per Page

The shape of the visualization above, Figure 4.16, is right-skewed, unimodal and asymmetrical. Therefore, we would want to look at the median to understand its center and interquartile range (IQR), which is the middle 50% of the range of the data to understand its spread. The median total space an artist receives is 40.93% of a page. The IQR of total space an artist receives is 28.59% of a page.



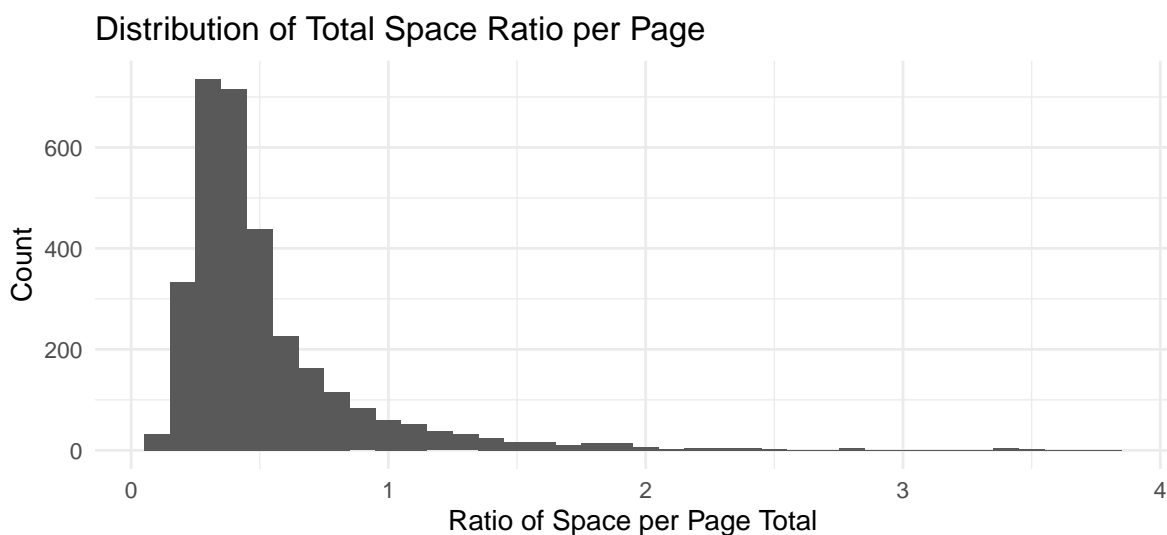


Figure 4.16: Distribution of Total Space Ratio per Page,  $n = 3162$ , (Source: All artists of two-dimensional works made after c. 1750 in Gardner’s *Art Through the Ages* and Janson’s *History of Art*, 1926-2020).

### 4.3.2 Total Space Ratio Per Page vs. Artist Gender

Interestingly enough, as displayed above in Figure 4.17 the median of the total ratio of space per page for female artists is .349, not far below the median of the total ratio of space per page in centimeters for male artists, .420, through all 25 varying textbooks. This indicates that even though the percentage of female artists as compared to male artists is 10.82%, the average amount of space allotted to a female artist is comparable to that of a male.

Table 4.1: The top five female outliers in total space ratio per page through all 25 books

Artist	Edition	Book	Total Space Ratio per Page
Hannah Höch	8	Janson	0.940
Hannah Höch	11	Gardner	0.920
Hannah Höch	7	Janson	0.913
Élisabeth Louise Vigée-Lebrun	11	Gardner	0.831
Cindy Sherman	11	Gardner	0.830

That said, there are far more male artists that are given a total ratio of space per page of over 1, meaning over a page of information regarding their work or works. No female has a total ratio of space per page of over 1. The closest female artist to having a page of area given to them is Hannah Höch as shown in Table 4.1. In fact, she holds the top three spots of the most area given to a woman in three separate editions: The seventh (2007) and eighth (2011) editions of *Janson’s History of Art* and the eleventh edition (2001) of *Gardner’s Art Through the Ages*. Her work included, as displayed by [?@fig-hoch](#), *Cut with the Kitchen Knife Dada through the Last Weimar Beer Belly Cultural Epoch of Germany*, stands as an example of a photomontage introducing the illogical and chaotic Dadaism.

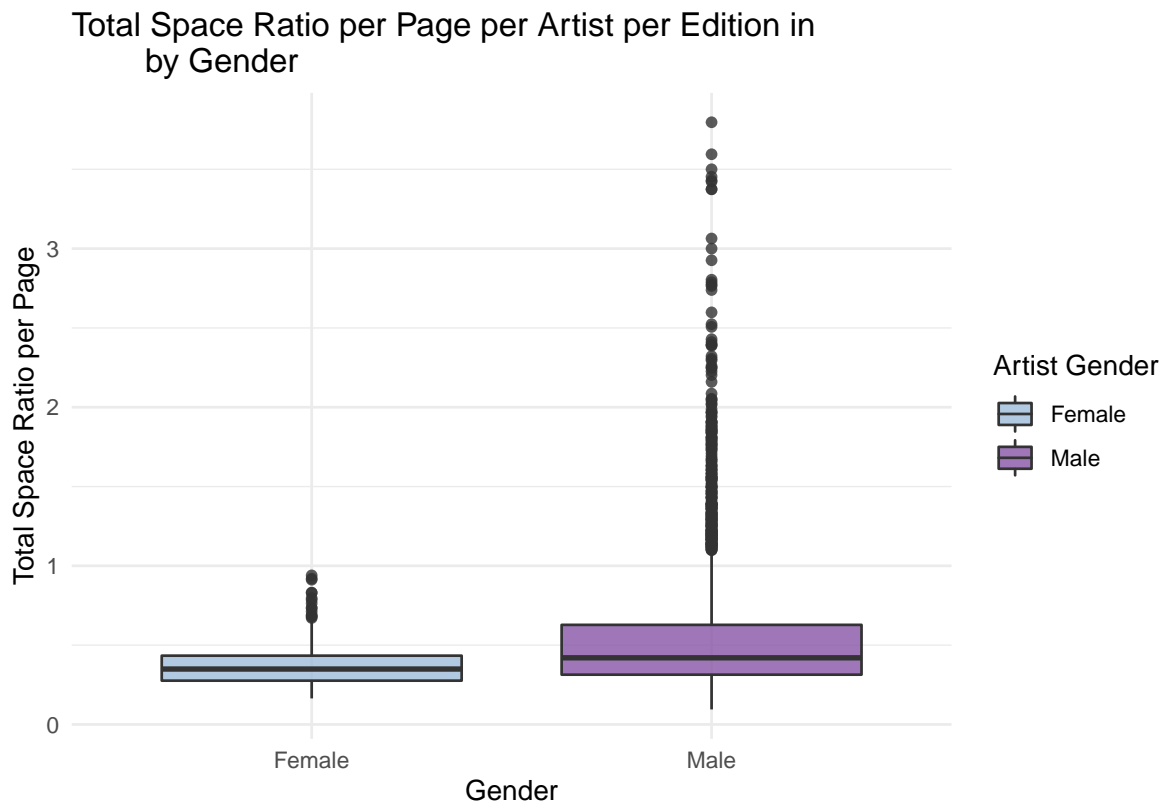


Figure 4.17: Ratio of Space per Page per Artist per Edition by Gender,  $n = 3162$ , (Source: All artists of two-dimensional works made after c. 1750 in Gardner's *Art Through the Ages* and Janson's *History of Art*, 1926-2020).

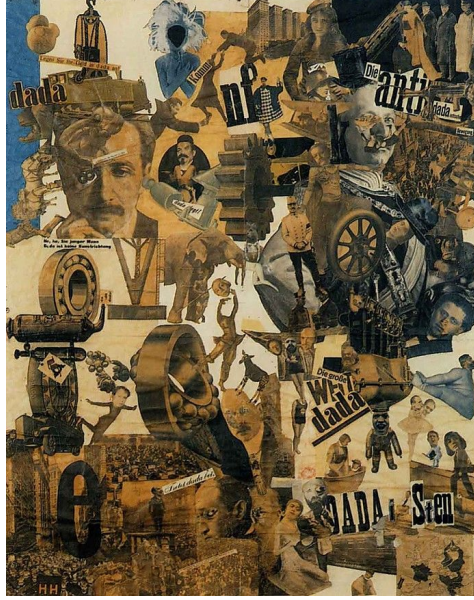


Figure 4.18: Cut with the Kitchen Knife Dada through the Last Weimar Beer Belly Cultural Epoch of Germany. 1919-1920. Photomontage, 114.3 x 90.17 cm. Neue Nationalgalerie, Staatliche Museen, Berlin.

#### 4.3.3 Total Space Ratio Per Page vs. Artist Race

In Figure 4.19, the median of the total ratio of space given to a particular artist through all 25 books is fairly comparable across varying races. Though the count of each race is far from being comparable, the respective medians per race are as follows: American Indian or Alaska Native, .469, Asian, .344, Black or African American .375, Native Hawaiian or Other Pacific Islander, .428 and White, .413. With that being said, even though the racial diversity in regard to the ratio of count for white to non-white artists is 92.85%, once an artist is represented, the amount of area given to them is fairly similar in regard to their respective medians.

Obviously, the top quartile of white artists dominates this visualization. White is the only race that has any artists given more than a page of space in any one book. Out of the top ten outliers of white artists as shown in Table 4.2, eight of them are Pablo Picasso, with the first five observations being from various editions of *Janson's History of Art*. Additionally, in that same table, it is clear French artist, Eugène Delacroix is given incredible amounts of space as well.

Table 4.2: The top ten outliers in total space ratio per page through all 25 books

Artist	Edition	Book	Total Space Ratio per Page
Pablo Picasso	6	Janson	3.797

Artist	Edition	Book	Total Space Ratio per Page
Pablo Picasso	4	Janson	3.595
Pablo Picasso	7	Janson	3.500
Pablo Picasso	5	Janson	3.453
Pablo Picasso	8	Janson	3.431
Eugène Delacroix	10	Gardner	3.422
Pablo Picasso	10	Gardner	3.375
Eugène Delacroix	5	Gardner	3.374
Pablo Picasso	2	Janson	3.064
Pablo Picasso	3	Janson	3.000

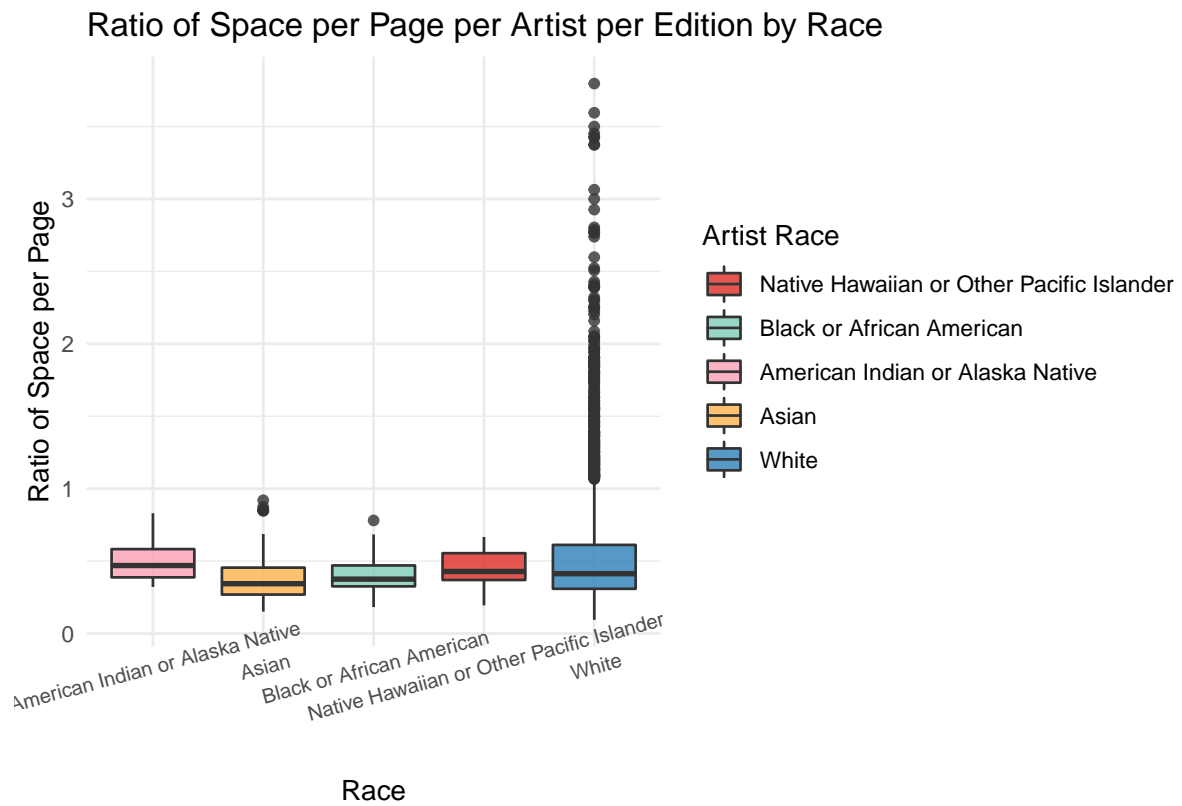


Figure 4.19: Ratio of Space per Page per Artist per Edition by Race,  $n = 3162$ , (Source: All artists of two-dimensional works made after c. 1750 in Gardner's *Art Through the Ages* and Janson's *History of Art*, 1926-2020).

#### 4.3.4 Total Space Ratio Per Page vs. Artist Ethnicity

Interestingly, the median for total space ratio per page for artists who are of Hispanic or Latino origin, .488 is higher than those who are not of Hispanic or Latino origin, .406, as shown in Figure 4.20. There are 158 observations of artists per edition who are of Hispanic and Latino origin and there are 2,946 observations of artists per edition who are not of Hispanic or Latino origin. Artists such as Pablo Picasso and Francisco Goya play a large role in such, as they are of Hispanic or Latino origin and accounts for many of the outlying larger observations for total space ratio per page.

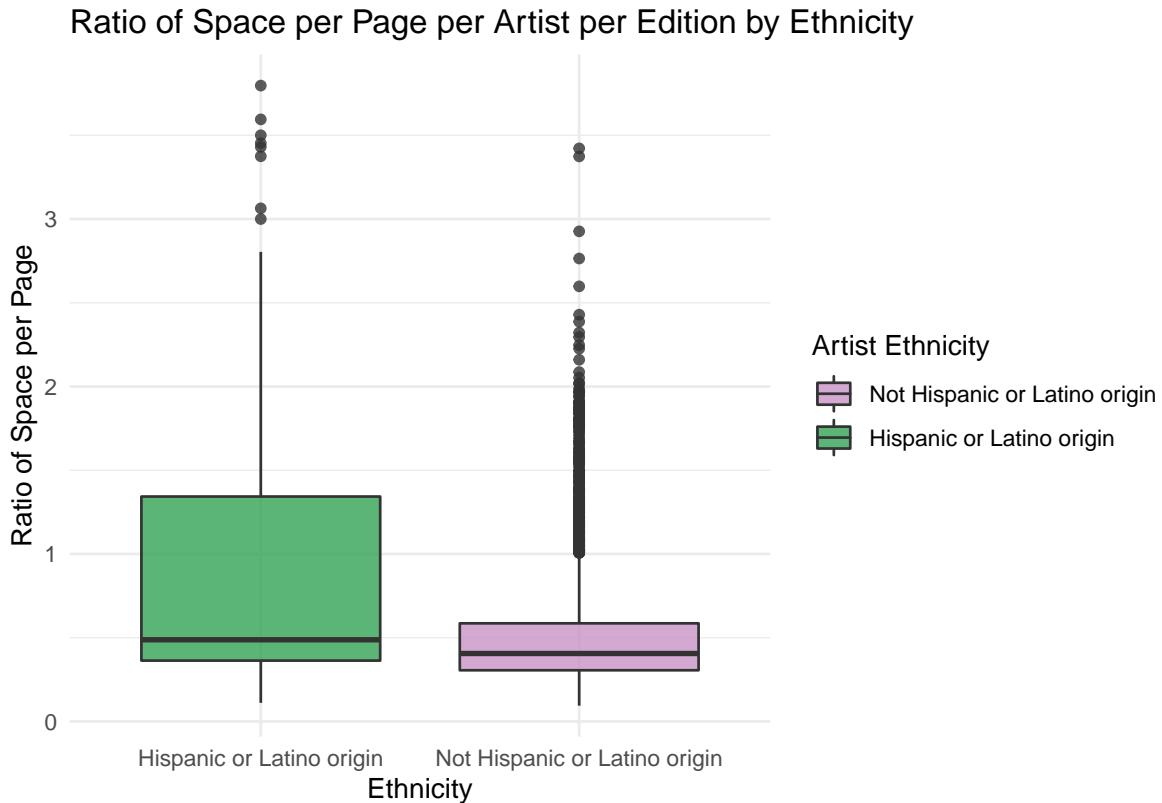


Figure 4.20: Ratio of Space per Page per Artist per Edition by Ethnicity,  $n = 3162$ , (Source: All artists of two-dimensional works made after c. 1750 in Gardner's Art Through the Ages and Janson's History of Art, 1926-2020).

#### 4.3.5 Total Space Ratio Per Page vs. Artist Nationality

In the visualization, Figure 4.21, it is clear the median total space per page does change in the case of particular nationalities such as French or Spanish. This is additionally highlighted in Table 4.3, as well as the percentage divide of each varying category of nationality. Most interestingly, Spanish artists only account for 2.97% of all artists included through editions, but once a Spanish artist is included, they are heavily discussed. Such can again be understood through the same examples for artist ethnicity, Pablo Picasso and Francisco Goya.

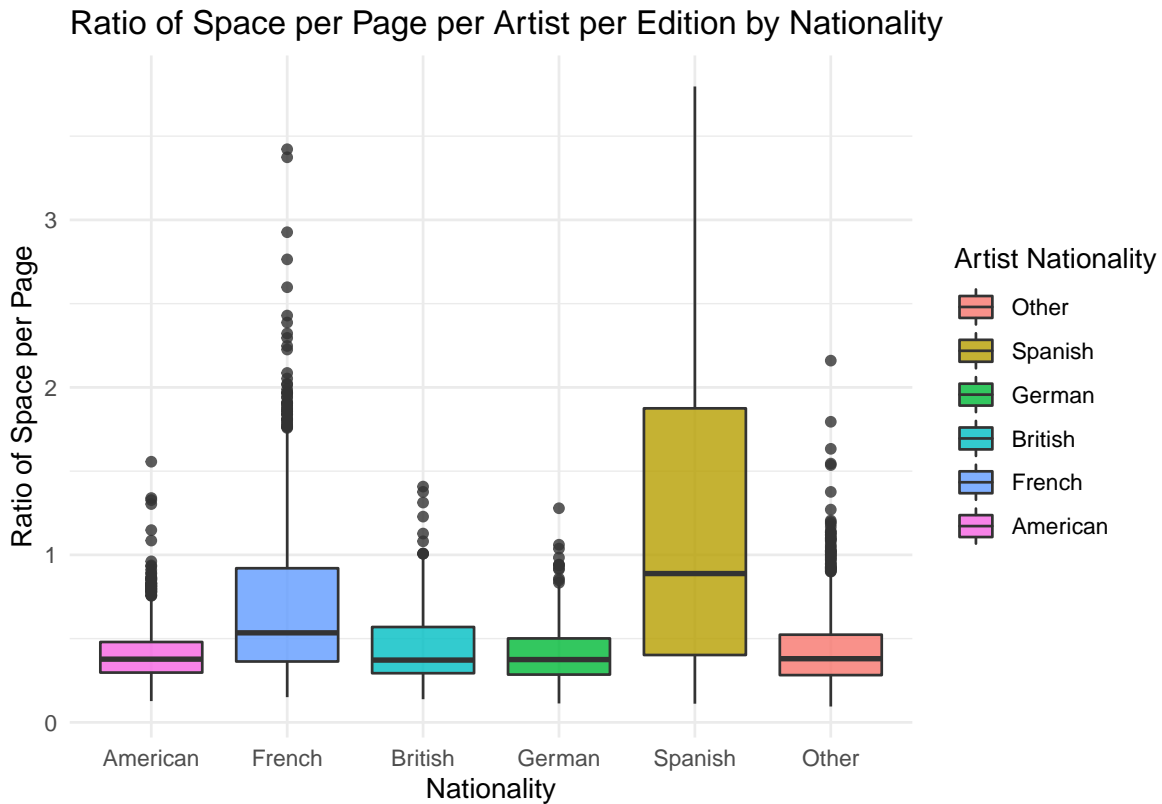


Figure 4.21: Ratio of Space per Page per Artist per Edition by Nationality,  $n = 3162$ , (Source: All artists of two-dimensional works made after c. 1750 in Gardner's Art Through the Ages and Janson's History of Art, 1926-2020).

Table 4.3: As categorized by nationality, this table highlights the percent of total count and the median of total ratio of space per page

Artist Nationality	Percent of Total Count Through all 25 Books	Median Total Ratio of Space per Page
American	28.72%	0.377
British	10.03%	0.372
French	27.51%	0.535
German	8.10%	0.375
Other	22.68%	0.380
Spanish	2.97%	0.889



## 4.4 Model Output: Research Question 2

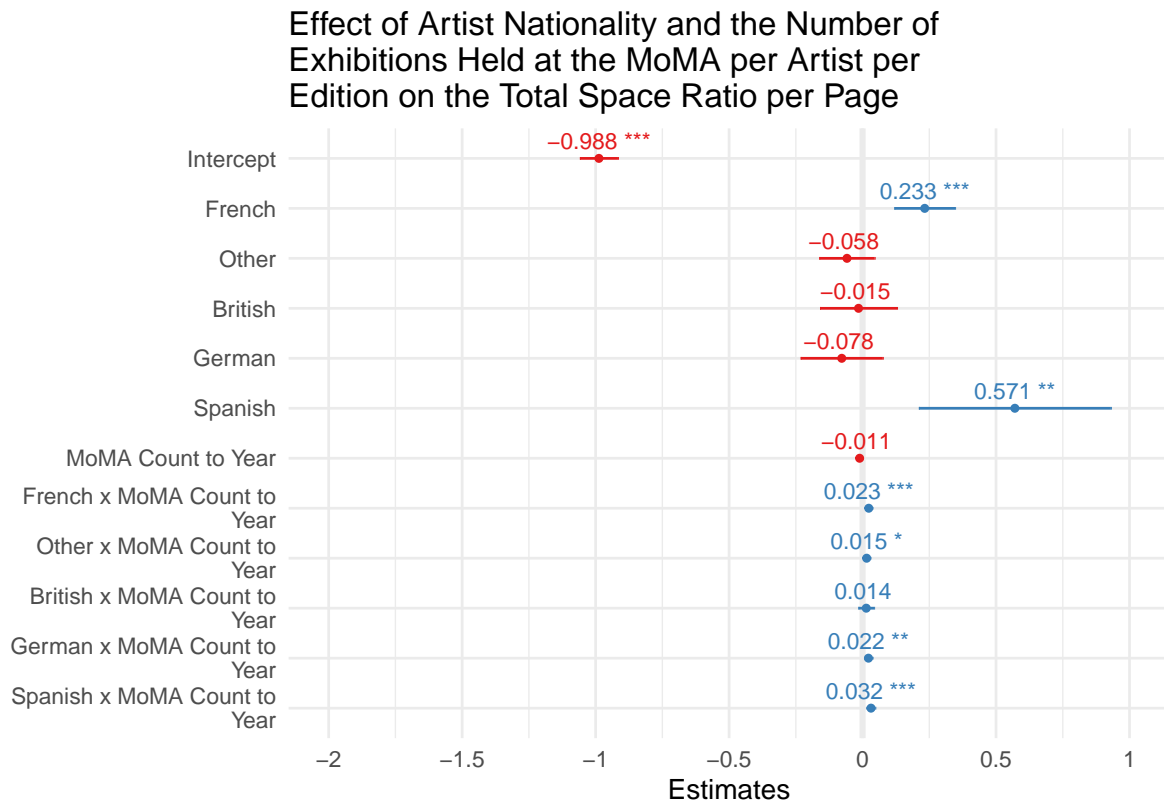


Figure 4.22: A visualization of the model output meaning the slopes of each level of predictor variable as well their confidence interval. If a beta is given one or more \*, such indicates that their respective p-value is statistically significant.

$$\begin{aligned}
\widehat{TotalSpaceRatioPerPage} = & -0.988 + 0.233 \times French \\
& - 0.058 \times Other \\
& - 0.015 \times British \\
& - 0.078 \times German \\
& + 0.571 \times Spanish \\
& - 0.011 \times MoMA \\
& + 0.023 \times French \times MoMACountToYear \\
& + 0.015 \times Other \times MoMACountToYear \\
& + 0.014 \times British \times MoMACountToYear \\
& + 0.022 \times German \times MoMACountToYear \\
& + 0.032 \times Spanish \times MoMACountToYear
\end{aligned}$$

After step-wise model evaluation, the model that is most parsimonious with an optimized AIC is a model using only artist nationality, the count to year of the number of exhibitions an artist is included in at the MoMA, and the interaction between the two.

With a log transformation applied to the outcome variable as it is heavily right-skewed, my linear mixed-effects model yields a conditional r squared of 53.23%. Such denotes that 53.23% of the variance of total space ratio per page given to an artist in a given edition can be explained by the model.

## 5 Discussion

### 5.1 Model Interpretation and Relevance

In the visualization above, the slopes with one or more asterisk(s) are the slope estimates that have a p-value smaller than .05. Therefore, the slope estimates that have one or more asterisk(s), we can reject the null hypothesis that the relationship between the log of total space ratio per page and a given predictor is equal to zero. The slope estimates with a p-value smaller than .05 are therefore statistically significant. The following denotes the interpretation for the intercept and every predicted slope the model outputs as statistically significant:

Intercept: For an American artist with no exhibitions at the MoMA, we expect on average for the `space_ratio_per_page` to multiply by a factor of 2.686.

French: Holding the count to year of the number of exhibitions at the MoMA constant, for a French artist, we expect the total space ratio per page to increase on average by 1.262 as compared to an American artist.

Spanish: Holding the count to year of the number of exhibitions at the MoMA constant, for a Spanish artist, we expect the total space ratio per page to increase on average by 1.77 as compared to an American artist.

French x MoMA Count to Year: For a French artist, for an additional exhibition at the MoMA, we expect total space ratio per page to increase by a factor 1.012, as compared to an American artist.

Other x MoMA Count to Year: For an artist with a nationality different from American, French, British, German and Spanish, for an additional exhibition at the MoMA, we expect total space ratio per page to increase by a factor 1.004, as compared to an American artist.

German x MoMA Count to Year: For a German artist, for an additional exhibition at the MoMA, we expect total space ratio per page to increase by a factor 1.011, as compared to an American artist.

Spanish x MoMA Count to Year: For a Spanish artist, for an additional exhibition at the MoMA, we expect total space ratio per page to increase by a factor 1.021, as compared to an American artist.

The goal of my model is to understand and infer which variables are most statistically significant when accounting for the variance of the total space ratio per page per artist per edition.

The goal of the model is not prediction, but rather inference and to identify which variables, out of the possible six predictors (artist gender, race, ethnicity, nationality, MoMA count to year and Whitney count to year) that I collected, explain the variability of my outcome variable. Creating a model that focuses on inference allows for me to see the most important predictors spanning from 1926-2020 of two-dimensional works made after c. 1750 included in either *Janson's History of Art* or *Gardner's Art Through the Ages*.

## 5.2 Limitations and Next Steps

That being said, the best fit model is limited by the imbalances in the data that I collected and highlighted through answering my first research question of how the demographic of artists included in the books change through time. There are incredible imbalances particularly when it comes to race, gender, and ethnicity. Mathematically, my model struggled with rank deficiencies, meaning there were so few observations of artists who are in a minority group either in regard to being female or non-white or being of Hispanic or Latino origin. My model is most generalizable for an audience of American white male from not Hispanic or Latino origin as this demographic is most dominant through the data I collected in *Gardner's Art Through the Ages* and *Janson's History of Art*. With more diverse data that potentially the future of art history introductory survey texts holds, one could achieve a model in which those demographic categories account for the variability of total space ratio per page per artist per edition.

Additionally, my research is limited to the lack of transparency in the sales of art. I would have loved to create a variable using price data of works of artists in an effort to quantify the relationship between various art markets and art history introductory textbooks. Additionally, due to time constraints, I would have loved to have created a variable counting the number of external publications written about a particular artist at each moment of time in which another edition of either *Janson's History of Art* or *Gardner's Art Through the Ages* was published. This would have been in an effort to quantify the relationship between art history survey texts and external publications. Additionally, there are potential gaps in information regarding the exhibition history at The Whitney as it is only the exhibitions as stated by their website in March of 2021, rather than a fully complete exhibition history. I would love to as well as a next step to be able to have used exhibition history's of other museums not only in the United States but across the world to better understand the relationship between museum spaces art history introductory survey texts. Additionally, there are myriad other art history survey texts one could catalog, as well as expanding the scope within the 25 books from which I did record data.

## 5.3 Interpretations and Conclusions

# Appendix

## Data Dictionary

Outcome:

`space_ratio_per_page_total` = The area in centimeters squared of both the text and the figure of a particular artist in a given edition of *Janson's History of Art* divided by the area in centimeters squared of a single page of the respective edition.

Potential Predictors:

`artist_gender` = The gender of the artist.

`artist_race` = The race of the artist.

`artist_race_nwi` = The non-white indicator for artist race, meaning if an artist's race is denoted as either white or non-white.

`artist_ethnicity` = The ethnicity of the artist.

`artist_nationality_other` = The nationality of the artist. Of the total count of artists through all editions of *Gardner's Art Through the Ages* and *Janson's History of Art*, 77.32% account for French, Spanish, British, American and German. Therefore, the categorical strings of this variable are French, Spanish, British, American, German and Other.

`whitney_count_to_year` = The count of exhibitions held by The Whitney of a particular artist at a particular moment of time, as highlighted by `year`.

`moa_count_to_year` = The count of exhibitions held by the Museum of Modern Art (MoMA) of a particular artist at a particular moment of time, as highlighted by `year`.

`year` = The year of publication for a given edition of Janson or Gardner.

Other variables:

`edition_number` = The edition number of the textbook from either Janson's History of Art or Gardner's Art Through the Ages.

`book` = Which book, either Janson or Gardner the particular artist at that particular time was included.

`artist_unique_id` = A unique identifying number assigned to artists across books and editions denoted in alphabetical order.

## Log Transformation: Total Space Ratio per Page

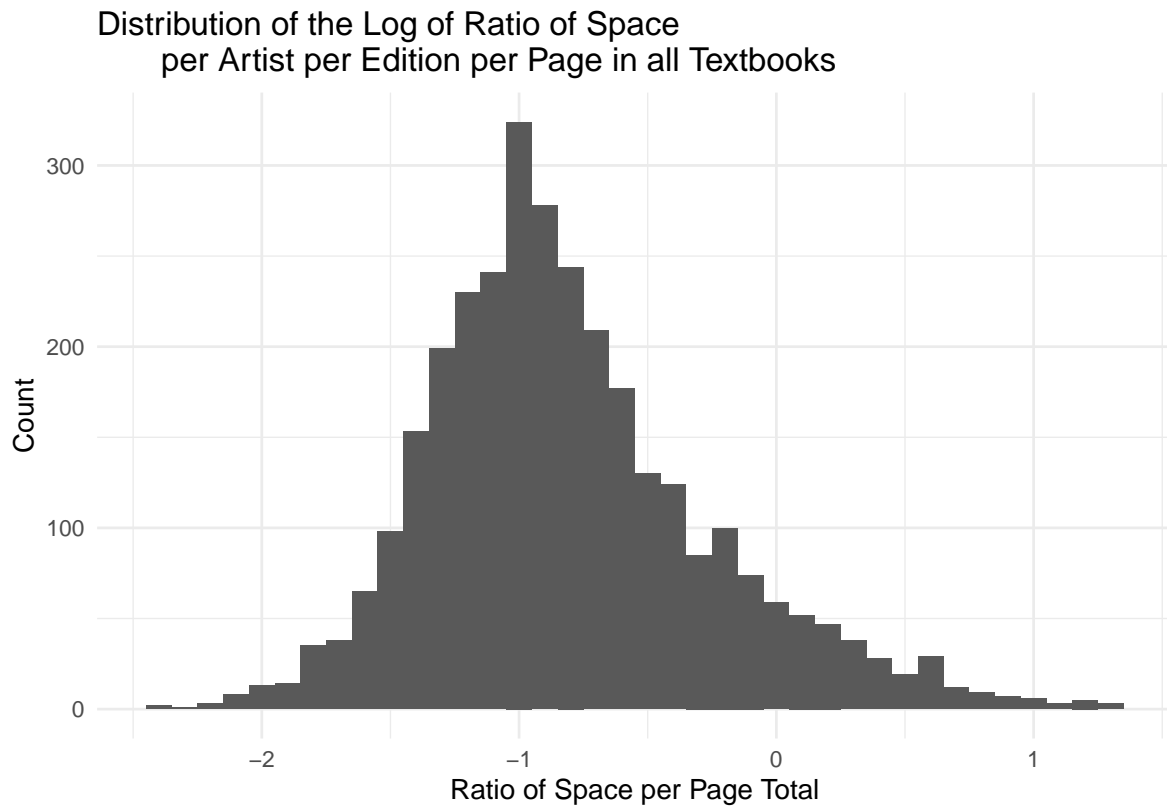


Figure 5.1: enter figure caption here

In order to create less skew in our outcome variable, it is evident that log transforming total space ratio per page given to an artist in a particular edition gives the spread a much more mild right-skew than before. The shape is still unimodal and asymmetrical. I will be using the log transformation on the total space ratio per page, our outcome variable, in the linear mixed-effects model. This allows for the residuals to have constant variance.

## Assumptions

### Residuals and Constant Variance

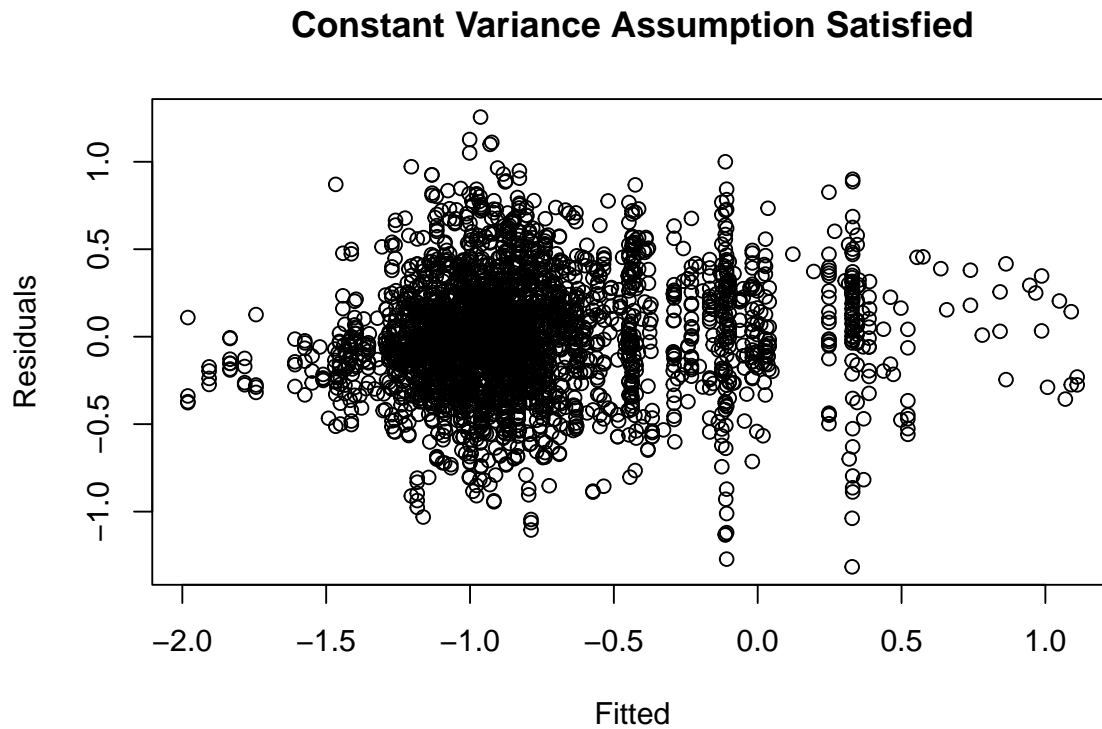


Figure 5.2: enter figure caption here

The very low values of the predicted values have very low variability for residuals but for the bulk of the data, there is constant variability in the residuals.

## Normality

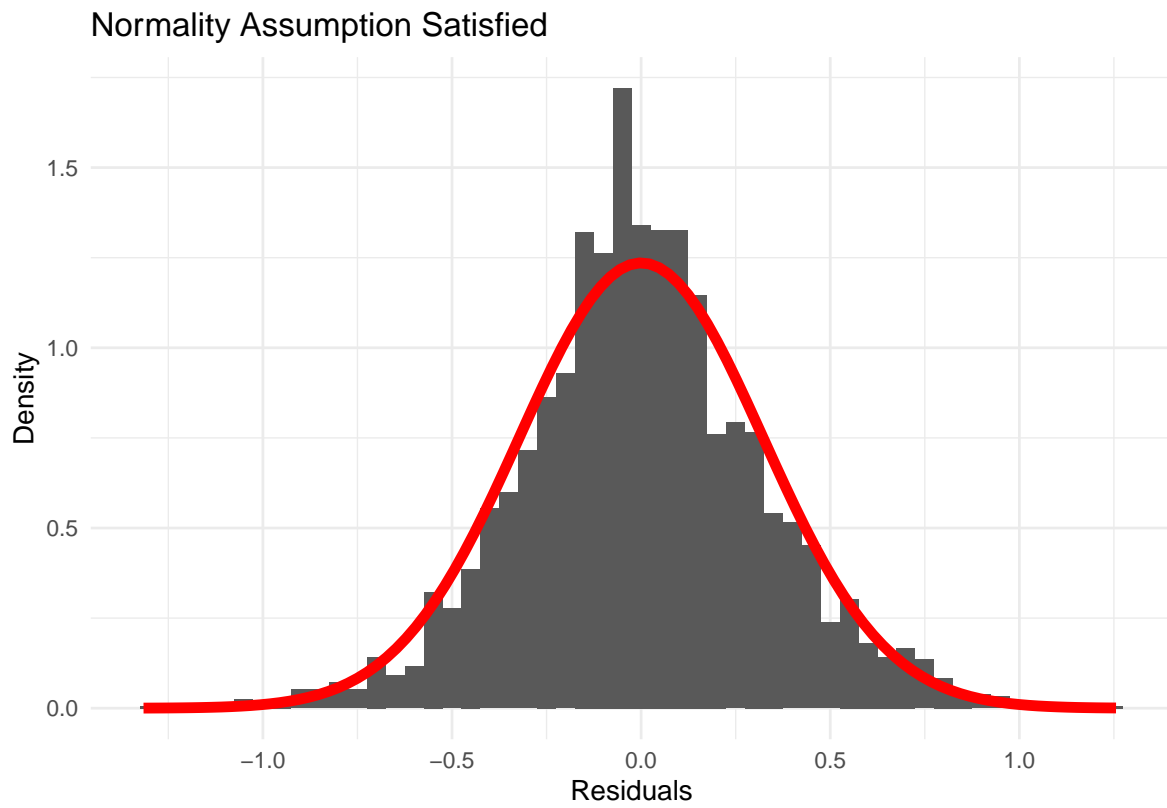


Figure 5.3: enter figure caption here

The distribution of the residuals is approximately normal.



## Independence

Since we cannot assume that each row in our data set is independent from another, because we expect an artist effect, we added a random effect at the artist level. Between artists, we expect the observations to be independent.

## Collinearity

	GVIF	Df	$GVIF^{(1/(2*Df))}$
artist_nationality_other	1.822957	5	1.061885
moma_count_to_year	10.422907	1	3.228453
artist_nationality_other:moma_count_to_year	16.196330	5	1.321118

Given artist nationality, MoMA Count to Year and the interaction between the two all have a corrected GVIF under 10 therefore no variables are collinear.

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