New York's Museum of Modern Art's Collection at a Glance: Featuring… Paintings!

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Courtesy of MoMA.com, "The Starry Night," Vincent van Gogh (1889)

Introduction:

New York's Museum of Modern Art (MoMA) opened its doors in 1929 and is widely considered one of the largest and most influential museums of modern art in the world. Modern art, which refers to (Western) art produced roughly from the 1860s to the 1970s, is associated with the spirit of experimentation and the conceptual trend towards abstraction. Famous artists such as Pablo Picasso, Vasily Kandinsky, and Jackson Pollock built upon the work of post-Impressionists like Vincent van Gogh, Claude Monet, and Paul Gauguin to create new works that challenged traditional realist modes and forms.

The broader question of "what is modern art" can't be easily answered, but one proxy is to see what museums canonize as valuable to the public. Allowing for discrepancies due to curatorial taste, access to rarer international works, prestige (for donations), and available funds (for purchases), what aspects of "modern art" does MoMA reflect through its metadata?

Dataset:
I used the MoMA's digitized research Artwork dataset, which contains approximately 150,000 valid records with fields such as artwork title, artist, classification, width, and height. These records are continuously evolving (last updated October 1, 2020), and may have missing or null information. I used Trifacta Wrangler and a 25+ step recipe to clean extraneous symbols, reformat dates to years, and group attributes together. (https://github.com/MuseumofModernArt/collection)

In this exploration, I transition from visualizations using almost 130,000-entries to a more specific subset of 2366 paintings. It is difficult to make broader claims on a multi-classification dataset due to the different processes for analyzing a sculpture, film, or painting. (For example, video art purportedly originates with Nam June Paik in 1965 along with the start of the Fluxus Movement, which could distort my chronological analysis as the museum has been open since 1929.) Since painting is a classification that has historically been and continues to be popular in Western art, this more specific filter will allow for more consistent insights into MoMA's "modern" collection.
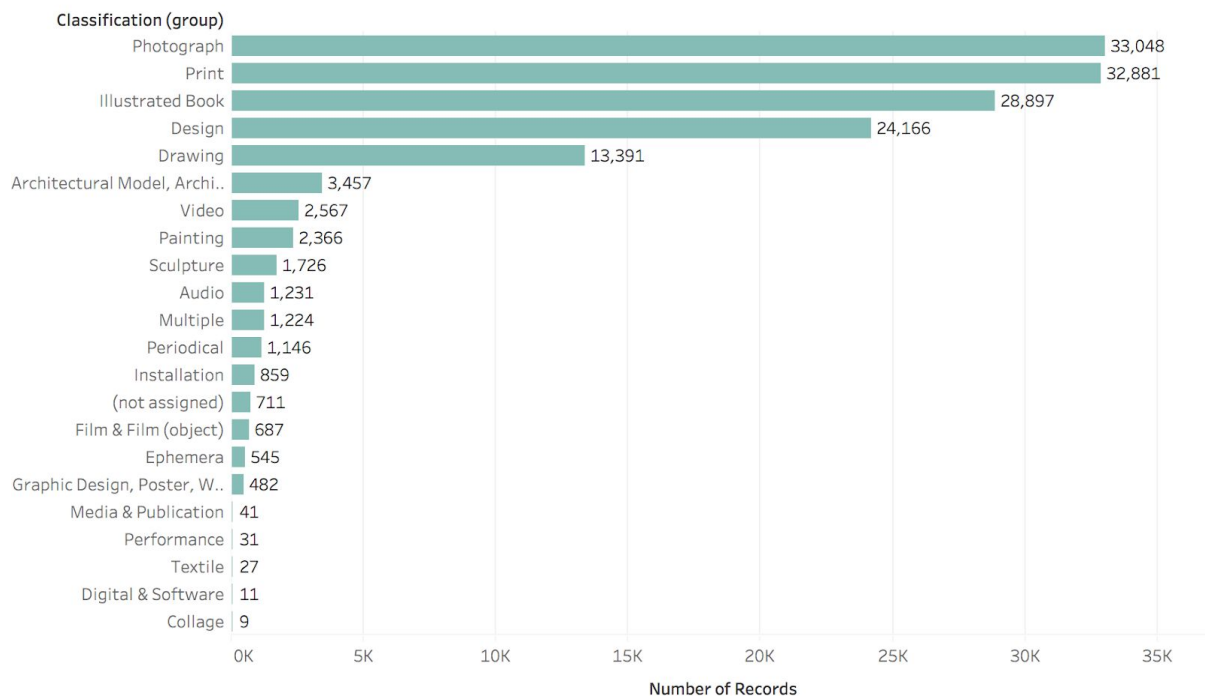
Guiding Questions:
1. What can MoMA metadata imply about *its* definition of "modern art," in terms of which years are represented by artwork and also when it acquires more pieces?
2. Who are the painters with the most work at MoMA, what is their nationality and gender breakdown, and has female representation changed across time?
3. How has modern art's dedication to experimentation manifested in formal elements like width and height?

1. MoMA's abundant classifications and abundance of art

Initially, I had grandly set out to perform a metadata analysis of the collection as a whole. However, there were 32 different classifications beyond traditional painting and sculpture. This seemed very high to me, so I explored the set and found a variety of anomalies. After removing null values, I retained approximately 130,000 records. I realized that MoMA grouped its research records with the other artwork, so this included the architects Frank Lloyd Wright and Mies van der Rohe special archives and even 1 work "WYDRN?" listed as software. MoMA also features a Fluxus Collection (an interdisciplinary digital art movement in the 1960-70s), and thus 711 works with no classification assignment. So, modern art is perhaps hard to classify because it's so experimental!

Overall, the dataset does not clearly distinguish between reference materials, donated works in progress, and sketchings in a portfolio, as compared to works intentionally created to be displayed in a gallery. The below graph shows Photograph and Print with nearly 33,000 titles each, but it is likely that these groupings include reference photos (e.g. for architecture or out-of-print ephemera and posters). When I further sampled the dataset, the larger categories also include reproductions, untitled experiments, and many lithographs and engravings (which are antique ways to reproduce images for media). Considering how small painting (2366) is in comparison, the larger categories could distort analysis on the group of artworks itself.

Artwork Classifications

Classification (group)

| Classification	Number of Records
Photograph	33,048
Print	32,881
Illustrated Book	28,897
Design	24,166
Drawing	13,391
Architectural Model, Archi..	3,457
Video	2,567
Painting	2,366
Sculpture	1,726
Audio	1,231
Multiple	1,224
Periodical	1,146
Installation	859
(not assigned)	711
Film & Film (object)	687
Ephemera	545
Graphic Design, Poster, W..	482
Media & Publication	41
Performance	31
Textile	27
Digital & Software	11
Collage	9

Count of artworks per classification, with research materials excluded, and similar classifications grouped. These filters funneled 32 groups to 22.

2. What years (of artwork creation) are represented by MoMA's set?

Using the cleaned 130,000 records, I made a chronological bar graph, organized by color with date created / number of titles. First, we can see the left trail of pre-1860 works, up to 1797, that MoMA has as part of its collection. We could postulate that these first came to MoMA due to bequest stipulations, special academic collections, and chronological-based exhibits. For example, the 324 works from 1818 are by Thomas Bewick, an English engraver instrumental in popularizing a new wood engraving technique. Likewise, 1900, a relative anomaly, could be due to null-values and artworks like "c. 19th century" that would translate to 1900. The large spikes often come from less-famous, and messily dated, portfolios of artists that are donated as part of a collection.

We see an initial peak around the museum's opening, 1929, suggesting that it acquired many works from then-contemporary sources. The largest peak is from 1955-1985, which correlates with the height of abstract art and the modern aesthetic, as also shepherded by influential art critics such as Clement Greenberg and Harold Rosenberg. The counts per year waned after the 1970s, with only 18 works so far in 2020, which could just be pieces directly inspired by modern art and also those used for exhibitions. This current era is already "postmodernism," so the MoMA's main focus now would be acquiring more time-relevant work and maintaining its collection. :)

Art Years Created
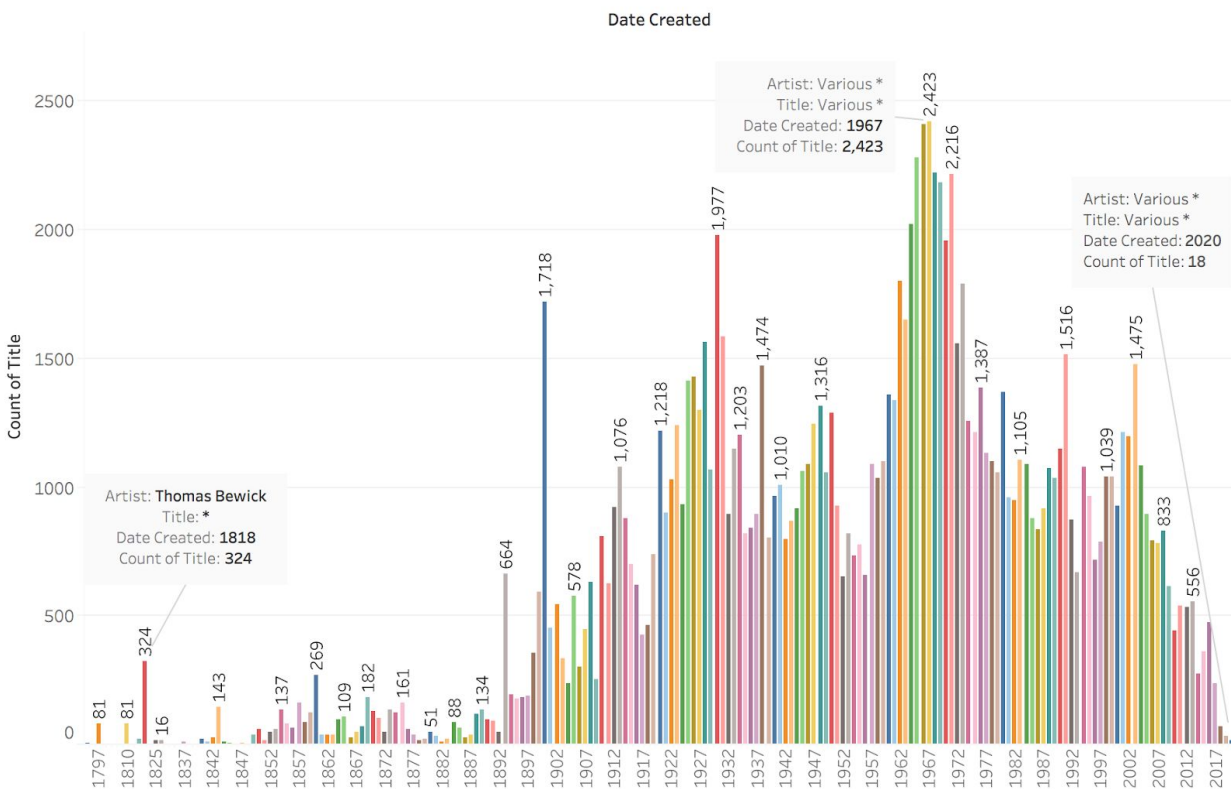
Date Created

3. How up-to-date are MoMA acquisitions, compared to the years created?
Using a line area graph as acquisitions and works created occur yearly and arguably
continuously, the 130,000 records reveal that the MoMA stays relatively up-to-date with
art collecting. There is perhaps a delay of a few years as the museum first began in 1929,
and had to catch up to all the works created before. (I did not remove the trailing left-side
for collection accuracy.)

Likewise, we can see that despite the art world's current shift to postmodernism, MoMA
continues to acquire modern art, with acquisitions overtaking the year of artwork creation
after 2005, when the gray rises higher than the red. Peaks are also due to bequests, often
from the artists themselves (such as Louise Bourgeois in 2008) and art collectors or
foundations (like Louis E. Stern and the Silvermans in 1964 and 2008 respectively).
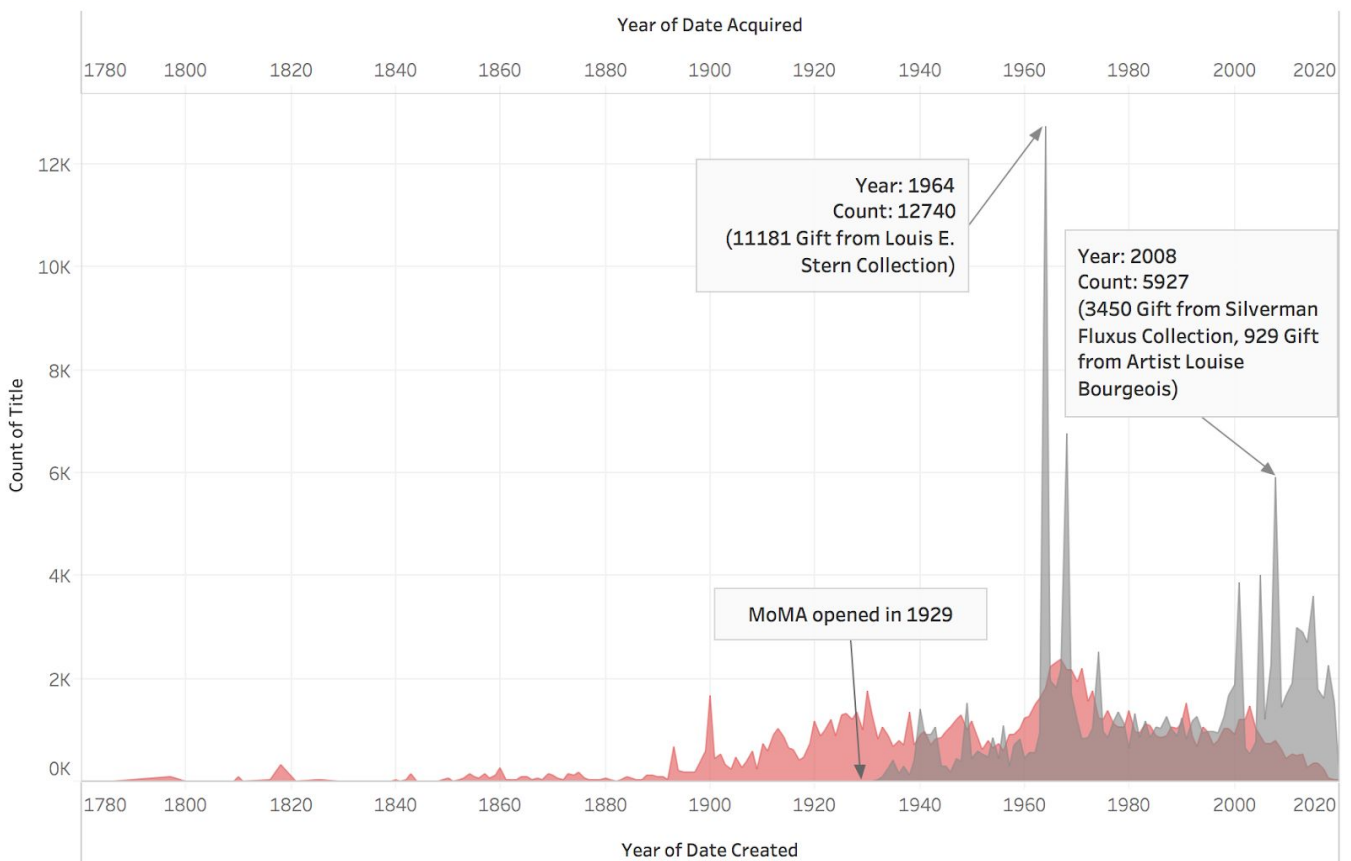
4. How soon are artworks acquired after creation?
Expanding upon the prior question, how closely related is the year of date created to the year of date acquired? (In essence, do the curators keep an eye out for active artists and ongoing trends, and try to acquire new pieces as soon as they are available?)

From the clustering towards the y=x line (from 97600 points, filtered down due to null-values for either value), it would appear so, especially for now famous works like Piet Mondrian's "Broadway Boogie Woogie" bought 1 year later in 1943. Other classics, like Vincent van Gogh's "The Starry Night" and Claude Monet's wide "Water Lilies," took longer to acquire, as their creations predate the museum's opening and involved significant funds or resources. ("The Starry Night" was exchanged through several hands after Van Gogh's death, until the MoMA acquired it in 1941 through famed art dealer Paul Rosenberg.)
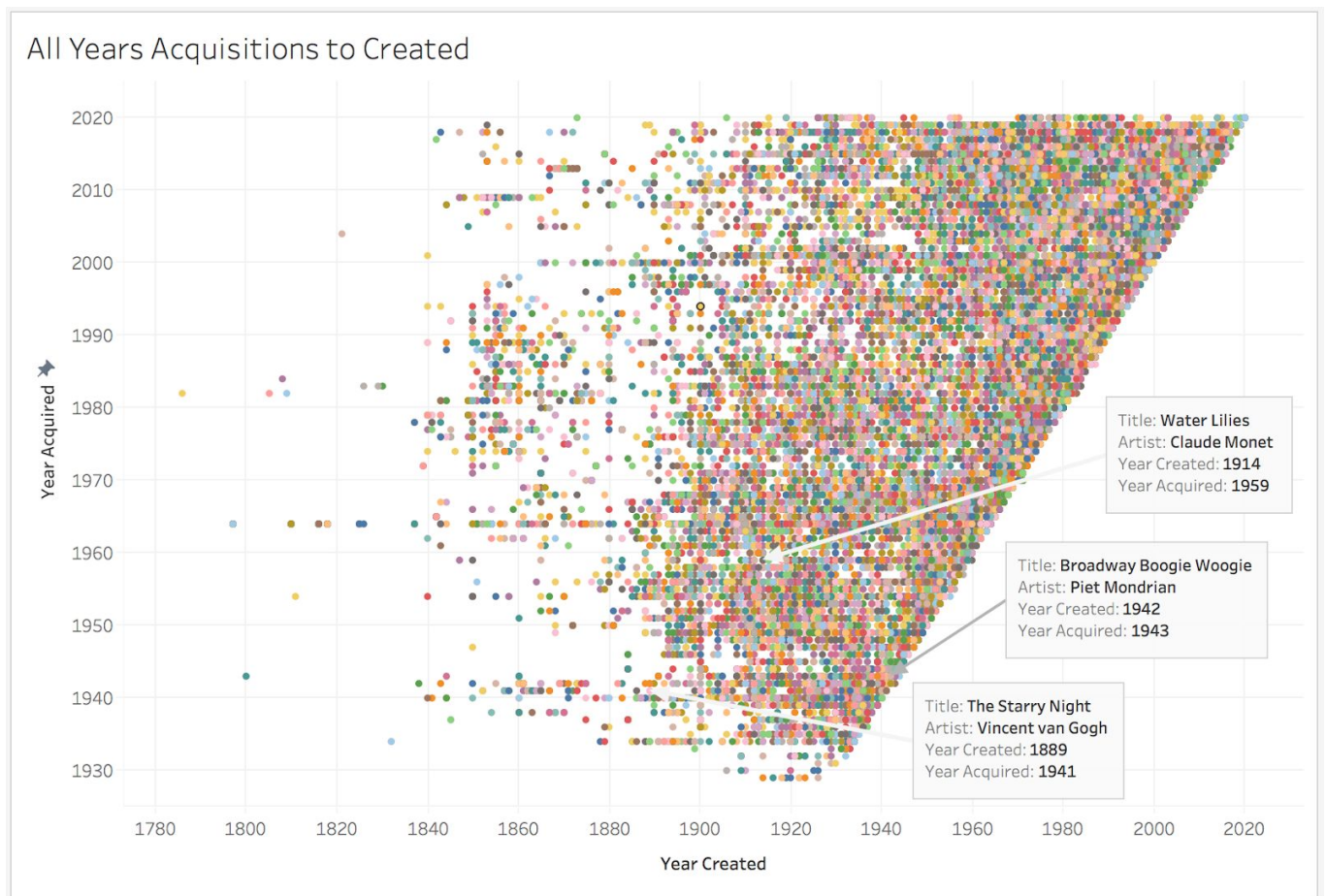
5. Who are the artists with the most works at MoMA?
Out of the 13700 catalogued artists for approximately 130000 artworks after filtering for non-null values, the top 20 were initially surprising.

A photographer Eugène Atget tops the list, which fits with how photography is the most abundant classification. He was famous for pioneering documentary photography, especially architecture and street scenes. Meanwhile, the next well-represented is unknown (which often includes a collective pool of women and underrepresented minorities). Afterwards, we see a few architects who also have special collections at the MoMA, such as Frank Lloyd Wright and Mies van der Rohe (with his frequent collaborator Lilly Reich), and artists with long, active careers, such as Pablo Picasso and Marc Chagall (who respectively lived until 91 and 97!).
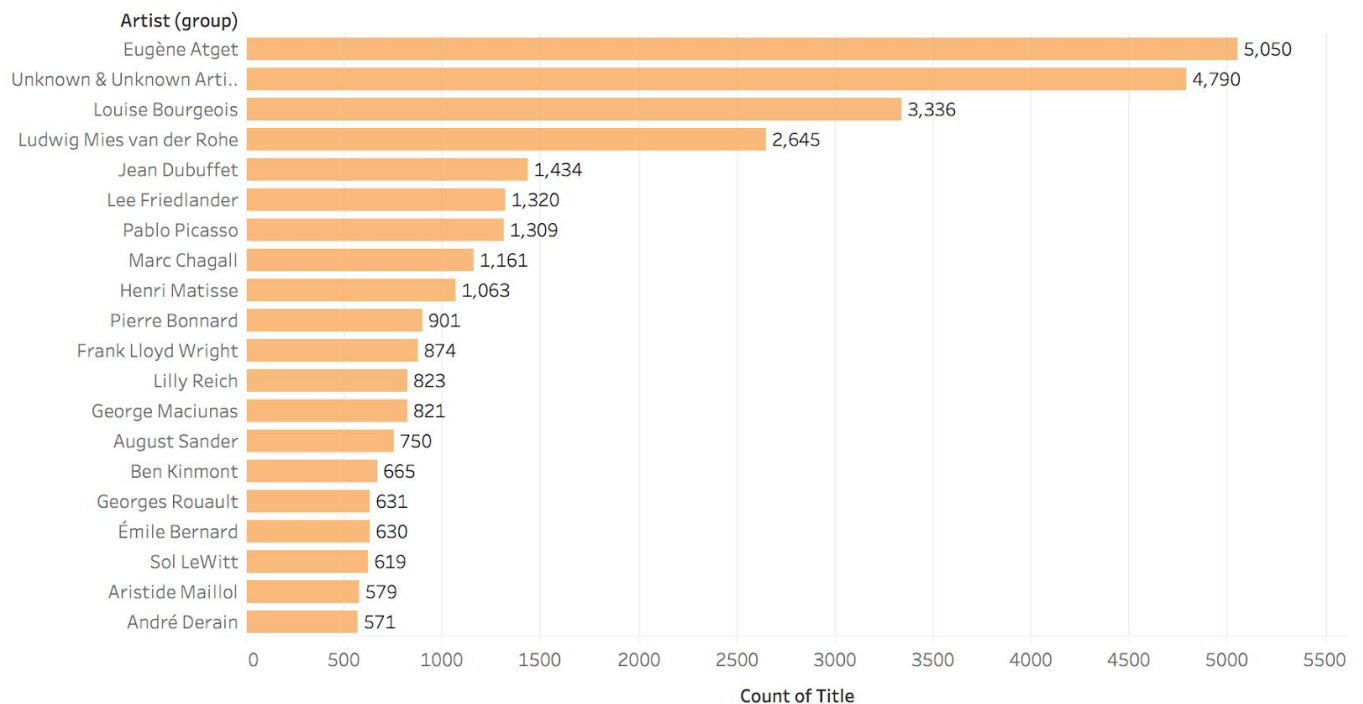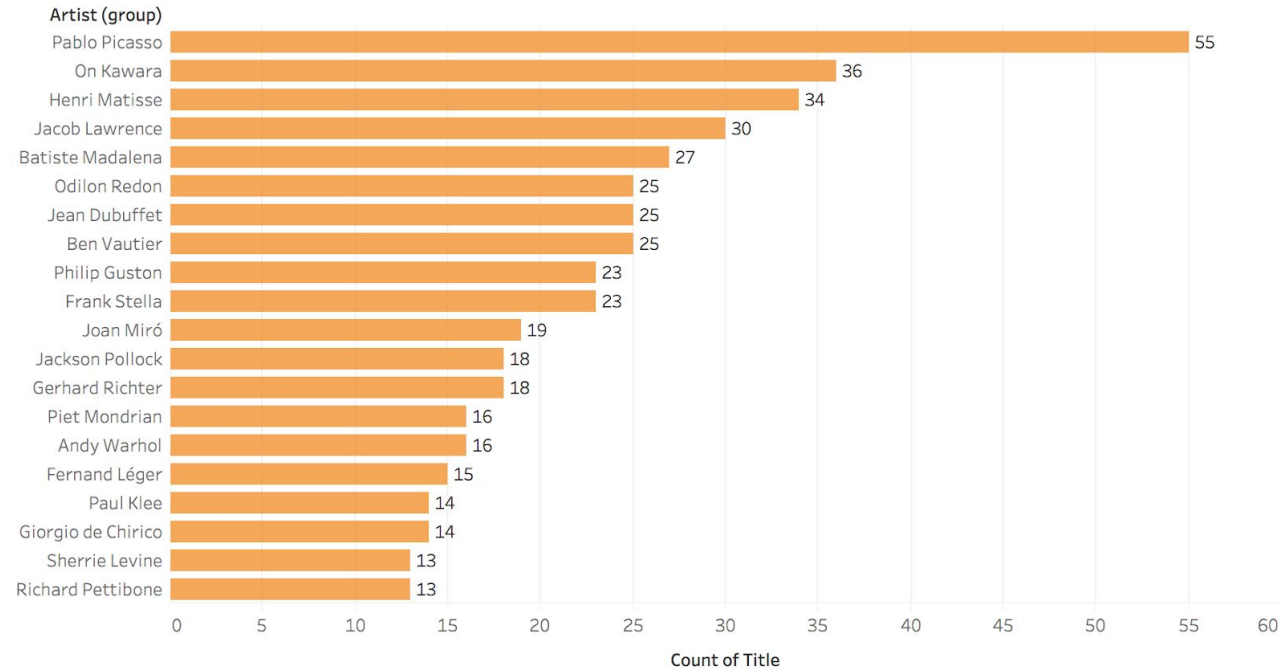

6. Transitioning to a smaller dataset… who are the top 20 MoMA painters?
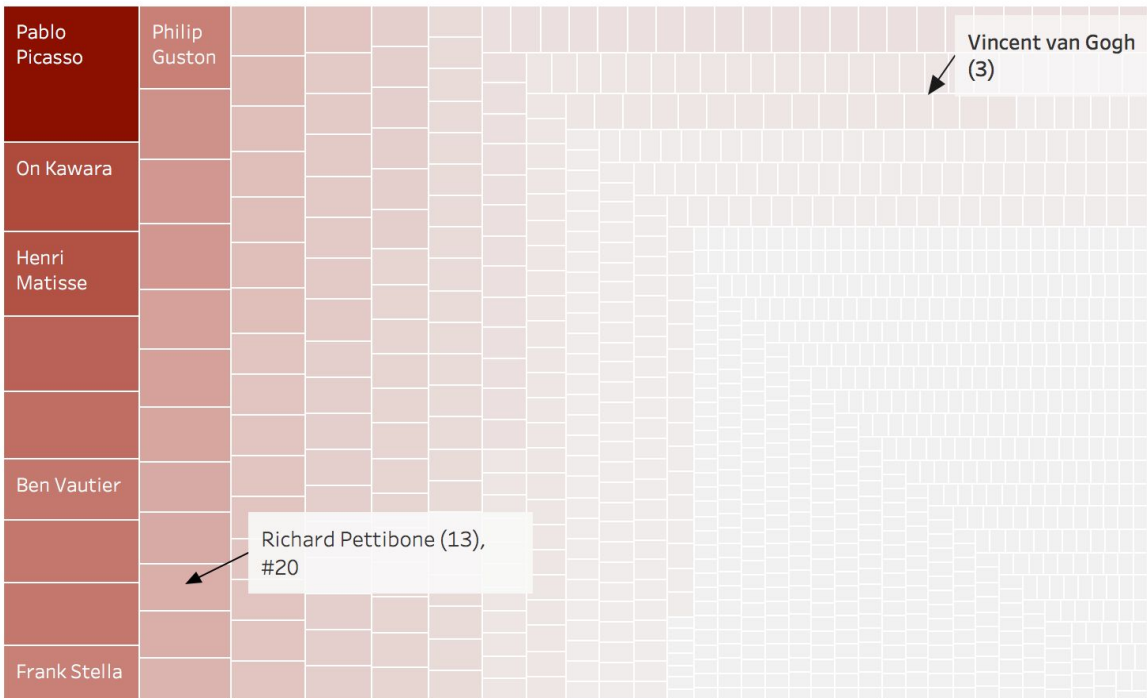Out of the 1029 catalogued painters for approximately 2362 paintings after filtering for non-null values, the top 20 were less surprising. Picasso tops the list, though it was my first exposure to second-place finisher On Kawara, a Japanese conceptual artist who lived in New York City since 1965, and donated some of his work to the MoMA. I chose to visualize this first as a bar chart, and then an area graph for how it reveals what spatial proportion these "top artists" actually have out of the whole body of work (less than 20% of MoMA paintings).

Not all renowned artists are well-represented; despite Vincent van Gogh's popularity (and how "The Starry Night" has entered the cultural mainstream), he only has 3 paintings at MoMA, with the others "The Olive Trees" and "Portrait of Joseph Arles" (though there is also a lithograph of his "The Potato Eaters").

Prolific Painters?

Artist (group)

Artist	Count
Pablo Picasso	55
On Kawara	36
Henri Matisse	34
Jacob Lawrence	30
Batiste Madalena	27
Odilon Redon	25
Jean Dubuffet	25
Ben Vautier	25
Philip Guston	23
Frank Stella	23
Joan Miró	19
Jackson Pollock	18
Gerhard Richter	18
Piet Mondrian	16
Andy Warhol	16
Fernand Léger	15
Paul Klee	14
Giorgio de Chirico	14
Sherrie Levine	13
Richard Pettibone	13

Count of Title

Prolific Painters?

7. How is artist nationality represented in paintings?
Despite the seeming simplicity of this chart, I find it surprising that Americans actually
dominate the proportion of MoMA paintings (49% of paintings, or 1127 works out of
approximately 2300), though perhaps this is to be expected with New York as the center of
abstract art, and with all the naturalized American artists, especially post-WWII.

This is significant because there's a long-standing impression that Americans "stole"
artistic traditions from the Europeans, at least until the birth of Transcendentalism (which
arguably was an outgrowth of European Romanticism + American exceptionalism).
However, modern art with its abstractions, and the "frenetic virility" of painters like
Jackson Pollock, start to feature a significant number of Americans, which in the case of
MoMA, is very close to half!

Next up in the counts are paintings with artists of French, then German nationality, which
relates to how French post-Impressionism and German Expressionism meld together into
eventual abstract art. I used a spatial treemap to mimic the amount of "space" in the
painting collection taken up by each nationality, with different colors to make the contrast
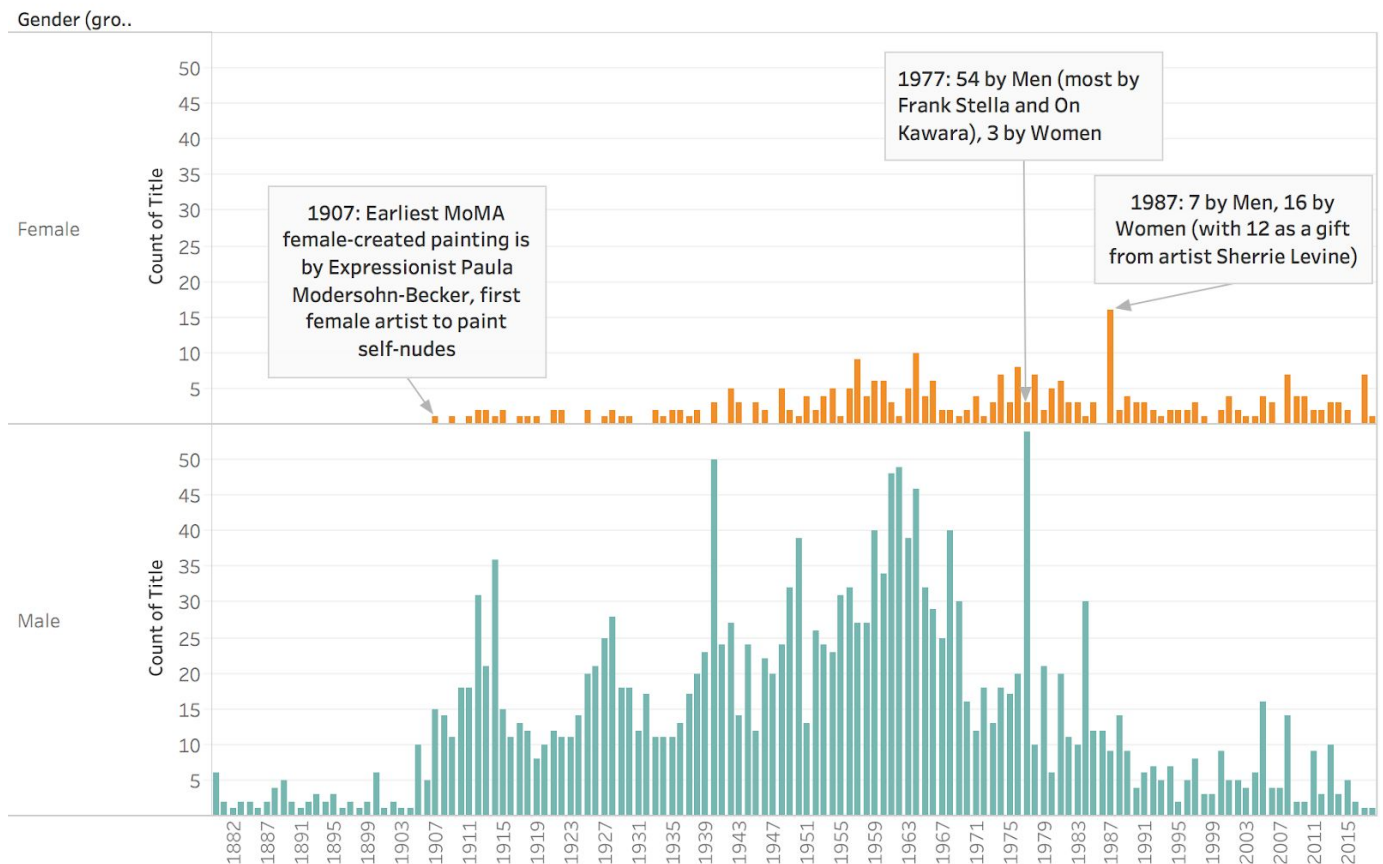more visible.

Paintings, by Nationality
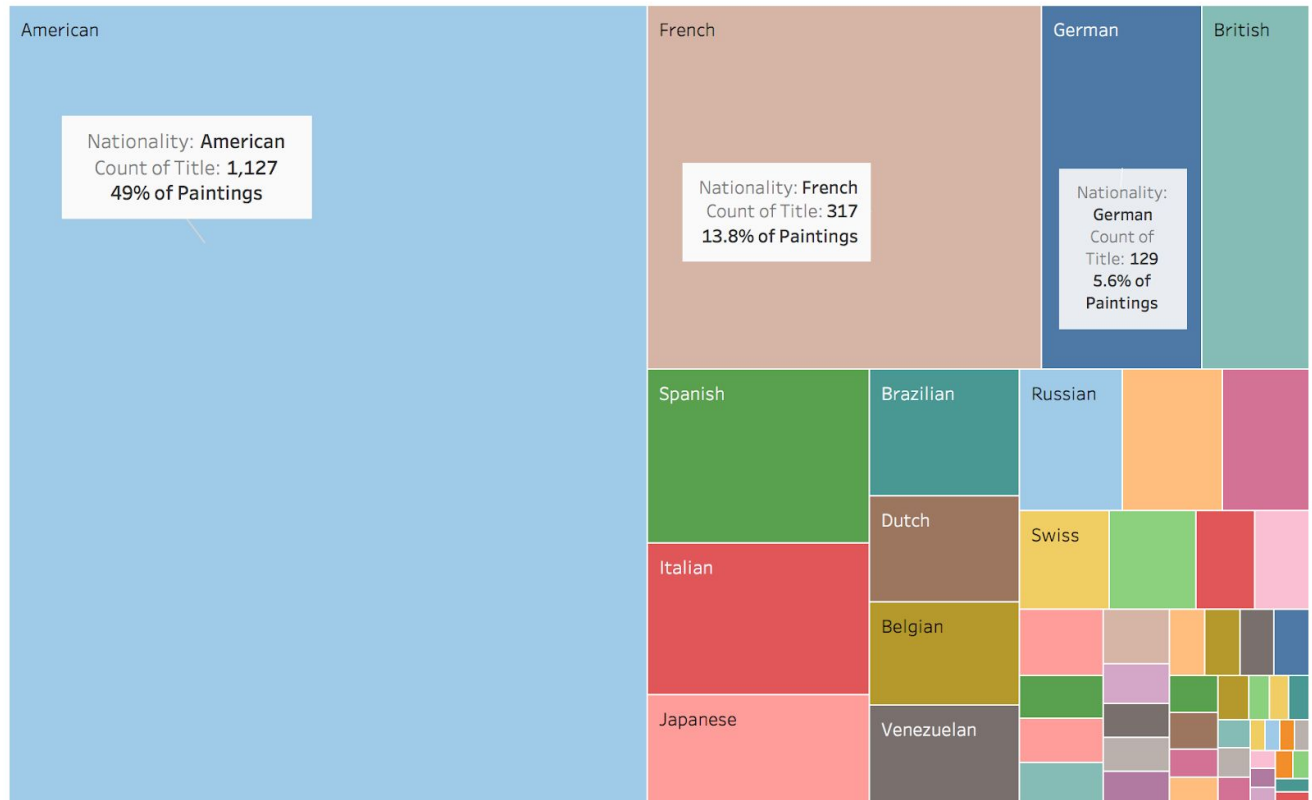
8. How are female artists represented in paintings by year, and by acquisition?
Out of 2362 paintings and after removing group- and other-created paintings to 2309, men have created 2017 and women have created 292 of the paintings at the MoMA, which is a percentage of 87.3% to 12.7%. These visualizations demonstrate the continued preponderance of paintings created by men at the MoMA, which is unlikely to change very much due to the constraints of the era. (For example, many female Abstract Expressionists in the 1950s like Helen Frankenthaler had difficulty exhbiting and were even then overshadowed by their male counterparts, while others such as Lee Krasner had to adopt a unisex name. Some of them destroyed their artworks or never sold them.)

a. It is important to point out the static numbers for representation of paintings by women in the MoMA collection. Even with new efforts to collect female-created paintings, these numbers may continue to be low, even for modern art (there are only so many female artists to be "rediscovered," since many female artists were limited by historical social pressures that prevented them from creating or selling work in the first place, as scholar Linda Nochlin notes in "Why Have There Been No Great Women Artists?").

Paintings per Year Created, by Gender

Gender (gro..

1907: Earliest MoMA female-created painting is by Expressionist Paula Modersohn-Becker, first female artist to paint self-nudes

1977: 54 by Men (most by Frank Stella and On Kawara), 3 by Women

1987: 7 by Men, 16 by Women (with 12 as a gift from artist Sherrie Levine)

b. Despite the assumption of progress in expanding museum representation for female artists, The New York Times cites that between 2008 and 2018, only 11% of art acquired by top museums were by women, so this shows how there is still a long-lasting effect from historical male dominance in art, with "the idea of women artists being more of a risk." At least for the MoMA, it seems that there's a slow trend of greater acquisitions of female-created paintings, and in 2019, 13 out of 21 acquired paintings were by women.

Several of the spikes in acquisitions are due to collector and foundation bequests, which often source from artists emerging during or were popular at the time, which once again tend to be works created by men.

## Paintings per Year Acquired, by Gender
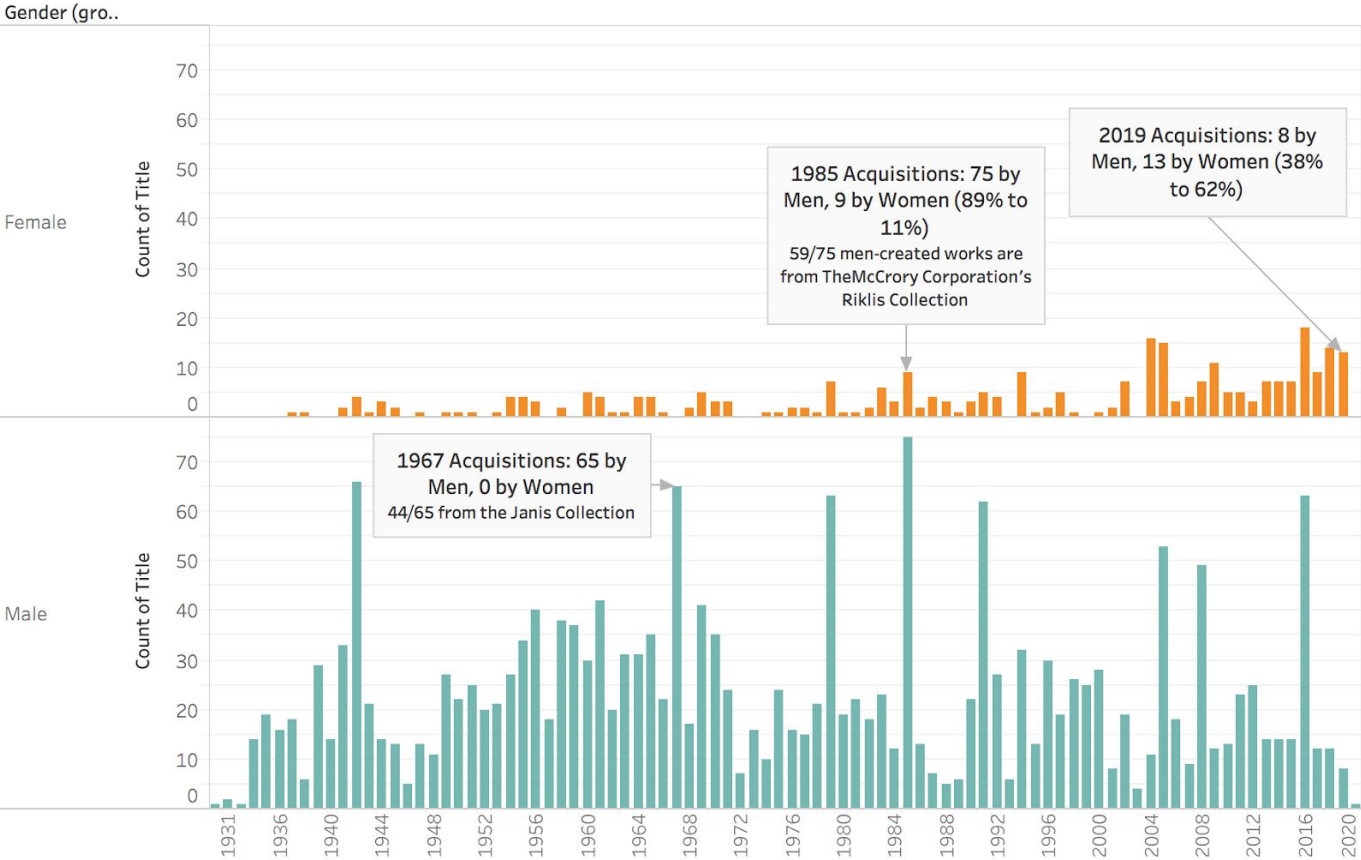
9. Onto format qualities… how has the aspect ratio (width / height) changed over time?

In almost any graphic design context, I hear the words "aspect ratio" (width / height) and I wondered how this would change through time for the paintings at the MoMA. Modern art often challenges existing standards (especially when it was supported by the US in the late 1950s as an opposition to Soviet-led social realism), and this often led to very grand experimental works, like Stella's 1977 Maquette for Maha-lat.

I used a scatter plot to see how artworks would cluster through time, and the dots have clear interiors and square outlines to mimic painting frames. We can see a more visible cluster rising out of the dense area between 1940-1990, suggesting that this span of 50 years was an age of painting dimension experimentation. Most paintings in general hover near square-like (aspect ratio 1), with a few closer to 0 during this same span for the sake of experimentation. There is a slow return to the usual state of things post-1990.

Fun note: When looking through this set, I briefly feared that the "Tableau (preparing)" was a side error from data filtering, but it turns out that it is a real artwork.

Aspect Ratio Through Time
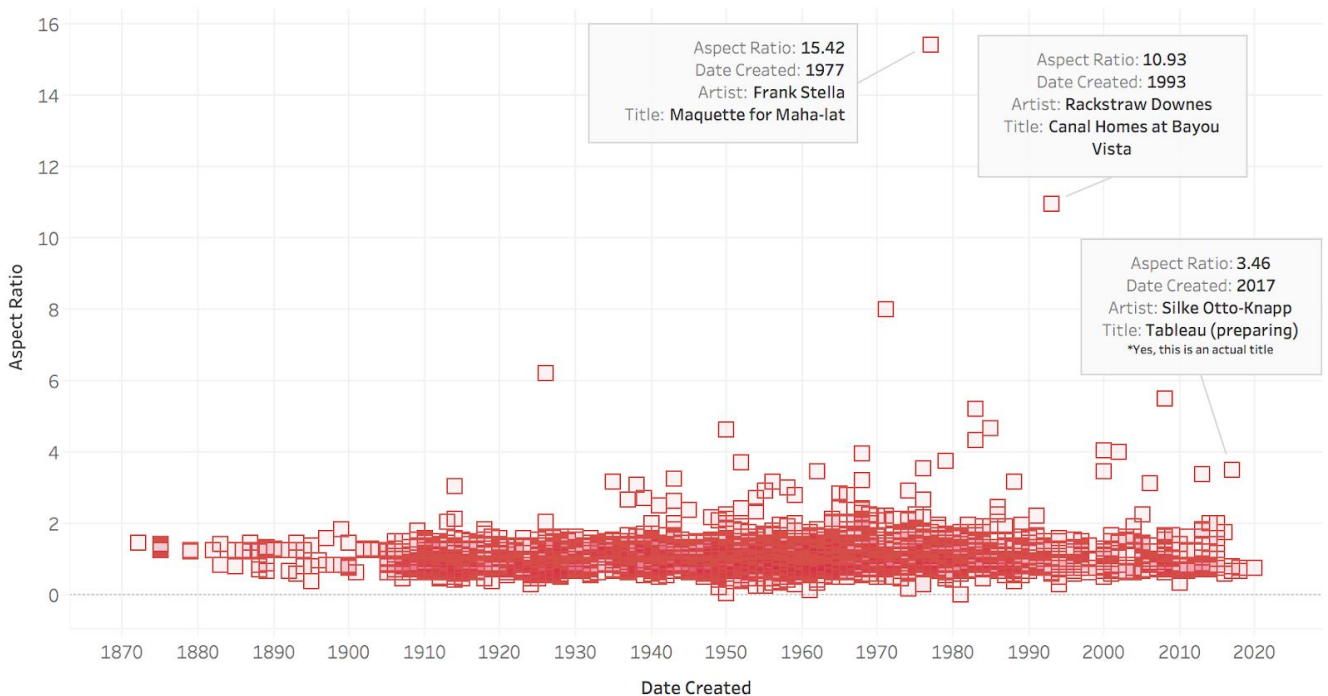
Abstract art was most popular in the 1950s as a reaction (and rebellion) to WWII and constrained Soviet social realism. The most experimentation in aspect ratios occurs in subsequent years, with a cluster between 1950-1980.

10: And finally, what are the most common painting dimensions of width x height at the MoMA?

For this final visualization, I opted for a more aesthetically-oriented one, with brighter colors that both allow for greater visibility of the data and possess some of the adventurous spirit of abstract art. I stumbled upon this visualization by testing drop line colors with the dimensions variables, and I noticed how this format mimicked the frame of a painting. Not all paintings have the dimensions catalogued, so after removing 4 very large outliers (4463 x 228 cm, 2521 x 304 cm, 140 x 1011, 1219 x 243 cm), and null values, the dataset filters down into 1747 paintings.

Immediately we can notice that the lines are more layered towards the width direction, which shows how most paintings that experiment with size and form trend towards playing with width. The green trend line also demonstrates this inclination for wider instead of taller paintings. Perhaps this choice is a practical matter due to limited ceiling space and a viewer's visibility being more restricted upwards than sideways. Coupled with the visualization from the preceding question, this suggests that most frames before pre-abstract art tended to max out at the 300 x 300 cm, while wider and wilder pieces occurred more during the peak eras of modern art, when everything was a challenge.

MoMA Paintings, by Width x Height

Artist: **Andy Warhol**
Title: **Rorschach**
Height (cm): **416**
Width (cm): **292**

Artist: **Claude Monet**
Title: **Water Lilies**
Height (cm): **199**
Width (cm): **599**

Height (cm)

Width (cm)