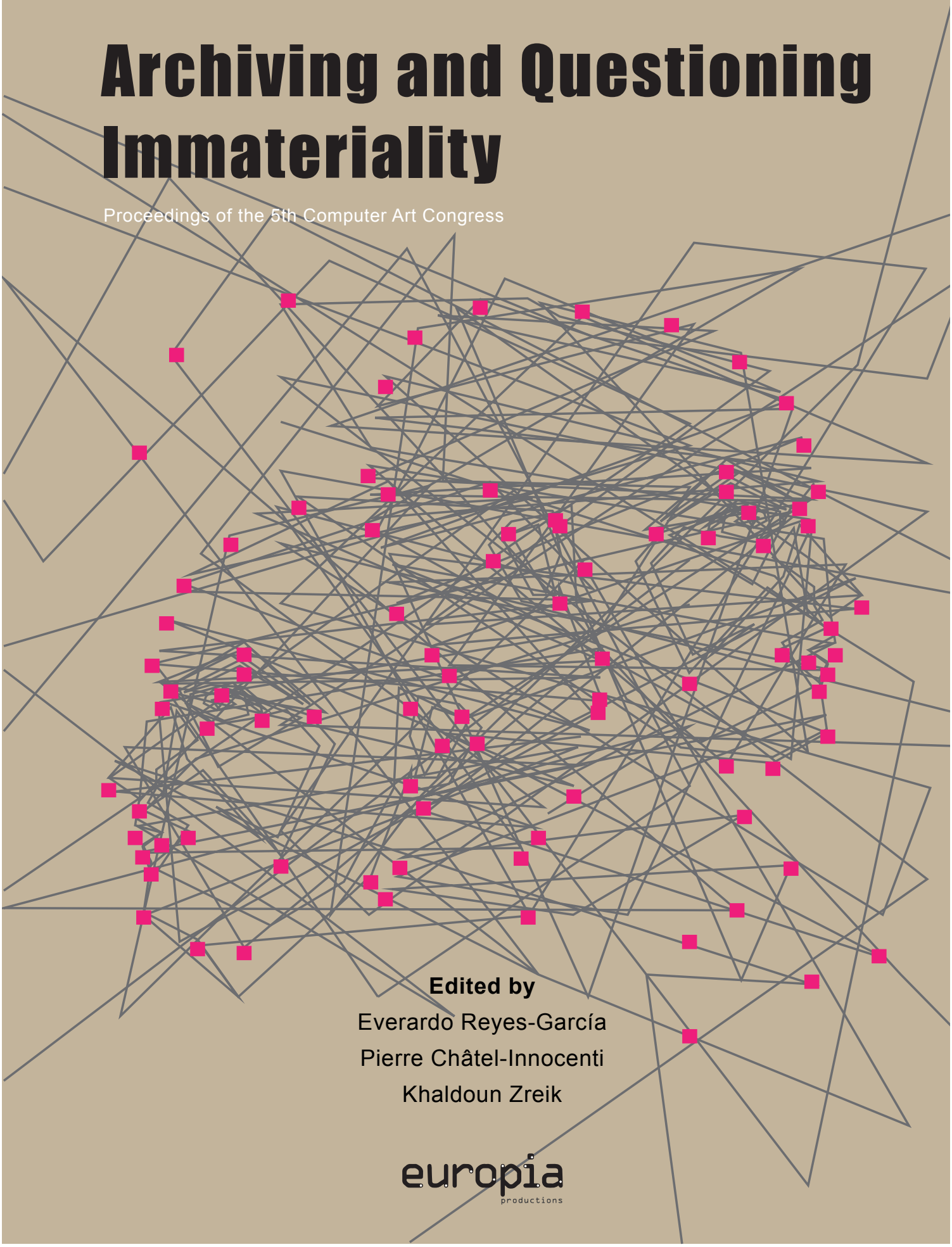
# Archiving and Questioning Immateriality

Proceedings of the 5th Computer Art Congress



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Art Exhibition

# Presentation

The Computer Art Congress is an international gathering around art, science, technology, and design. Its first edition was celebrated in Paris (2002) -then traveled to Mexico City (2008), came back to Paris (2012), and recently was hosted in Rio de Janeiro (2014). In fourteen years, a community of artists, curators, researchers, scholars, scientists, designers, students, and professionals has contributed to the domain with artworks, papers, round tables, workshops and exhibitions, exploring questions such as "emerging forms of computer art", "post-digital art", and "computer art for all".

In 2016, the 5th edition of the Computer Art Congress took place at Maison des sciences de l'homme Paris Nord, organized by the Citu-Paragraphe research team at Université de Paris 8 in partnership with the University of Michigan, the University of Hong Kong and the Universidade Federal do Rio de Janeiro. The selected topic for this edition is "archiving and questioning immateriality".

CAC.5 called for contributions interested in reflecting on the artwork as a material object, but also invited to consider the complex processes that surround a work of art. In this respect, the artwork can be regarded from the emotional and intellectual effects that it triggers. Such effects can be deployed from small teams to the entire world via networked technologies and distributed exhibition spaces. However, the Internet and electronic devices have proven to be less stable and long-lasting than they seemed. How should we deal with artworks if we take into account their multidimensional nature: temporal, spatial, exploratory, communicational, collaborative?

CAC.5 believes that such entry points raise problematic issues that also demand to interrogate the "Material" supports that give form to an artwork; the archival methods that artists, curators, collectors and institutions employ in their practice; the remix and re-cataloging appropriations that common users and audiences put in place. We hoped these initial questions pushed our discussion towards speculative visions on archiving subjectivity, and creating obsolescence.

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## Special thanks

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# Using images to analyze images. Semiotics meets Cultural Analytics

Maria Giulia Dondero

**Abstract**

In our text we examine image visualizations generated from big collections of archived images produced by Lev Manovich and his team in the field of Cultural Analytics. Our aim is to examine how these image visualizations function as analysis-images from two correlated perspectives of one semiotic approach: 1. *Enunciation*. What point of view is conveyed by the image visualizations about the computer-manipulated archive images? 2. *Rhetorical/mereological composition*: What is the mereological relation between the final visualization and the multitude of images that it contains, filters, or manipulates?

**Keywords**

Visual Semiotics, Rhetoric, Image, Enunciation, Meta-language

## 0. Introduction

In our text we will examine visualizations generated from Big Data, particularly the images produced in the field of Cultural Analytics through the techniques of Media Visualization as practiced by Lev Manovich and his team in CUNY.
The techniques used in Media Visualization take archived image sets (works of art, comics, films, etc.), often available on the Web, and apply computer mapping and analysis tools to them. In this article we will call them "analysis-images", to mean visualizations resulting from computer manipulations of image collections. These computer manipulations are done in a series of different stages; for instance, visual properties can be extracted, then quantified, and finally compressed to yield new visualizations.[1] Computer extraction and quantification techniques are performed on quantifiable visual parameters such as hue, saturation and brightness; position, the size of shapes, and so on.

Manovich studies collections of images (e.g., the complete works of a painter) through visualizations produced with programs such as *ImageJ* and *QT Image Processing*, which are meant to function as analytical tools aided by statistical techniques. On this point, Manovich states that Computer Graphics is to be understood as a method of research.[2]

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[1] In Manovich, Douglass, Zepel (2011) the authors write that this process includes two parts: "1) automatic digital image analysis that generates numerical descriptions of various visual characteristics of the images; 2) visualizations that show the complete image set organized by these dimensions."

[2] See Manovich & Douglass (2009).

Our part will be to examine how these image visualizations function as analysis-images from two correlated perspectives of one semiotic approach:

1. *Enunciation*. What point of view is conveyed by the image visualizations about the computer-manipulated archive images? What strategies are used in the analysis-images to reflect/comment on the images that they visualize?
2. *Rhetorical/mereological composition*: What is the mereological relation between the final visualization and the multitude of images that it contains, filters, or manipulates? We will examine these visualizations as end-products of rhetorical operations that are "mereological" — meaning that they are centered on relations between the whole and the parts (including addition, deletion, selection, superposition) (Groupe μ 1992, Bordron 1991, 2011). By conceptualizing computer manipulations as mereological operations, we would like to answer the following questions: How is the analysis-image formed into a whole from a collection of millions of images? What are the compositional strategies one must use in order to successfully map and visualize the information bits of an image collection as a *comprehensive whole*, and also as an esthetic *form*?

**1. Lev Manovich's "Media Visualization"**

In communication science and digital humanities we are currently witnessing an explosion of publications about data visualizations produced for informational and esthetic purposes. Generally speaking, there is a growing need to study these data visualizations and get a grasp of their constructed nature (Bachimont, 2014), including the point of view they convey, via this construction, about the actual data, despite the illusion of objectivity lent by the statistical method used to generate them.[3] In most studies, this issue is discussed in connection with visualizing numerical data or language data (Drucker 2014, Flichy 2003, Bonaccorsi 2014), but not specifically with respect to *visualizing visual data*.

For the purposes of this sort of sociological analysis, of course it is easier to construct diagrams and other analytical visualizations from numerical data and/or word data: in other words, from discrete units rather than images, which are syntactically and semantically dense (Goodman, 1968). Paintings are a case in point, as the relevant information is spread over a continuous space

[3] See Cardon (2015) for an analysis of the values that currently support the algorithms.

and not very discretizable.[4] It is true that if one is working with images as a focal point where cultural and/or societal changes can be understood, one cannot rely on the recurrence of fixed units (objects represented and themes); one must rely on translocal forms/formations, which Manovich calls *patterns*:
Until now, most visualizations of cultural processes used either discrete media (i.e. texts) or the metadata about the media. […] In contrast, our method allows for the analysis and visualization of patterns as manifested in changing structures of images, films, video and other types of visual media. (Manovich & Douglass, 2009: 23).

We need to be able to examine details of individual images and to find patterns of difference and similarity across a large number of images." (Manovich, Douglass & Zepel, 2011: 3). Our goal is to understand which enunciative strategies and which compositional theories (mereology) are embodied in the visualizations produced by Manovich.

As mentioned previously, we will enlist a metavisual and enunciative approach (known as the "uttered enunciation") from the semiotics of images and art history (Marin 1993, Fontanille 1989, Dondero 2016a, Dondero & Fontanille 2014, Stoichita 1993, Caliandro 2008, Damisch 1972, Böhm 2007, Elkins 2008). These approaches have focused on types of viewpoints recorded in images — and the values associated with them — by attempting to demonstrate the image's reflexive autonomy with respect to verbal language. However, in semiotics (Dondero 2014) we were positing that a reflexive image is supposed to deploy at least three kinds of meta-operations:

1. one on itself (*meta-image*),
2. one on the pictorial or photographic medium, which serves as its substrate and presents it to the observer (*metalanguage*),
3. one on how its social and institutional status works (be it artistic, scientific, religious, ethical-political or other) to make it intelligible (*metadiscourse*).

In semiotics these explorations have always been done in contexts that are almost solely synchronic, and focused on small corpora of images. Even in cases where the corpora have in fact been established as relevant objects of analysis, the goal of semiotics has continued to be one of describing the local workings of the images, grouped exclusively by generic (Beyaert 2009), auctorial (Floch 1985) and publishing commonalities (Basso Fossali & Dondero 2011).

[4] See Dondero (2009) for a discussion of autographic arts such as painting, allographic arts such as music, and hybrid arts such as photography; this analysis also takes image status into account (scientific, artistic).

The approach used in Media Visualization sets forth a new way of studying images, one in which millions of images are studied through their visual qualities, and in which visual consideration of the visual is foremost, and entirely independent of verbal language.

Media Visualization effectuates a "distant" reading of visual archives,[5] a computerized, statistical reading, as opposed to the "close" reading of small image corpora supported by the hermeneutic tradition in semiotics. We would like to take a "closer" look, semiotically speaking, at this "distant" analytical methodology which uses visual means to study images.

It should be pointed out that Manovich's analysis-images are meant firstly to describe the development of imaging styles and techniques,[6] whereas semiotic analysis of self-reflexive images has pursued the goal of analyzing how the image functions, and only secondarily — and almost by accident — has it examined the diachronic transformations of techniques and the trends identifiable through these metavisual devices (changes in genres and styles, for instance, or the trajectory of an author).

The "hermeneutic" methods of semiotics, art history, and visual studies have thus far recognized certain metavisual strategies in pictorial and photographic images, based for instance on the *duplication* of their *framing device* (such as a frame within a frame, a mirror, window, or curtains), or based on using texture as a reflection on the sensory motivity of the maker. By contrast, the operations at work in analysis-images are completely novel. We will explore them after a short detour through the metavisual strategies identified by art historians and semioticians in pictorial and photographic images.

## 2. Metavisual devices according to Stoichita and visual semiotics

Victor Stoichita's work has taught us something of great importance: that it is possible to trace the development of the arts, and particularly genres in painting, by observing the development of frames within a frame (paintings, mirrors, windows, doors, niches, and so on). Stoichita calls these "metapictorial strategies" (1993).

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[5] See Hinterwaldner & Buschhaus, eds. (2006) on visualizations of image collections (*distant* reading) compared with *close* reading.

[6] "The time has come to align our models of culture with the new design language and theoretical ideas made possible (or inspired) by software. Design, animation and visualization software allow us to start conceptualizing and visualizing cultural phenomena and processes in terms of continuously changing parameters - as opposed to categorical "boxes" still standard today" (Manovich & Douglass 2009: 8).

The different placements of these frames within a frame make it possible to trace the development and diversification of independent pictorial genres (portraits, landscapes, interior painting, still life, and others) from religious painting, which occurred in the early modern period. More generally — and panchronically — the different variants of frames within a frame show a variety of focalization acts recorded in the images, but they also show the presence of conflicts and competing forces within any focalization: obstructions to vision, gaps in the view, and so on. [7]

Stoichita's analyses describe the paintings of the early modern period as an organized whole which has a variety of relationships with its parts, and which governs the relations of the parts with each other. The pivotal device Stoichita explores — the frame — can be broken down into a number of perceptual operations meant to focus attention, to build a center and a periphery in the image, to distinguish encompassing forces from encompassed forces, or to distribute the supporting elements that form the foundation of the image's structure and the basis of our perceptual progression.

The frame as a general act of focalization generates a variety of devices, such as a painting within a painting, a window, a niche, a mirror, or a door, with each of these forms giving rise to different ways of thinking about the particularities of the syntagmatic relations of forces and shapes in visual language.

Below we will list the operations that we consider to be characteristic of each of these devices, which particularize the general focalization operations brought into play by the frame.

**1.** A painting within a painting deals with assembly operations, i.e., distancing and rapprochement, inclusion, and partitioning; these operations are seen in cabinets of curiosities (Wunderkammern), depicting the way in which a painting reflects on a portion of art history. What distinguishes the painting within a painting is the act of embedding one point of view within another, and in some cases, arranging them hierarchically.
**2.** A window is a device that can highlight actions such as passing, going beyond, projecting into the distance, traveling the distance, and pulling in what is distant; these actions accompanied the birth of the landscape genre. The operations we would like to identify as being specific to the window-frame are projection, exploration and going ahead.

[7] See Dondero (2016b), where the operations in the devices studied by Stoichita are used to explore the metavisual aspects of scientific images.

**3.** A niche highlights operations characterized by competition between opposing forces such as /obstructing the view toward the horizon/ and /invading the spectator's space/ so that the viewer turns his attention back on himself. The niche is the device used in still lifes and *Vanitas*, which, although they look like forays into the banality of mundane objects, they function as appeals to the viewer's conscience. They use two strategies for this: a) the dark background and the wall, blocking all access toward the horizon, and b) the objects falling below the threshold separating the image and the observation space. The operations that characterize the workings of the niche, then, are obstruction of the horizon from the observer's view, counterbalanced by invasion of the observer's space.
**4.** A mirror, or for that matter, any reflective surfaces present in the image (armor, glasses, bottles, gold and silver cutlery, etc.), turn one's gaze back to the act of creating the painting; these surfaces express a kind of reflection on the activities of producing and looking. But unlike the niche, the mirror does not block one's view to the horizon; instead it can turn the horizon around into the foreground of the image — and make it possible to include the figure of the painter in the painting. The mirror is thus a framing device that can turn the view around, and allow additional viewpoints within the image by including scenes that are *a priori* outside it.
**5.** A door or curtains, on the other hand, allow the viewer to observe from an angle, to penetrate past an obstacle, or to look into a space in between. Doors and curtains can be used both to reveal and to hide, but above all, they let the viewer have a glimpse without being noticed. What is in play here is the gap in the closure of the visual field. The relevant operations can thus be described as follows: a) subtracting from and/or fragmenting the view, and b) ferreting out the strategies used to insert the gaze past obstacles.

All of these devices show us that every look we take at an image is very complex and dependent on micro-forces generated by one initial operation, which is focalization. The operations that we have detected from the devices Stoichita studied help us to see how diverse the actions required of the observers are. These are operations that are pushed to the extreme in art images, with the goal of having the viewer experience the full spectrum of his perceptual powers in response to the power of visual grammar.

Going back to our distinction, formulated earlier, between the meta-image, metalanguage, and metadiscourse, each image that contains a duplication of its frame affords not only a meta-image analysis, but it can also be understood as a reflection on its medium (metalanguage). This is especially true in photography, where the framing process is even more fundamental than in painting – which uses the sensory-motor creation of texture as its basis more so than the

framing. As we have seen, the point of view provided by the frame can also yield a reflection on the status of art (metadiscourse) and on the fact that art shows a predilection for nesting frames within frames, along with duplications and proliferations/variations on these creative mechanisms.
In parallel with art history, visual semiotics has also explored the metavisual concept, often by linking it to the issue of the uttered enunciation, that is, to the markers of the act of enunciation that are left in the image.

1. The foremost metavisual strategy is the *thematization of the act of enunciation* in the utterance. It has to do with representing in the image the act of producing it. Think of the painters shown working in paintings like *Las Meninas* by Velázquez (1656) or *The Painter in his Studio* by Vermeer, or the photographic act recorded in Denis Roche's photos.
2. The second strategy is *embrayage* (engagement), that is, a direct appeal to the viewer through a look or gesture directed toward the front. Needless to say, compared to an *embrayage* in painting, there is a surfeit of authenticity in photographs, for they reflect the distinguishing feature of the photographic process: to see what was seen.
4. The third strategy has to do with *texture*, or the *embodiment of the enunciative act* in the pictorial utterance itself. This strategy is nicely illustrated in paintings such as Van Gogh's *Wheatfield with Crows* (1890). This is where technique occupies the limelight, i.e., the relations between the medium and the result, played out between the treatment of the canvas and the rhythmic motions of the paintbrush, which are directly linked to the sensory-motivity of painting.

**4. The semiotic method analyzes the quantitative method**

In our view, Manovich's approach also pursues image analysis through framing devices and visual operations. Its inventiveness relative to practices seen in art history and visual semiotics is not solely defined by the targeting of large corpora of images analyzed statistically. While using the frame within a frame in most of his image visualizations, Manovich's analysis goes beyond framing operations. He uses tools that emphasize the differences and fine distinctions in the images: those which are not necessarily embodied in devices or objects, but are scattered across the surface of the image. Think about energy differentials (like light and color), for instance, which are measured for intensity and extent, and which are not necessarily contained within shapes or devices such as a frame within a frame.

Moreover, Manovich's approach is again innovative when compared with analytical strategies based on content analysis, i.e., on labeling the features of every image included in the collection. Manovich is quite aware of the pitfalls of

using verbal descriptions for images, taken from metadata and the themes represented; he proposes an alternative approach directed at examining image corpora through the plastic characteristics of the images. The descriptors are not metadata, then, but attributes of visual language, such as mutual placement, visual features in the topology of the image, types of lines used (straight, curved, and so on), hue intensities, and shading. Not only does he not use verbal language to index images, but even within his strictly visual consideration of the visual, he uses differences and distinctions as the hub of his analysis, rather than pre-determined devices.

Let us turn to Manovich's techniques for organizing a big corpus of images into a unique visualization. Now we are seeking to understand the semiotic strategies used to produce a whole: which compositional strategies are at work, how do the connections between parts work, and how is it unified? These parts can be identified with whole images or with parts of images, or with intensity averages when the image is not counted in its entirety, but instead is broken up into measurable values.[8]

Before aggregating, there are procedures used to extract visual qualities, and then, once these visual characteristics are measured, Manovich proceeds with recomposing in the data space produced from the initial quantitative analysis.[9] Manovich describes the process of recomposition/ unification in a general fashion:

We create 2D visualizations that position the images according to their feature values. For example, we may use horizontal dimension (x-axis) to represent grayscale mean, and vertical dimension (y-axis) to represent grayscale standard deviation. These image features calculated by software in step 1 became image coordinates in a 2D space. In this way, *the differences between images along a visual dimension are translated into their positions in space.* (Manovich, Douglass, Zepel 2011: 14).

For this reason, in the final visualization, is that the degree of similarity/ difference between paintings is simply equal to the geometric distance between the points in the space.

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[8] The examples of dimensions that can be measured include contrast, presence of texture and fine details, number of lines and their curvature, number of type of edges, size and positions of shapes, and so on. In the case of color images, it's also possible to measure the colors of all pixels (hue, saturation, brightness).

[9] Firstly, a data representation is modular, i.e. it consists of separate elements: objects and their features. Secondly, the features are encoded in such a way that we calculate on them. (Manovich 2015: 18).

The first and most obvious composition strategy is unification into a mosaic. As states by Reyes (2014), the mosaic is generated by ordering the corpus of images one after another in a sequential manner. The ordering rule could be obtained from measures of visual features (for instance going from the brightest to the darkest), from metadata (for instance by year) or by order of appearance in the sequence (from the first to the last frame). The resulting image montage shows a rhythm of variations and transformations.

In mereological terms, this image generated by Manovich (Figure 1) could be described as a sequencing of images that respects the whole of every image included in the corpus. The syntax is typical of verbal texts, which are arranged in lines to be read from left to right and from top to bottom. This image enables us to see the pace of the transformations and discern the patterns.

The operation generated by this visualization remains governed by metadata (the date, the sequencing of the pages in the manga, and so on). The rules are therefore external to the image (syntax by chronology, external grammar).

In this frame, we see a whole formed from other, smaller wholes; its parts, which are identifiable in the manga pages, have undergone no manipulation at all in their plastic characteristics, but have simply been sequenced so as to easily see the trends and the grayscale variations. This is a frame-within-a-frame operation where the aggregated visualization is unified by rules external to the image, and which I would call an "inventory-image". Its goal is to be exhaustive (although this is a local exhaustivity).

In the second case (Figure 2), in order to establish what Manovich is calling "Style Space", the placement of the images in the encompassing visualization is more interesting: this was done by mapping a relation between two variables onto a *space encompassing the existence of pictorial activity*.

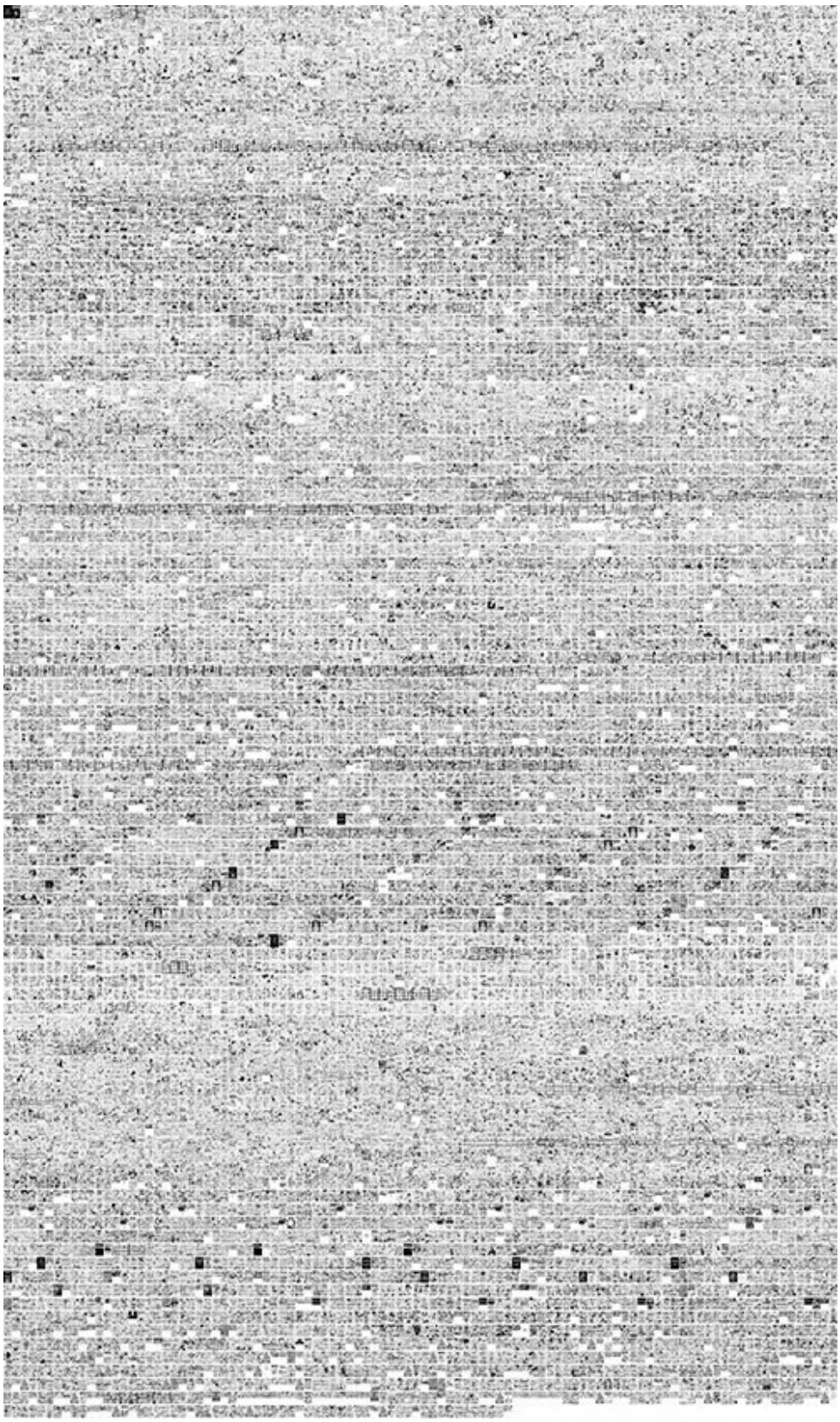

*Figure 1. 10461 scanlation pages from One Piece as available on OneManga.com, organized by sequence of publication (left to right, top to bottom).*

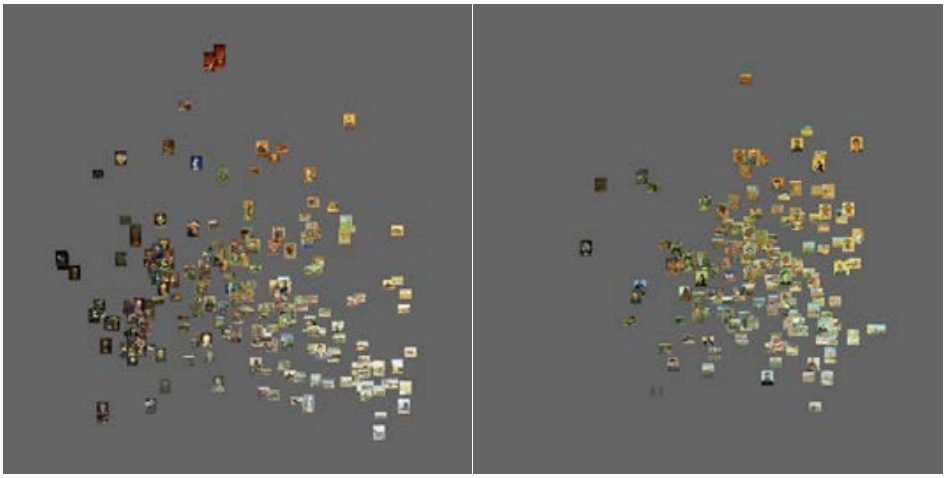

*Figure 2a and b: Lev Manovich. Comparing paintings created by Van Gogh in Paris (left) and Arles (right) on brightness and saturation dimension. X-axis – average brightness; y-axis – average saturation.*

This image represents the work Van Gogh produced during his time in Paris (2a), compared with his time in Arles (2b). While the first example (Figure 1) shows a whole that is enclosed and absolutizing, the two visualizations in Figure 2 (a and b) create a whole which has painting as its relevant field, with Van Gogh's work occupying a limited area.

This is once again a whole, but this time it is a whole that also depicts a space outside the object of study (the works produced by Van Gogh in Paris and Arles).[10] This is not a whole that has been isolated, like the first case we examined, but a whole that shows parts and aggregations between parts (the paintings). These aggregations of parts are placed with respect to an empty, but equally relevant space (a gray background), for it is populated with virtual paintings; it is a space that *could have been* occupied by Van Gogh. The background area is a virtualized presence (brighter paintings may have been possible at that time, in Arles, but Van Gogh did not in fact produce them).

Referring to Bordron, in some ways, one could say that this whole is produced through "screen" operations, that is, sorting and distribution operations: For example, a screen lends unity to a diversity of light beams, no matter where they originate. This principle may be defined as a stop function or sorting function, which comes down to the same thing. The screen lends unification through selection. It assembles elements by virtue of its presence alone. (…) The screen separates because it unifies. (2013: 73, our translation).

[10] This example shows the difference between the *reference corpus* and the *study corpus*, according to Rastier's distinction (2010).

In the lengthy legend that accompanies these two images, Manovich (2015) states: The visualization shows that on these dimensions, van Gogh's Paris paintings have more variability than his Arles paintings. We can also see that most paintings created in Arles occupy the same part of the brightness/saturation space as Paris paintings; only a small proportion of Arles's paintings explore the new part of this space (upper right corner).

The still nearly "empty" space at the top right is significant as a space that could have been actualized by Van Gogh, but was not. So it is a space suspended and unused, which will, however, be used by other artists. The space of this visualization has blank areas (the gray background) to signify what the painter did not do, showing the boundaries of his artistic trajectory (in terms of brightness and average saturation only, of course, not esthetic quality).

Another example of this sort of composition practice is a comparison between two evolving styles, Mondrian's and Rothko's (Figure 3). Here is another example of a style space concept application. Manovich compares 128 paintings by Piet Mondrian (1905-1917) and 151 paintings by Mark Rothko (1944-1957). The two image visualizations are placed side by side, so they share the same X axis.

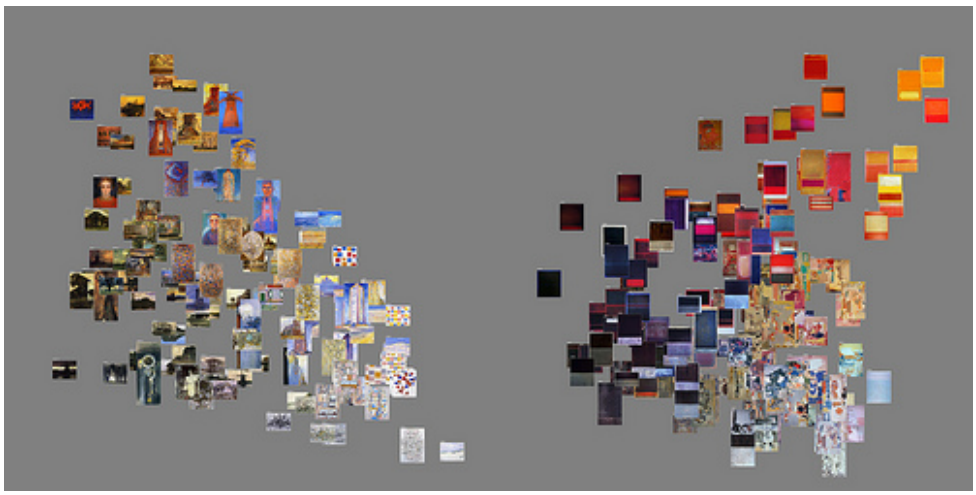

*Figure 3. Lev Manovich. Mondrian and Rothko paintings sharing the same X-axis.*

The paintings plotted on the graph are represented in their entirety (the frame is still there), so this visualization is another whole that is an assemblage of wholes. But not all the relevant characteristics of these parts/wholes are taken into account. Only certain parameters have been "selected" as relevant. In one way, the paintings of the two artists remain whole, with their frames, but the parameters subject them to a "breaking-up" operation. This action is metavisual, because the choices made about brightness and saturation are highlighted by assembling another "painting" of paintings that are grouped not

by the same rules as one finds in the Wunderkammern compositions (intertextual connections that are both semantic and compositional; see Stoichita, 1993), but by relations that concern only the selected historical period and some formal characteristics of the plane of expression.

The third and last case we have examined here is again different, because when millions of images are visualized, it becomes impossible to keep each painting (or manga page) visible as a part/whole within the encompassing visualization. The image, whose status was one of "part/whole" in the first example (Figure 1) and "part/whole-broken-down-into-various-characteristics" in Figures 2 and 3, is reduced to a simple point/value in our final example (Fig. 4). In this pixel definition, the point is just a value, that is, a final, rather abstract trace of the textuality from which it was extracted. The visual representation of all these values is an image named "Cloud" by Manovich. Rather than a visualization of images, it is a visualization of values instead.

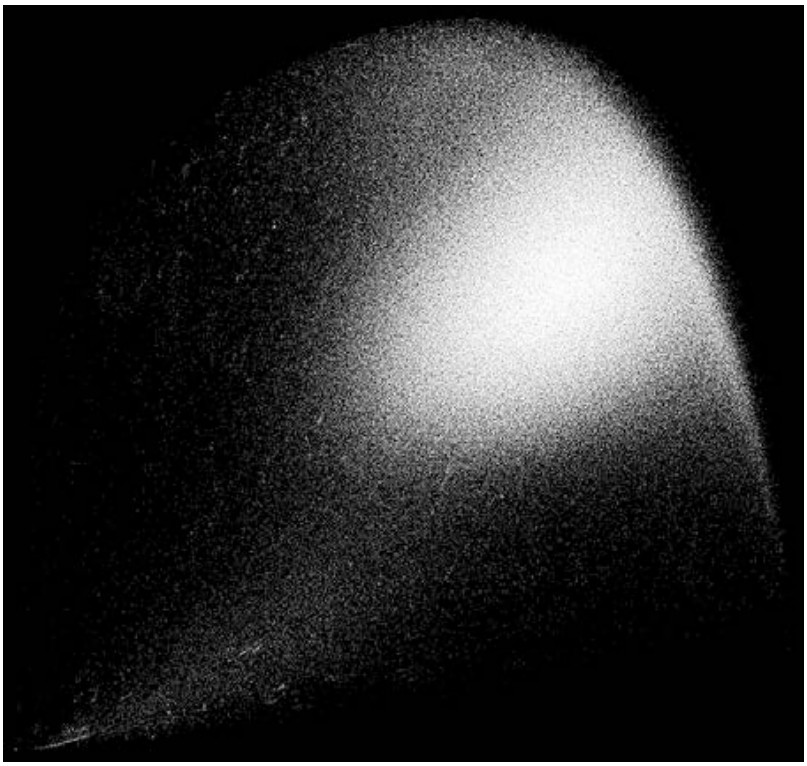

*Figure 4. One million manga pages rendered as points.*
*X-axis = standard deviation of greyscale values of all pixels in a page.*
*Y-axis= entropy calculated over greyscale values of all pixels in a page.*

Manovich's discussion of this image follows: "The plot shows that the distribution follows Bell-curve like pattern: single dense clusters with gradual fall off to the sides. The parts of the plot which remain black represent the graphical possibilities not realized in our manga sample." (Manovich, Douglass, Zepel 2011: 36).

Having reduced the characteristics of the manga pages to little black and white dots, this visualization delivers a "shape", which could be described as a portrait of the characteristics that were examined. Rather than plotting and distributing positions, this is a process of watching shapes emerge from visual textualities. The shapes emerge from the images because in this case, the variations are continuous, and so rather than producing separate zones, they create shapes depicting what was realized on a neutral (black) or shaded (grayscale) background. This shaded density makes it possible to visualize everything that exists from what was realized to what is possible, but unrealized: the actualized, the potentialized, and so on.

It seems we can conclude that in order to do a cultural analysis, especially when dealing with phenomena where the data are excessive (such as manga pages or the selfies taken in the world's largest cities over the last several years), one must abandon the wholeness of the parts, and instead reduce them to numerical values. In Figures 2 and 3, we saw whole images that were sorted and redistributed according to selected values (e.g., brightness), whereas in this case, all that is left of the image is the numerical value selected for relevance to the analysis. Now the whole no longer encompasses parts/wholes; it shapes the values extracted from these parts. The values take on a shape, i.e., the shape of the image collection, which emerges due to the selection of certain parameters. In Image 4, we are looking at selection operations, as in the previous cases, but what is different is that after selection, the data undergo a merging operation, fusing them into a whole where the parts do not keep their initial identities.

**Conclusions**

Although the basic mereological operation in our first two examples (Figures 1, 2, and 3) is a frame within a frame (inclusion), it differs significantly from the operations we identified in the wake of Stoichita's analysis of devices. Particularly in Figures 2 and 3, the frame within a frame depends on a "screen" effect, which allows one to redistribute the parts according to their affinities. In this case, we have sorting and distribution operations that place the entire corpus in different zones of the visualization.

In Figure 4, conversely, the frame-within-a-frame operation is no longer relevant: the point is to delete the very element that preserves the wholeness of the parts (the frame within a frame, fittingly) by putting the parts (the manga pages) through a filtering operation and a merging operation, fusing them into a shape: the shape of the image collection.

The aim of studying analysis-images from the metavisual perspective is to link the mereological manipulations to the epistemic operations performed on the image collections being visualized: the sequencing of parts, the "on-screen" distribution of parts, the merging of values, and the deletion of parts. Once the merging of values has occurred, the visualization of the parts is gone (the primary visual textualities selected for the study), and one obtains a shape of the collection of parts/images. These shape-engendering visualizations can also become esthetically relevant, not to mention informative.

Thus far, Manovich's work has been focused on examining the plane of expression, particularly what we call the *form* of the plane of expression in semiotics (eidetic, chromatic, and topological categories). We wonder whether someone might eventually manage to study vast numbers of paintings selecting the characteristics of their *substance* on the plane of expression -- texture, for instance, which is the focus of current investigations in semiotics. Or is texture a characteristic that is too attached to the unique material aspects of the painting to be studied by quantitative methods? We can also speculate whether Manovich's approach might someday be applied to analyses of the plane of content, or whether analyzing the content plane is too distant a goal for a methodology focused on exploring the transformations over time in visual culture.

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