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# Semiotic Approaches to Big Data Visualization

EDITED BY  
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# Semiotic approaches to big data visualization

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BY: Pierluigi Basso Fossali, Maria Giulia Dondero, Lia Yoka

## 1. Our project

With a few exceptions-focusing on journalism (Compagno 2017), on works of art (Chartier, Pulizzotto, Chartrand & Meunier 2019, Dondero 2020), on deep fake videos (Leone 2021, Dondero 2021) and on data epistemology (Bachimont 2018)-semiotics has been late to approach *big data*. In contrast to information and communication studies, that have been quick to recognize the big data revolution in medical, biological, political, urbanistic, and journalistic practices, and while digital humanities and digital art history continue to offer crucial insight with their analysis of large collections of artworks and heritage objects, semiotics has yet to live up to the big data challenge.

This tardiness is due to several factors: (i) the prevalence of the structuralist tradition's textualism, which encourages sophisticated analyses of either single objects of study, such as the production of a single author, or limited corpora of works; (ii) the belief that general semiotic theory is applicable to any cultural object, and the consequent assumption that there is no need to adapt semiotic models to new media or practices; (iii) the habit of working with objects endowed with *motivated* meaning (myths, paintings, novels, political discourse, etc.), whereas an archive of big data (a non-text in the traditional sense) is not considered a meaningful object, but rather a device that *opens up* to practices of meaning, meaning that is yet to be located, inferred and invested. Last, but not least, one of the most important reasons of the defiance of semiotics towards current big data phenomena is (iv) its outright rejection

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of a theory of communication understood as a mathematical theory of information (Shannon & Weaver 1949), and, as a consequence, its distrust towards all theories for which *sign* and *signal* are interchangeable concepts.

A semiotic theory of meaning based on the close interlinking between the *expression plane* and the *content plane* can be useful in complexifying mechanistic approaches that either study the expression plane of artistic objects (see, for instance, Manovich's *Media Visualization*, Manovich 2020, and the *Replica* project, Seguin 2018), and are thereby indifferent to content, or privilege thematic and language-dependent analyses of works of art, which, conversely, subordinate expression to content. Furthermore, semiotics needs to contribute to the analysis of large collections in both diachronic and synchronic terms, and explore the extension or even the overall revision of some of its own key concepts such as *enunciation*, *isotopy*, *semi-symbolism*, etc.

In summary, this *Punctum* issue has attempted to:

1. contribute to the global discussion of possible semiotic approaches to big data theory and methodology;
2. explore specifically an epistemological approach to visualizations of big data, i.e. to their manipulation, design, display, and interpretation;
3. study, from a critical vantage point, the ideologies and epistemic perspectives that underlie the acts of collecting and visualizing big data, prior to their analysis.

Our goal is to trace the path that leads from visualization, regarded as a unifying representation of disparate data, to its full elevation to an interpretative device.

At the end of this introduction, we will take a short overview of the selected contributions. Ultimately, this issue has been an opportunity to assess the inscription of semiotic reflection in digital humanities, to value both the specific contributions of the discipline, and the demand to update epistemological frameworks and methodological approaches. Within the novel lines of argumentation and conceptual aspects these contributions seek to highlight, enunciative and rhetorical strategies of data management, forms of visualization and patterns of interpretation, the punctum of relevant circumstantial details and the panoramic *studium* of the mass of available data, all intersect and often collide with each other.

## 2. Historical perspective and complementary dimensions of Digital Humanities

In contrast to our initial intention when suggesting this issue, the contributions collected here focus more on the *present* and *future* of digital humanities, and less on the *past*, and thus on the historical perspective. For example, while art is very often being taken into account, (digital) art history hardly is. We thus take the liberty in this introduction



to mention a few points that can be considered complementary to what the reader will find in the articles. Notably, we would like to introduce some suggestions in the form of paired aspects, aspects potentially complementary, that often present themselves in the form of opposites or incompatibles.

(i) The first complementarity that resolves an old opposition is that between *quantitative* and *qualitative* analysis: it is increasingly evident that the analysis of vast corpora brings to the fore new objects of observation. Quantitative studies, when well conducted, create an important qualitative dimension for research. They do not only secure well-encoded results, but also allow a form of emancipation from the evidence of the already known, in other words, they mobilize active knowledge. At the end of the 1950s, Gilbert Simondon had already suggested the need to integrate computer technology in culture as a factor of emancipation, a factor that could release an organizing potential beyond finalities taken as justifications (Simondon, 1958: 105).

(ii) However, if we are to undertake a “comparativist visual semiotics”, truly articulable with a “digital critical hermeneutics” (Rastier 2011), rooted in protocols of objectification and leading to practices of interpretation, it is necessary to resolve the classical opposition between the acceleration of computation, to the point of near “immediacy” of the results obtained, and the “studium”, the slow analysis characterized by a truly interpretive approach, capable of elaborating on the difference, or rather on the “gap”, the critical distance between the elements within a corpus. In short, the point is to render *enhanced computation* and *extended mediation* reconcilable with each other, so that the processing speed is not merely a direct performative condition of *felicity* for the results and furthermore, so that the multiplication of mediations, of “re-entries” into mediations already carried out, allows for the progressive revelation of new features in the objects under scrutiny according to a multiplicity of perspectives.

(iii) This struggle against the evidence of data in favor of a critical and situated hermeneutics leads us to look less at the latest technical breakthrough and more at the integration of informational and interpretive methods, an integration that remains largely incomplete. Innovations in image processing have less to do with the ambition of providing a new single technology. Rather, they consist of an unprecedented assembly of image-processing algorithms and machine learning techniques, such as reinforcement learning or incremental metric learning. These methods are interconnected and guided by an interpretative grid of cultural objects that relates their forms of composition on different levels of relevance. In this framework, the cultural object and its reproducibility no longer have to be thought of in terms of qualitative opposition, and always have a fixed starting point, namely an *origin*. What is at stake is a philological approach, an approach that will respect the identity of the cultural objects analyzed, and that is compatible with the recognition that the objects continue their own form of life in new ecological niches. For example, the museum of fine arts was not necessarily the pre-assigned place to host the aesthetic relationship with a work of art originally

located in a church and integrated within an iconographic program, itself composed within a vast network of other works or ritual objects. This, however, does not mean we should get rid of places of experience, but rather to reconstruct the variety and complexities in the reception and interpretation of cultural objects. In this sense, we can make compatible a *dematerialization* of documents (for example, the intertext) and a *reintegration* of *in vivo experience*.

(v) The complementarity between the search for the originality of a work, according to an open system of relevance, and the anchoring in a “site-specific experience” can coexist in the digital analysis of the life form of a cultural object, a life form changing over time. We might also speak of a relationship between the “virtual complementary spaces and a marked inter-contextuality”, in the sense that the bringing together of multiple contexts does not fail to point to a *marked space*, a cultural gravitational space in which different contributions, once attracted, guarantee that the experience, though augmented, is not “without a sense of place.”

### 3. Data visualization and augmented reality

The relationship between data visualization and augmented reality is rarely understood as crucial, as if the mass of available information could itself direct our “seeing in.” However, an archive of data or even a well constituted and carefully selected corpus of data is never self-sufficient. Forms of “augmentation” are always necessary in order for us to liberate ourselves from the debilitating idea that a framework can never be fully reconstituted. This augmentation, relating an object to a cultural reality, will also serve to activate a “seeing as”, if not a “seeing through”, that is indispensable if we are to make fertile comparisons between domains of knowledge, as well as between constituted domains and a cross-domain that questions meaning itself.

Augmented reality is a symbolic circuit much more complex than the simple normative welding between two layers of reality that have pre-established and fixed roles. Far beyond a kind of amalgam, a work that is compatible and comprehensible must be accomplished. For example, it is not enough to recognize a standard model describing the reality of heritage, we would need a work of individuation that would renew the very model of heritage and thus allow for an optimal model of visualization.

Alternatives in data visualization are not simply options or tests unilaterally conducted by the analyst. The mass of data seems to release them from their cultural status, reducing them to information waiting to be exploited. In fact, visualization should be precisely a perspective that modulates its internal possibilities and then stabilizes itself where it encounters an interpretive question that can be associated



with a body of objects emerging from the bottom of the information archive. And it is left to artificial intelligence and its deep learning to offer *salient* visualizations. Meaningful results (namely *pregnant* results) occur when the expression plane of emergent forms can be associated with content, and the latter is rarely already immediately available. Instead, it requires “augmentation”, collateral knowledge, other corpora already instituted. This does not indicate a relativization or a downgrading of the contribution of the digital moment, but more simply signals that the latter must have confidence in its own re-entries, i.e. in the circuit between visualization results and augmentation possibilities, which immediately entrusts the entries with interpretive depth. For example, visual Big Data do not constitute a totalizing, homogeneous, synchronic frame of History. Big Data Analyses allow us to discover a new nexus of cultural tensions (technical, conceptual, social, artistic *etc.*), but this does not prevent, indeed it fosters, the recognition that images are responses to other images that constitute themselves, sometimes unpredictably, as dialogic and polemical spaces.

Finally, there is the need to compose, in the analysis of visual Big Data, a diachronic perspective that can recognize genealogies of transformations of forms. If such a project is called “the life of forms”, it is because forms are not conceived as following a linear history. As a matter of fact, several transversal dynamics have to be acknowledged: (a) influences coming from different genealogies of forms, (b) evolutions in techniques and in materials, (c) the contingency of reception. The intersection of autonomous factors (i-iii) with heteronomous ones (a-c) implies, for example, that Focillon’s work (1934) in art history is both emancipated from formalism and determinism as well as deeply pragmatic, from top (“the tool awakens form from matter”) to bottom (the impact of a form on its era is always controversial). Forms question, and are questioned by, a horizon of intentions (production) and of expectations (reception).<sup>1</sup>

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<sup>1</sup> The life of forms is at the heart of the project ANR Augmented Artwork Analysis (<https://anr.fr/Projet-ANR-20-CE38-0017>). Regarding the epistemology of artwork interpretation, between analysis of large visual databases and augmentation of the object in its usual location, namely the museum, the AAA project stands in contrast to three major forms of reductionism. First, the reduction of the art image to a type or to general categories: the AAA tool engages the image as a nexus of cultural tensions (technical, conceptual, social, artistic, etc.) and thus as a specific historical solution. Second, the reduction of the art image to a “cultural singularity”: the AAA considers the image to be inseparable from a system of other images, both congruent and deviant (every dimension of the image makes sense in the way it maintains or breaks linkages with the legacies of whole families of images). Third, the reduction of the art image to a historically derived product: the AAA represents the art image within families and traditions spanned by cultural tensions, naturally, but the image cannot be reduced to a totalizing, homogeneous frame that is standardized or stereotyped and called “History” (with a capital H) (Koselleck 1986). Within this perspective, the art image is always a response to other works; it is meant to be an alternative to other efforts, or a critique of them (Baxandall 1985; Damisch 1987).

#### 4. Contributions: open questions in designing and interpreting data visualisation

The issue opens with **Johanna Drucker's** acknowledgement and analysis of Jacques Bertin's 1967 *Sémiologie Graphique*, a work that is still indispensable for design in general and data visualisation in particular. His description of graphic variables (color, texture, value, pattern, shape, position, and orientation) offers concise categories that help us better grasp visual entities within a semiotic system, no matter what scale. Drucker devises new fundamental categories complementary to Bertin's, in accord with features of dynamic display of today's technology, and suggests their standardisation and instrumentalisation in Big Data visualisation and digital design.

From a different point of view, that of the user of data visualisation rather than the designer, **Federico Biggio** addresses the "framing of truthfulness" in data images. The "interpretive advantage" offered by visualisation software can turn into its opposite. In an exercise in applied semiotics, Biggio illustrates the need for a constant awareness that subjectivity is being constantly modulated in data images, and therefore also that, as Jacques Fontanille has noted, "every data image is the result of a computational enunciative practice."

A crucial part of this "framing of truthfulness" mentioned in the previous text is the management of "latent space" in a deep-learning system. **Cristina Voto** analyses the work of the artist-coder Jake Elwes, *Zizi-Queering the Dataset* (2019), in order to flesh out exactly how rhetorical and ideological premises of data visualisation are inherent in Artificial Intelligence software. Using Elwes' discussion of gender-parameter design bias, Voto points to the fact that the visualisation of latent space, i.e. mathematical map of what the Neural Network has learnt from the training dataset, helps us deconstruct and reveal these presumptions and prejudices.

Indeed, data visualisation is hardly transparent or objective, it is hardly a direct representation, as **Valeria Burgio** confirms. Elaborating on examples of scientific and journalistic images, Burgio employs the semiotic concept of enunciation in a way similar to that in critical design theory and digital humanities, and offers a reading of data visualisation as expression, and as interpretation. She discusses the uncertainty of the visualiser vis-a-vis the data observed, and suggests that the presence of this interpreter/visualiser be enhanced, so that the enunciative traces of visualisation become more evident.

Besides stressing the rhetorical and the interpretive moment, we need a clear process of analysing visualisation techniques one by one, in a reflexive informational framework that **Valentina Manchia** calls "discourse of data." This is true especially of media visualisation based on big cultural data, namely "visualization without reduction", as Lev Manovich has described it. With her two aptly chosen case studies, Manchia shows how data is the "chanelled result" of putting together a series of what Bastide has theorized as "devices of visualisation."



The issue ends on an interestingly confessional note. **Alon Friedman** and **Martin Thellefsen** discuss one of the most popular open-source applications for managing and analyzing social media data, the open-source R programming language, and test it against Peircean sign theory. While there is indeed a lot of space to further scrutinize, and expose, the techniques, prejudices, decisive interpretive moves and theoretical premises in data visualisation (its design and its study), as is shown in all contributions to this volume, it is much harder, as Friedman and Thellefsen state, to create algorithms that generate or suggest and interpretation of visual signs.

We deeply thank all the authors for their excellent texts on such a current, dynamic and fleeting subject, and for their willingness to cooperate with us all the way, for the creation of a coherent and challenging result. We are grateful to all the friends and colleagues who kindly offered their time and expertise: Anne Beyaert, Karin Boklund-Lagopoulou, Enzo D'Armenio, Rossana De Angelis, James-Peter Lancaster, Claudio Paolucci, Joao Queiroz, Alberto Romele, Marta Severo, Yannis Skarpelos, Matteo Treleani, Andrea Valle.

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# Dynamic and spatial variables in data visualization systems

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BY: Johanna Drucker

## ABSTRACT

Jacques Bertin's groundbreaking work, *Sémiologie Graphique*, has remained definitive for the more than half a century since its initial publication (1967). His formal description of graphic variables is fundamental for information design because it offers a way to understand how visual entities can be used to create a semiotic system with clear and distinct categories. According to Bertin, color, texture, value, pattern, shape, position, and orientation can each be assigned a specific role within a signifying system in accord with logical rules of representation. However, given the technology of the time in which Bertin was writing, features of dynamic display were not included in his discussion. These include elements of animation (such as direction, speed, acceleration, transformation, and rate of change) as well as some features of perspectival and spatial systems (including point of view, scale, projection, folding) that did exist but were not much used. The critical question is whether these graphical features can be formalized to the same degree as Bertin's seven graphic variables, and included within the operation of semiotic systems. While these variables are not associated with fixed values any more than Bertin's original ones, their use in information display suggests that they would benefit from the same kind of descriptive analysis he applied to static ones. This paper describes dynamic and spatial variables, offers some preliminary thoughts about their specific contribution to visualization of big data, and addresses the way they produce meaning within a graphical semiotic system.

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The first screen of the May 14<sup>th</sup> *New York Times* online displays a map made of small black dots that mark the site of Covid-19 related deaths (2022). Within seconds, the dots swarm, rise from their places, and reform into a bar chart. After a brief pause, they swarm again and distribute across the map. I read the two graphics as versions of the same statistical information connected by the movement of the dots. In recent decades, this sort of dynamic feature has become integrated into information graphics and most common platforms have built-in animation capacities. Excel, for instance, readily integrates Visual Basic commands to show various states of data in progress and Tableau has its own Viz Animation with parameters for speed, duration, and control of various actions, such as changing an axis or shifting scale (Koenig and Shay: 2020). Online newsfeeds regularly make use of data journalism with graphic animations of large data sets. These visualization benefit from the ability to show change over time, increase or decrease in values, or simply to animate a presentation for the sake of reinforcing a narrative. The dynamic and spatial features are part of the designer's toolkit, but little systematic critical work has been done on the way they produce meaning. How and what do these features *signify* and what critical reflection might make it possible to understand these dynamic and spatial qualities as part of a semiotic system?

Jacques Bertin's groundbreaking work, *Sémiologie Graphique* (1967), has remained definitive for the more than half a century since its initial publication. His formal description of graphic variables continues to be fundamental for information design through its clear articulation of the ways visual entities can be used effectively as a semiotic system. Bertin described seven distinct graphic variables: color, texture, value, pattern, shape, position, and orientation. He showed that each could be assigned a specific role within a signifying system in accord with logical rules of representation. Given the state of visualization technology at the time, information graphics (maps as well as charts and graphs) were static print images, so features of dynamic display were not included in his system. Now, it seems that the elements of animation (such as movement and rate of change) and their behaviors (interaction, acceleration etc.), as well as features related to perspectival and spatial systems (especially point of view) all deserve the same critical attention Bertin gave to static variables.

The critical question is whether these dynamic features can be formalized to the same degree as Bertin's seven graphic variables and included within the operation of semiotic systems. While these variables are not associated with an inventory of fixed values any more than Bertin's original ones, their use in information display suggests that they would benefit from a descriptive analysis of the

way they produce meaning within a graphical semiotic system. This paper describes these dynamic and spatial variables and offers some preliminary thoughts about the ways their capacity to signify makes specific contributions to data visualization.

Dynamic variables always include a rate of change. This fundamental fact introduces some instability into the visualization because at any moment the display will always be only one of many possible states. The variation can occur continuously or in discrete intervals. The generation of these changes depends in part on the kind of data that feeds the visualization. But changes can be generated through a continuous feed or as a series of discrete data files displayed sequentially or blurred to appear as if they are a smooth transformation. As a result, a user may not be aware of how the data are structured, nor what processing is generating the display. So this paper will focus on the graphic properties of the visualizations rather than on the back-end underlying programming.

By contrast to *dynamic* features, *spatial* variables are indicators of scale and position that inscribe an enunciative system into graphical formats. Many elements of spatial positioning could be broken out in detail, but the fundamental recognition that all visualizations address and position their viewers is what is crucial for addressing issues of enunciation. Spatial structures (such as a flat plane) may appear to be static. The position of a display on the screen is often fixed. A point of view system may remain stable, it does not have to shift, though in game graphics, immersive displays, and many other dynamic visualizations, it may change dramatically. The scale may also remain unchanged. But the dynamic of the relation of the viewer to their position within a system of enunciation is always active, generating an exchange between display and interpreting subject/viewer.

Though these dynamic and spatial visual effects can be analyzed without any detailed description of the data and its feeds, the basic rules of good (and ethical) data visualization should be observed—such as not representing discrete data with continuous graphs and so on (Schmid: 1983). The goal in this study is not to examine the relation between the structures of data and their visualization, but simply to consider how the semantics of dynamic and spatial variables can be codified in a standard manner and made legible within a signifying system. Again, Bertin did not assign specific values to the seven variables (e.g. texture does not have a specific meaning though it can invoke meaning through association). But he outlined the fundamental principles on which their distinction from each other could be used effectively. Initially Bertin was focused on cartographic systems and by extension his work has been applied to many other information graphics.

## 1. Approaches to visual perception

For the foundation of critical work on dynamic graphic images, we turn from Bertin to the work of other scholars engaged in the study of the psychology of perception. In his classic 1954 work on *Art and Visual Perception*, the psychologist and art historian Rudolf Arnheim examined various features of moving images (1974).<sup>1</sup> His insights provide one useful foundation for the extension of Bertin's graphic analyses into the realm of dynamic and animated images. Arnheim stated unequivocally that motion "is the strongest visual appeal to attention." He attempted to isolate "pure motion" by suggesting that something that is at a great distance or small scale becomes a mere dot, trace, point that moves without having any particular identity as anything except movement. His goal in making this separation was to be able to describe the behaviors of moving objects within a classification scheme.

For Arnheim, movement was considered a subset of the larger category of dynamic elements. Arnheim also distinguished between change, which does not depend on a shift of location or place, and movement, which does. He pointed to a boiling lobster turning red as an example of a change that is not related to motion (Arnheim 1974:373). The distinction between movement and change is fundamental to establishing the basic primitives of dynamics in graphical systems. Because his focus was on perception, Arnheim was interested in the meaning that became attached to different kinds of movement and motion, rather than simply in classifying types of movement or change in themselves. In the 1950s, Arnheim was able to draw on a considerable body of experimental studies of human perception in which movement was assigned various attributes according to specific characteristics of the moving objects. As a result, some motion was associated with animate entities, some with mechanical, and so on. While Arnheim's emphasis was on perception, the assignment of qualities to motion allowed these distinct types of movement to function as signs that referenced living and non-living entities (among other categories).

Nearly thirty years after Arnheim's text was published, *Vision*, the 1982 posthumous work of computer vision scholar David Marr, addressed the issue of primitives from the point of view of features that could be parsed individually (1982).<sup>2</sup> Marr's goal was the production of components for an artificial vision system capable of high level analysis of representations as well as of the phenomenal world. His phrase, "processing visual information," made clear the connection to computational capabilities towards which he was working. The step-by-step outline was highly formalized and

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<sup>1</sup> Rudolf Arnheim, 1974. *Art and Visual Perception: A Psychology of the Creative Eye*. The New Version. Berkeley and Los Angeles: University of California Press. 1954.

<sup>2</sup> David Marr, *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*. Cambridge, MA and London, UK. MIT Press: 2010. Originally publication: 1982. W.H. Freeman.



procedural. Nowhere were meaning, semiotic signage, concepts of reference or cultural value present. Marr's approach was fully mechanistic and brought up in this context because, like Arnheim's, it assumed a universal physiological foundation for engagement with the visual world. This mechanistic approach could also be readily translated into computation.

Marr's work became the foundation for formal foundations of machine vision. While we might eschew the adequacy of such an approach for the semiotic understanding of dynamic properties in graphics, the benefits of such a systematic description are worth attention. His formal approach, like that of Bertin, allows us to establish a basic descriptive vocabulary for the various types of dynamic features—movement and change—in animated graphics and in the process consider how their meaning production is structured. The distinction between meaning and effect is important to keep in view, as a movement may be described, tracked, and perceived without its having any referent, while position and location are always situated within parameters with cultural and historical specificity. In other words, we can posit that movement and change may not always be signifiers, and that animated graphics might engage with dynamics that do not constitute signs. At the same time, a formal descriptive system gives rise to the recognition that many of these dynamic features do have explicit and implicit meanings rooted in their formal characteristics.

All dynamic graphics created in digital platforms are produced through formal specifications based on step-by-step instructions. This is essential for algorithmic operations of feature identification and image parsing as well as for the creation of dynamic graphics. Marr's approach to vision was grounded in representation, not perception (in this he deviates from Arnheim). Thus analysis of the elements of *picturing* were the foundation of his approach to visual *processing* consistent with his goal of creating a model of highly functional machine vision able to parse an image of the world. The categories into which his analysis was divided showed this clearly as he began with techniques such as “zero-crossings” designed to segment an image into constituent parts, identifying light sources, groups, and developing a basic understanding of visual components (2010:54). To reiterate, no meaning was attached to such procedures or the object of their analysis. Marr began his processes by creating a full sketch of objects in a scene and then shifting to analysis of surfaces, shapes, textures, shading, and color (among other features). More properties followed (e.g. image segmentation, discontinuities) and he devoted chapters to the representation of surfaces as well as shapes. While a brief statement on “psychological considerations” appeared at the very end of his study, Marr was chiefly concerned with what could be automated (2010:325).<sup>3</sup>

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<sup>3</sup> For a useful conversation about Marr's work, in particular in relation to that of James J. Gibson, see this thread: [https://www.researchgate.net/post/In\\_what\\_way\\_exactly\\_was\\_David\\_Marrs\\_approach\\_different\\_from\\_that\\_of\\_James\\_Gibson\\_in\\_the\\_field\\_of\\_Vision\\_and\\_Perception](https://www.researchgate.net/post/In_what_way_exactly_was_David_Marrs_approach_different_from_that_of_James_Gibson_in_the_field_of_Vision_and_Perception)

## 2. Data visualization

Work on visual perception, machine vision, and interactive design continues to expand. But in addition, a separate literature has emerged in information graphics. In this arena, Colin Ware's publication, *Information Visualization: Perception for Design* provides an excellent example of a systematic approach (2013). Created as an instructional text for producing visualizations, Ware's text exhaustively detailed the many elements of graphic communication. Drawing on considerable empirical user studies, Ware produced a comprehensive handbook. In his opening chapter, "Foundations for an Applied Science of Data Visualization," he rejects both Ferdinand de Saussure's concept of the arbitrary nature of signs and the cultural relativism of Claude Levi-Strauss, Roland Barthes, and others building on that tradition (2013:6). Ware's assertion that "a new semiotics" could be based on "scientific evidence" returned to an empirical orientation towards human perception. Ware's work is included here because it sits between the classical semiotics of Bertin and computational information visualization while making use of some of the same principles of psychology of perception that shaped Arnheim's work and the approach to digital production that was central to Marr's. The mechanistic approach that Ware outlines also has no mention of subject-centered experience, cultural values, interpretative processes, or the inflections of historical circumstances.

Dynamic visualizations present the challenge for producing a useful structural analysis and description of their features and potential for signifying. To reiterate, it is important that Bertin did not assign specific meaning values to his graphic variables, but instead offered a framework in which the distinct and discrete qualities of shape, color, value, orientation, position, size, and texture could be used effectively. Certain shapes and combinations might well have semiotic properties. A star is not a circle, a huge square placed beside a small triangle produces a certain relational value. But meaning production is context and system dependent as well as cultural, historical, and referential. Perception of movement is highly sophisticated and much studied from neuro-biological and psychological perspectives. This work is of essential importance in the design of automated systems for self-driving cars and other marketable technology. But the *significance* of movement is less systematically addressed.

The features of dynamic graphics can be divided, as per above, into change and movement. These features suggest certain binaries, such as animate and inanimate, organic and mechanical, intentional and incidental, and growth and decay (Hoare 2017). Experiments with users' perceptions have demonstrated, for instance, that an object that stretches and shrinks will be perceived as organic and animate, while one that simply moves without morphing is more likely to be

understood as mechanical (Arnheim 1974:398).<sup>4</sup> Not surprisingly, these categories of identity correspond to some extent to analogs with the phenomenal world. In addition to these fundamental binaries, attributes of various kinds—speed, acceleration, direction, rate of change, apparent force, efficiency, or efficacy—add qualities of behavior to dynamic elements.

The field of cartoon animation also contributes to the basic vocabulary on which dynamic graphics are created and understood. In their classic text, *Disney Animation: The Illusion of life* Frank Thomas and Ollie Johnston outlined twelve principles of animation (1981).<sup>5</sup> Their goal was to create lifelike characters, and so their principles guided production of the illusion of living entities through principles like squash and stretch, staging, timing, anticipation, follow through, overlapping action, secondary action, blocking, arcs, slow in and out motion, exaggeration, and appeal (1981). Their principles addressed attributes of objects as well as of their movement (e.g. the idea that lighter objects move more quickly than heavier ones), and they were keenly aware that a such behavior as the timing of an action could change its meaning. Because of the affective force of these behaviors, they need to be used judiciously when applied to information graphics. Animation tropes can easily carry too much meaning, or unintended values, if misapplied. The problem of unintended semantic values is endemic even in in static visualizations, as many are generated according to display parameters that are not carefully considered (2021).<sup>6</sup>

In addition to movement and change, the features of spatial conventions play a role in structuring the relationship between viewer and scene in implied and explicit ways. Whether orthographic or perspectival, flat or with illusions of space, these graphic conventions inscribe subject positions that are fundamental features of enunciative systems (Drucker: 2017). Often unacknowledged, they are ubiquitous within user interface design, game graphics, and other computationally generated digital displays. Other more complex issues in spatial representation (motion, folding, distortion) could be analysed as well, but for purposes of this piece, only the three fundamental constructions—flat, orthographic, and perspectival—will be discussed.

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<sup>4</sup> Arnheim, p. 398, drawing on the work of André Michotte, *La perception de la causalité* (Louvain: 1946).

<sup>5</sup> Frank Thomas and Ollie Johnston 1981. *Disney Animation: The Illusion of life*. Westport, CT: Hyperion.

<sup>6</sup> For one good study of such issues, see Tim Stobierski, 2021. "Bad Data Visualization: 5 Examples of Misleading Data." Harvard Business School. <https://online.hbs.edu/blog/post/bad-data-visualization>.



### 3. Dynamic features and processes

Each of these dynamic and spatial features will now be examined in turn to understand how they support signification within a visual system.

**Animate/inanimate:** The distinction between the movement of animate and inanimate entities is fundamental and profound. In the perception of the phenomenal world, it is a primary distinction separating the living world from the non-living.

In accord with this distinction, concepts of agency are assigned differently. An animate entity may have intentional agency, take sentient and considered action. An inanimate entity may have mechanical agency with any number of effects or consequences. The qualities of motion that allow this distinction to be made are based primarily on the difference between the appearance of an uninflected, mechanical motion and the more errant and variable movement of a living entity. These categories are not binary, however, and the continuum of motions allows interpretation to ambiguate between animate and inanimate entities.

Since the discussion here is focused on the movement of entities within animated graphics, the crucial issue is whether the entity appears to be alive—referencing the animate world—or not. If it has the appearance of a living entity, signaled through a higher level of variation and unpredictability in its behavior, then it references the category of animate entities.

Motion capture is sometimes used as a base on which to draw animated figures, human or animal, since the complexity of the movement is easier to replicate than to create from scratch. Bird flight, wing motion, ambulatory activity are examples of animate movement, while mathematical models of growth rates, changes over time, or expressions of quantitative change are examples of inanimate movement. The latter are far more frequent in information graphics, which are generally, though not exclusively, expressions of quantitative value while models of animate phenomena are more likely to be simulations of natural and living phenomena used in games, digital art, and simulation for scientific research.

In the animate image, the motion often is the information, while in the inanimate image, the motion represents information. But in both cases, movement is a sign of something. The motion of an animate entity is first and foremost a sign of life, of being alive, of a living-ness of being. With an inanimate entity, movement is a sign of change, and stands for a shift in value measured graphically as a change in position, direction, speed or other attribute. The curiously delicate line between enacted motion and represented motion blurs the line between actual and depicted movement even though both exist as representations.

**Organic/mechanical:** The animate/inanimate distinction is not exactly the same as that between organic and mechanical entities. Something can be organic, part of the natural world, without being “alive” in the biological sense of being a living entity able to sustain and replicate itself. Organic processes are almost always part of complex systems. Information graphics that model these complex stochastic processes, such as weather, a tsunami, climate damage, or other natural phenomena use non-linear systems to calculate transformation and change.

The dynamics of mechanical entities conform to the laws of classical physics. Their graphical representation can be done using straightforward linear systems. The movement of trains, calculation of effects of load or stress, the estimation of outcomes of investments in relation to interest rates can all be shown using mechanical means. Models of the social and economic conditions in which the interest rates are determined that factor human behavior into their analysis cannot be displayed using mechanical methods. The number of variables and their degree of (un)predictability in these processes also makes them complex stochastic systems. Their graphics need to embody the variation and specificity inherent to these systems to signify their complexity. Almost by default, the depiction of movement will appear mechanical unless it has the variable features of a stochastic, organic, process.

Repetitive movement generally suggests mechanical entities. The higher the degree of precision in a repetitive motion, the more likely it indicates a non-organic entity. The human perceptual apparatus is highly sensitive. Just as the mechanical beat of an automatic drum-machine will always be distinguishable from that of a human musician, so visual motion that is non-variable will be perceived as mechanical. The subtlest variation will shift the perception, and robotic, automated graphics designed to simulate living and sentient entities, play in this liminal space, often very convincingly.

**Intentional/incidental:** The distinction between intentional and incidental action relies on whether a movement seems to be directed by a decision-making process. Self-initiated movement appears more intentional while reactive movement appears less so. Incidental movement occurs without apparent cause or motivation. The timing of incidental movement, as well as its course, will often be arbitrary and appear disconnected from any surrounding event, though incidental activity often occurs as a byproduct of intentional actions. An intentional movement signals the likely presence of a sentient being capable of self-initiated action. Such actions are associated with agency. Agency takes many forms from mechanical/physical to sentient/intentional, and when it appears to have an effect, becomes associated with causality.

The appearance of causality is not necessarily an indicator of intention. But the closer in time and space that an action and a resulting movement are, the more likely it is that they will be perceived as related, but the implication of causality relies on some

indication of coordination between one entity and another. Temporal and spatial proximity serve as signs of connection whether the action is intentional or accidental. Synchronicity is never an irrefutable or absolute indicator of causality, when an action and resulting movement occur in a short time window, they are more likely to be read as part of a single action. The notion of follow-through takes the fundamental principles of gestalt perception of continuity into the realm of dynamic variables. The other gestalt principles—figure ground, closeness, similarity, proximity, common region, and closure—also apply to the perception of dynamic graphics in their temporal and spatial dimensions. The basic gestalt principles can be extended so that “common region” becomes “common direction” or “shared speed” and so forth. Each of the standard principles can become dynamic so that features like closeness shift into clustering or scattering, proximity into attraction or repulsion, and so on.

With these features in mind, we can note that perception allows a meaningful, signifying, value to be assigned to movement. The referents for movement include deliberate intention, accidental or circumstantial activity, qualities of animate and inanimate entities, and characteristics of organic and mechanical processes.

**Growth/Reduction/Decay:** Change over time has its own signifying properties, since the referents for growth, reduction, amplification and decay are associated with larger life-cycles and the perception of the health or well-being of an entity. While increase is not always positive, it signals the productive absorption of energy or resources while reduction indicates a corresponding diminishment.

An entity can grow without any sign of improvement, but decay is always associated with a loss of vitality or well-being. If an element in an information graphic, such as a bar, square, circle, or curve, begins to swell, the implication is that input of resources (money, heat, food, population etc.) can be assessed, even quantified. If the same elements begin to diminish, the opposite is assumed. If an entity begins to sprout, give rise to branching or extension, it seems to signify growth. But if the elements start to crumble, or wither, or show fissures or cracks, the process suggests a breakdown in the sustainability of the systems and structures they support. The affective force of decay is rarely put at the service of information graphics, but no impediment exists for doing so.

Other expressive and affectively connotative actions could also be used to good purpose—such as the rapid jumping up and down of graphic features to signal happiness or agitation, quick shaking or trembling to indicate anxiety or fear, and so on. The semiotic possibilities for these actions has yet to be explored in information graphics, though they are frequently used in animated cartoons and narratives in a fairly-well codified and standard form. Visual methods used in the display of large data sets—charts and graphs—even when interaction or dynamic, tend to be conservative, preserving the authority and seriousness of their effect.



**Interaction:** As a fundamental category, interaction can be broken down into a considerable number of fine grained subdivisions, and these can carry inflections as well—hostile, friendly, manipulative, beneficial and so on. But as a general category of dynamic signification, interaction signifies through demonstrated connection of an entity to one or more others in a process of exchange. The concept posits the autonomy of each entity as a premise. Interactions are the dynamic processes of exchange among these entities and imply either a physical or social system at work. Interaction signifies these systems and conditions as well as the specific quality of exchange or communication in any particular case.

**Intra-action:** By contrast to interaction, the dynamic principles in intra-action, a term coined by the physicist Karen Barad, are not premised on the autonomy of entities but on their shared and co-dependent condition (2007). The approach eschews hard and fast boundaries between entities, and instead sees them as elements of a constitutive system. The entities involved in the gravitational forces in the solar system, in the relationships in a nuclear family, or in any physical situation (e.g. thermal equilibrium conditions) are thus understood as engaged in intra-action, a set of dynamic exchanges from within a system of which they are the constituting parts and participants. Intra-active dynamics thus signify the existence of the co-constitutive conditions of a complex system.

**Metamorphosis/transformation:** For an entity to show a metamorphosis in a legible manner, its signifying features must be retained sufficiently for the past or start form to be seen in the later one, at least during the initial process of transformation. Once fully transformed—pupa into butterfly, tadpole into frog, human into vampire, woman into tree—the object that has been metamorphosed might not bear much resemblance to the original entity. But the dynamic process of metamorphosis can reference either a change of shape and form (butterfly) or a change of fundamental identity (e.g. human to non-human). Thus a graphical metamorphosis can be a sign of morphological transformation (just appearance) or of ontological change (actual identity). Retaining the full continuum of states, or, at the very least, the start and end states, is a crucial part of the signifying system. Grasping the full signification of the graphic thus depends on a user's being able to retain an absent image as part of the way the present one is read. This is a highly complicated set of requirements for a sign.

**Hybridization:** Like metamorphosis, hybridization involves a change of state from one thing to another, either through a merger or a generative act of new production in which features from one entity are grafted onto or integrated into another. When an entity is fully hybridized, the source entities may be completely absorbed, even

disappear, as is the case with some metamorphoses. To signal hybridization, however, the new entity must retain some recognizable features of the sources. This inscription of more than one state of the entity is what allows the graphic to function as a sign of dynamic hybridization processes, not simply as an image of its outcomes.

**Propagation:** The act of propagation involves multiplication, possibly also hatching or subdivision of an entity into others. As a dynamic process, it can be single or iterative, involve many generations of new forms emerging from an extant entity, or occur simply once. The process is associated with living entities, but is not limited to them. A mechanical object can also propagate through industrial methods of replication. The process signifies a relationship of derivation—from a mechanical mold or template to a biological genealogy of traits passed through breeding or division of genetic material.

Propagation does not imply animate entities, though of course they often participate in such activity. The dynamic process is one in which an original, a source entity, becomes multiple and therefore it both enacts and stands for this replicative process. As in other dynamic activities, the distinction between depicting and enacting is sometimes blurred since it is difficult, if not impossible, to show propagation without performing it.

In summary, what becomes evident is that the complexity of dynamic processes is manifold. For instance, consider the dynamics of the mechanical world and its efficiencies—do these properties *signify* or do they simply *inhere* in the processes. The assertion that motion can exist without producing any signification seems hard to accept, especially within any framework of cultural semiotics. This consideration raises the question of whether a motion or dynamic action on its own *has* or *produces* meaning and through what means. The categories of dynamic action described above conjure associations and meaning values, and so do the behavioral attributes about to be described. Again, and throughout, the question remains whether or not these dynamic variables function as signs in their own right or merely as inflecting attributes of the signs to which they are attached or associated.

#### 4. Behavioral attributes

Behaviors are attributes that augment the dynamic features, modifying and complicating their capacity to signify through analogy, association, or direct perception of effect.

**Speed/acceleration/direction/velocity:** The rate of speed is relative to a perceptual frame. Even with the dynamic graphics of quantitative data, not extending to the

realms of special and general relativity, the question of the frame is none-the-less crucial. Being able to measure speed relies on having something within which or against which to measure it. The perceptual tendency to see objects in motion is much studied, but the question of gauging speed involves multiple variables, including the stable or unstable position of the viewer.

In standard physics, speed is defined simply as the temporal rate at which something moves along a pathway. By contrast, the category of velocity includes direction as well. In physics the values of these are defined as a scalar vs. a vector value. The question of what the rate means and what the direction signifies are also frame-specific. Speed in a cartoon of racing carrots and other vegetables has a fantasy aspect to it, the sign of an imaginary world, as does the velocity that carries Road Runner or Bugs Bunny off the edge of a precipice for several milliseconds before they realize their mistake in mid-air—and then fall. But the speed at which a data display on a map indicates spikes in the spread of a pandemic has its referent in the world of epidemiology and medical statistics where it may correlate with the actual rate of propagation, though timed displays are almost never structured in real-time.

But does speed *stand* for anything independently, or only as an attribute of another entity that has either speed or velocity? The contrast between acceleration and deceleration, measured as a factor of relative or comparative speeds, performs a sign value when it is embedded within a sequence of events, whether narrative or merely phenomenal. When an entity speeds up it acquires any one of a number of meanings—of frenzy, desire to escape, exhilaration, exuberance and so on. Similarly, when it slows down it suggests calming, or, exhaustion, even decrease of vitality. But neither acceleration nor deceleration has a sign value in itself that is fixed, determined, and unambiguous. In the semiotic as well as the physical sense, speed registers in relation to a frame of reference.

Direction also carries considerable associative power. Up and down, though fully relative, are marked with cultural associations from the banal to sublime. Our orientation in space as biological creatures makes the *up* direction positive and the *down* direction often negative as in the use of the terms and their association with graphing languages. In information graphics, the conventions of x and y axes reinforce these stereotypes. The values assigned to axes are not natural, merely a convention of Cartesian thinking and grids. Still upward movement carries a very different associative value from moving down, even if the downward motion of an airplane, for example, might signal a return to home, earth, and hearth with only positive connotations.

**Force:** Force is described in terms of push or pull, attraction or repulsion, an influence that can result in movement or change of the position, speed, direction, or state of an entity. In the sense that any force is attributable to a source, it is an indexical sign,

connected to the originating object. But force also signifies iconically, as interaction, a property of connection and exchange in which energies interact with various degrees of intensity. And of course force can signify symbolically, when the evidence of power or influence results in motion towards or away or other movement or change.

**Play:** Play signifies through its specifics and particular modes of behavior, movement, and action. Unlike force, however, play need not be interactive. The concept of play in mechanisms is associated with the idea of mobility, providing room for elements to articulate freely and without friction. Play as an animating quality can inhere in the actions of an individual entity. Interactive play such as seduction or flirtation, avoidance or repulsion, is an inflection of the larger dynamic category of interaction. But play can also be present in an adjectival sense, as an attribute of a playful being, action, expression, or behavior. Play signifies through its specific qualities and characteristics, many of which are read entirely through anthropomorphic codes.

**Reaction:** As a subset of interaction, reaction is an action that appears to link one entity and another or others through a time sequence of events. Reactions imply a cognizant recognition in the process of exchange, as one entity necessarily acknowledges another for reaction to occur. As in the case of mechanical, or chemical, or physical entities, this activity does not require sentience or consciousness and so reaction cannot be said to signify awareness, only linked action or behavior.

**Timing:** The semiotics of timing are, like those of speed, reliant on frames of reference for their value. The components of sequence and seriality, of synchrony and apparent simultaneity, of regular intervals and random occurrences are all structured by intervals and segments of timing. Timing has rate/frequency and duration, and as in many of the behavioral features described, it can signify through analogy (as in the imitation of particular beat or rhythm, or the invocation of a calendrical structure, or a clock measure) or through its affective impact (fast or slow pace and/or change of pace). Timing is relational as well as being able to be measured with standard metrics and their encoded anthropological and sociological values. But timing is also profoundly psychological, producing meaning through individual perception and reaction.

## 5. Spatial conventions and features

The conventions for creating the illusion of space on the flat space of a page or screen have long been codified in the visual arts. Here the classic work by Erwin Panofsky, *Perspective as Symbolic Form* laid the foundation for a critical engagement with the



properties of these conventions (1991). Other contributions by such crucial figures as William Ivins and later, Victor Burgin, provide crucial links between the graphical systems and their implications for the creation of subject positions (1946) (1991). Recent work on information as enunciation continued that work into a dialogue with visualization graphics, showing that their graphical organization inscribes a viewer's subject position (Drucker: 2017).

**Planar:** The flat plane of the page, wall, or canvas lends itself to rationalization in accord with the tenets of Cartesian grids. The intellectual and ideological force of Descartes's coordinate system makes its integration into information graphics nearly invisible by virtue of its familiarity and apparently "natural" format. But the x and y (and z) axes on which metrics are assigned and then used to construct graphical expressions of value for the purpose of calculation and comparison have no corollary in nature. Their structuring effect relies, however, not only on the ways they are used in producing legible and persuasive graphic arguments, but also, on the extent to which the flat presentation positions a viewer. The plane meets the viewer frontally with such a habitual orientation that that fact of its being a mode of direct address disappears. In effect, the flat plane is hailing its viewer, silently perhaps, but nonetheless irrevocably in its presentational mode. The screen space allows the viewer to be positioned in such a way as to not see the presentation as an artifice. The enunciative system that positions the viewer simply disappears through the appearance of the image. But the flat plane positions the viewer within the I/you activity of a graphical system of enunciation. The question of who speaks in the graphic and who is spoken by it—the ideal subject of the image—is further complicated by the presence of an actual user whose subject position is never that of the ideal, but always inflected with the specifics of their own identity and circumstances.

**Orthographic:** Orthographic projections make use of conventions of architectural and technical drawing in which the scale of measure remains constant. The lack of distortion in these drawings is also accompanied by a bird's eye view, a ubiquitous position that provides the illusion of complete control over the surveilled field. While eschewing the point of view of either the flat plane with its direct address or perspectival systems inscribed from a single position, the orthographic view constructs its own omniscient-seeming subject. The cultural conventions within which these views are several. In Western antiquity they were used to render tactile and sequential encounters with space (e.g. Pompeian wall paintings). But they are also present within Chinese, Japanese, Mayan representations of structures and spaces, as well as many cartographic and other visualization modes. They perform the curious function of appearing to be without an articulating subject since the metrics are

not inflected by the viewing position. But at the same time, they inscribe an omniscient subject who views all elements from a seemingly objective position.

**Perspectival:** The invention of perspective in Europe in the Renaissance transformed spatial renderings into inscriptions of subject positionality. The conceit of the flat plane (of glass gridded for convenience) into the cone of vision to create a scrim on which to depict the complexity of the visual world and its vanishing points remains a feature of graphical construction today. Game graphics for “first-person shooters” are a paradigmatic instantiation of these techniques in dynamic formats, in which the world is continually re-drawn from the point of view of a single subject. The evident effect of this approach in structuring an enunciative system is both obvious and frequently invisible, again, by virtue of its familiarity. But the speaker and spoken of these images are locked into an enunciative relation through the positioning activity of the graphical structure.

Each of these spatial systems (other examples could expand this discussion) offers a distinct mode of structuring the relation between viewer and viewed, inscribing subject positions differently in ways that articulate power through graphical form. They carry potent signifying value by virtue of combining their formal properties with their invisibility and familiarity.

## 6. Conclusion

In outlining these various dynamic processes, behavioral features, and spatial conventions, the goal of this paper has been to articulate the components of graphical expressions that make use of these in animated images for data display. The dynamic features treated here—movement and change—as well as the spatial structures are common elements of information graphics. Just as Bertin’s seven graphic variables were not assigned inherent value as signs, but identified as elements that could be strategically and deliberately deployed to communicate effectively, so the dynamic variables described are not assigned or considered to have inherent sign value. They can be used for signification, and in accord with their particular properties. This outline lists distinct and discrete dynamic graphic variables as a start for the discussion of how they signify.

Because dynamic images have movement, behavioral activity, and change over time, they often exist in an analogy to the living world. But most information visualizations are quantitative abstractions—representations of data or structured information that is already far from the phenomenal world, already cooked, as it were, through the structuring process that parameterizes various features of whatever is

under examination. The outcome of this process is referred to as *capta* rather than *data*, a term that calls attention to constructed-ness rather than any “natural” condition (Drucker: 2011).

Many possibilities exist for further work in outlining the structural formality of dynamic systems and developing the description of the relations of their parts and behaviors to signifying practices. In looking at dynamic systems, a constant tension exists between what Gilles Deleuze identified as the distinction between representation and becoming, depiction and enactment (Roberts, 2019:6). Movement is not represented, it is real, but it is also constructed—through the techniques of animation—and semiotic. The dynamic variables on which it operates have signifying properties, but as in all semiotic systems, these are culturally and historically situated as well as inflected by individual psychological interpretation.

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# The “modulation mania”

## Impersonal enunciation and visual rhetoric of the data image

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### ABSTRACT

The growth of contemporary positivistic trust in computational tools inspired semiotics to contribute to the debate on the strategies of communication of truth. In order to study these strategies in data images, the article features a framework modelled on the theory of impersonal enunciation. The computational utterer is believed to assure a super-personal enunciation, understood as impartial and true. Furthermore, it will be observed how subjectivities are in any case modulated in the data images: this operation constitutes as much a visual rhetoric to achieve the effect of truthfulness as it is a discursive practice featuring the computational enunciation of the data image.

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## 1. The framing of truthfulness

Today, data visualisation, data-scraping, computational and automated data analysis software can be understood as techno-linguistic artefacts that users employ in order to gain an interpretative advantage. The hypothesis of this article is that semiotics can better address the epistemic challenge posed by data analysis with which scientific communities are grappling today.

One of the main themes of contemporary thinking on this topic concerns the effects of meaning produced by data visualisation images, or data images, and since semiotics has established itself as the science of texts and meaning, the semiotics of big data often focuses on these kinds of visual objects (Reyes 2017; Dondero 2020).

To this end, it is important to note that, if we consider the data image as the result of a computational enunciation, it is possible to argue that a certain effect of truthfulness (Greimas 1984)—which is traceable to that of referential illusion or objectivity (Greimas & Courtés 1979: 116)—is closely linked to the supra-personal and encyclopaedic nature of the computational enunciator. If we assume the existence of such effects of meaning, it is possible to assert that the data image is a textual form, the result of a predicative practice aimed at obtaining an interpretive gain for the human utterer who once a data image has been realised and enunciated, can be configured as a communicative gain.

In this perspective, every data image is the result of a computational enunciative practice (Fontanille 1994). A data analysis session and the enunciation of a data image are guided by the collaboration between a user and a computational entity. An example of this enunciative process is found in the collection of data disseminated over a network. To extract a cluster from the data, the collector manipulates the discontinuity of the data streams. Through the collection process, a set of data is extracted from databases and organised into clusters and features to provide a meaningful reading of a process. Through a Google Trends search, users can understand what are the most important “keywords” mentioned by other users in their tweets, posts, or search engine queries. During a data analysis, data generated during interactions with previous users may have been identified and grouped into semantic categories based on which the elements of the data image were organised and modelled.

In trend analysis software, users can retrieve a series of “strings” (referring to the interactional-spatial utterances of other users), process them, “clean them up”, and visualise them in a data image. Such computational utterances are “meta-communications” in that users produce an interactional-spatial utterance to communicate a representation of a set of discourses about human-computer interaction of *other* users and semantically organise them into behavioural categories. For example, these operations may consist of simultaneously viewing images produced by users and shared on Instagram. Trend analysis software, on the other hand, allows users to manipulate a data set more quickly and (seemingly) more fairly than the user could. At the heart of these operations is the definition of contrasts and divergences, boundaries and attributes, semantic categories; it is the automatic assignment of specific features, labels, and abstract metadata using programming metalanguage to achieve interpretive gain.

Such an enunciative practise is able to describe the values of objectivity and truthfulness in the data image, thus to achieve a gain for the users. This idea is prevalent in computer and media science.

For some, at the ontological level, data are benign. Data are simply data, essential elements that are abstracted from the world in neutral and objective ways subject to technical constraints. [...] They are pre-analytical and pre-factual. From this perspective, a sensor has no politics or agenda. It simply measures light or heat or humidity, and so on—producing readings that reflect the truth about the world unless tainted by

a technical glitch. In other words, the sensor produces an objective, realist view of the world revealing things as they really are, wherein the reality of thing being measured is independent of the measuring process (Kitchin 2014: 48).

Assuming the commonly shared belief in computing, the first aspect to consider is the artificial nature of the computer enunciator. In this context, drawing on the framework of impersonal enunciation elaborated by Claudio Paolucci (2020), one can formulate the idea that the interpretive gain of data analysis and visualisation operations lies in the—alleged—impersonality of the computational utterer. Impersonality is defined by Paolucci as a property of the non-human actor, as is the computational utterer.

In this context, a cultural analysis should consider the innate fascination with predictability and computational predictions of the future that has appealed to humans since the dawn of time, sometimes in search of universal equilibrium (Cramer 2005; Pasquinelli 2019). In this perspective, “super-personality” can be assumed to be a feature of computer languages, which are metalanguages (Sieckenius de Souza 2005) that can guarantee their meta-pragmatic functioning, just as the meta-communications of the sciences do, through which the speakers of a cultural community implicitly or explicitly establish the rules of referentiality and the values of objectivity.

However, the non-human actor is not the one who produces the empirical utterance. This is done through the human and non-human pair of utterances: “if we consider the same opposition human VS non-human, we can very well see that it is not a “non-person” (non-human) at all, but rather a “person + non-person” (human + non-human)” (Paolucci 2020: 67).

On the one hand, it can be said that this gain is interpretative in nature, as data processing algorithms perform computational analysis more accurately and correctly than a human, and for this reason provide a gain to users seeking a quantitative result in their search. A data image that graphically represents the data extracted from the acquisition processes brings some gain in that it allows one to move from the indeterminate impure to the determinate pure, thus leading to the acquisition of objective knowledge (and thus an effect of truthfulness) that comes from the impersonality of the computational calculation. In this view, it is not the algorithms that want something from us (as Finn noted in 2017), but the users that want something from the algorithms. This interpretive gain with data analytics software is closely linked to the establishment of a “distant gaze” that users adopt in their interactive-spatial expressions. It is precisely the process of moving away from the subjective, embodied, and situated scopic regime that allows us to formally speak of super-personality.<sup>1</sup>

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<sup>1</sup> The distant reading paradigm, developed by Franco Moretti (2005) in the field of literary criticism denotes a method of computational analysis of written texts belonging to a single literary current or referable to a single author (but the same can be done with visual texts as Manovich’s cultural analytics does). This method is able to bring out trans-textual isotopies and recurrent stylistic elements into a corpus of texts: “distant reading: where distance, is a condition of knowledge: it allows to focus on units that are much smaller or much larger than the text: devices, themes, tropes or genres and systems” (Moretti 2005: 48-49).

On the other hand, as we shall see, it is not only the computational calculation of the artificial exterior that produces the gain in truthfulness and objectivity. Although the co-enunciative practice of the data image suppresses the personality and subjectivity of the human enunciator, one can observe in several cases how a new form of subjectivity, plural and collective, emerges. It is this latter form of subjectivity that characterizes the encyclopaedia and the quantitative determination of truth in data images.

Based on these ideas, this gain also lies in the ability of data images to self-reflect users and their mutual relations, to give them tools (images) to understand themselves.

From this perspective, the main property of data images lies in their explanatory potential and their ability to make visible relationships and dynamics that are invisible to the naked eye. An example of this type of practice is data analysis in socio-geographic research, which is conducted to self-reflexively understand the cultural dynamics that characterize a sociological context. In a 2015 study, Marta Severo compared several national networks (France, Italy, and Switzerland) involved in the implementation of the 2003 Convention UNESCO to highlight national trends and specificities, using online “traces” to study offline phenomena such as routines, oral traditions, and cultural practices. The analysis resulted in image data and, in effect, heat maps depicting clusters of topics in relation to the social position of the pronouncing actor.

Much like the Internet, the Web is not a single network but a network of networks, a graph in which densely connected zones are separated by relatively empty spaces. For the most part, these zones correspond to thematic communities: groups of people clustered around interests and points of view. The hyperlinks between sites dealing with human-computer interaction can therefore reveal much about the networks of actors involved in the conservation of human-computer interaction. In other words: If we know which websites are linked online, we can infer which actors are linked offline (Severo & Venturini 2015: 4).

Here, we can clearly observe the meaning that comes from following hyperlinks along users’ paths and analysing digital traces. Moreover, this concept of “reflexivity” implies certain practices that are closely related to the creation of an effect of transparency.

The analysis confirmed that national and institutional nodes (especially the overlap of the two categories, i.e., national institutions) play the role of authorities in the networks, as they receive the most links and are consequently very visible sites in the corpus. [...] While national institutions occupy the centre of the networks, local and individual nodes tend to be located at the edges of the graphs, and local sites are often densely clustered around specific cultural practices. Moreover, as expected, the network structure of each country reflects the main characteristics of its cultural system (Severo & Venturini 2015: 15).

The data meditation rituals of Salvatore Iaconesi and Oriana Persico (2020), concerning autobiographical and collective writing paths that were graphically organised



into data images and multisensory images with strong evocative value using data visualisation software, and also used for meditative purposes, were also in this direction.

In such a view, to be reflected in the data image is the attitude of a social actor, which is a collective and a plural one. The lesson we can draw from the impersonal utterance, then, is that it is characteristic not only of a particular type of discourse (the free indirect speech) or of a social value (the a-personality), but also of an “inner” discourse, of an “I” saying “I” (Paolucci 2020) and opening up to self-awareness.

## 2. Impersonality, encyclopaedia and database

According to Paolucci, “impersonality” describes the determination of culturally established (i.e., encyclopaedic) norms, schemes, and customs on subjective (i.e., personal) enunciates. In this context, Paolucci cites Guillaume and “the primacy of he/she” in describing impersonality as the quality of the delocutive form as an “evenemential subject that opens up subject positions in which *one* speaks” (Paolucci 2020: 73). In such a view, the theory of impersonality not only allows us to describe the general functioning of enunciation, but also to affirm a super-personality at the level of language, which ultimately allows us to describe cultural stereotypes, clichés, and genres.

In such a perspective, enunciation is impersonal in so far as to produce an utterance is to *keep in the present* a set of norms, customs, and differential relations that constitute a schema (Eco’s encyclopaedia), i.e., to adhere to a certain *implicit operative context* that is meta communicatively presupposed. In such a perspective, the epistemic tradition of Benveniste is rejected, according to which the subject of the enunciation selects the linguistic elements of the *langue* in order to realize them in the *parole*.

Although Eco’s conception of the encyclopaedia was mainly a theoretical and abstract one that could refer to a specific typology of knowledge located before the spread of the Web—and although the encyclopaedia is theoretically the totality of knowledge and information, whereas the Web is just one of the archives of knowledge and information—it could have great heuristic value to find in it a theoretical place or level to explain “digital crumbs” (Pentland 2014) and “digital traces” (Severo & Romele 2015; Ferraris 2021). Indeed, we now know that the distribution of online media content must be considered against the background of a complex, deep information system that determines the order in which content appears, a system that has been called “web platform.” This system is typical of social media or search engine feeds; it is based on algorithmic calculations of data about the user’s online activities. It constantly creates digital simulacra of the world and directly influences the perception of the world. One could say that it is the production of an ekphrastic mathematical representation of the existence of individuals who extend themselves and produce data through their actions in the digital space.

Social physics functions by analysing patterns of human experience and idea exchange within the digital bread crumbs we all leave behind us as we move through the world—call records, credit card transactions, and GPS location fixes, among others. These data tell the story of everyday life by recording what each of us has chosen to do. And this is very different from what is put on Facebook; postings on Facebook are what people choose to tell each other, edited according to the standards of the day. Who we actually are is more accurately determined by where we spend our time and which things we buy, not just by what we say we do (Pentland 2014: 22).

In this perspective, recovering Umberto Eco's (1979; 2007) concept of the encyclopaedia will be useful to define a paradigmatic semantic horizon that brings together all the knowledge of a community and the information produced during a practice of human-computer interaction with digital media. Consequently, the *langue* of computer utterances is precisely the set of digital archives (databases) linked to special software capable of scraping such encyclopaedic spaces. Also, the utterances provided by the methodological-applicative proposals of data science can be called "enunciation of the encyclopaedia", i.e., utterances that access the archive of a large number of differentiated utterances and make it possible to draw continuity inferences and derive semantic isotopies.

If we accept the definition of the encyclopaedia as "the totality of all utterances", the set of "what has already been said", we could consider the database as the totality of all digital utterances that have already been announced and translated into data. According to Lev Manovich, one of the most important theorists of software culture, the database is—to quote Panofsky—a "symbolic form", a structured collection of data. In his most famous book, *The Language of New Media* (2001), he argued that the computerization of culture is accompanied by the advent of "storage mania", data collection, and indexing. Such a process is not only a linguistic operation aimed at producing a data image, but also a practice charged with social, economic, and political values.

In this respect, we are at the beginning of a new education in which the digital (the computational, the logical-mathematical translation of the world into discrete units) constitutes the process of universal construction of knowledge (like the university pedagogy of education) (Berry 2011).

### 3. Impersonality, empiricism and narrativity

To deal with the gains from the social use of data analysis tools, the absence of the possibility of attributing personhood to the non-human actors who rule over the enunciation of feeds and data images can be described as both *impersonality* and *a-personality*.

According to Eugeni, "the first way is that of impersonality: according to this view, the drying up of the category of person leads to a homogenization of humans, animals, and machines, and thus to the so-called post-human" (Eugeni 2021: 212). This position

is retrieved by Paolucci, who, however, is not concerned with “post-human” environments as described by Eugeni (2021), but rather with the gain of impersonal tools.

For this reason, the enunciation in the realm of Big Data not only retains the “memory” of its future re-enunciation, but it is entrusted with a set of norms and uses that attend to the data, linking its semiotic format to a set of other social institutions whose particularities and norms (political, economic, ethical, etc.) influence the data journey itself (Paolucci 2020: 164-165).

On the other hand, Eugeni postulated the concept of *a-personality*: according to him, de-personalization (or delocution) is only a penultimate truth and considers it as a *pars destruens* that precedes a re-personalization: “an investigation of the forces in the field, finally free from imaginary and ideological prejudices, allowing us to understand, beyond the attempts to personalise artificial intelligences, what they actually do in the shared environment and who is actually responsible for their design and operation” (Eugeni 2021: 212).

Thus, it could be argued that the truth effect is determined by the utterance of a “super-personal” and computational utterer. It is a personal type of utterance, since this utterer is an artificial, non-personal entity. At the same time, it is an impersonal type of utterance, since the utterance contains several encyclopaedic dimensions of utterance, and it is this plurality and multiplicity that suppresses the subjectivity of the individual in rhetoric and makes the impersonal utterance appear as not characterised by the encyclopaedic features of its utterers.

The connection between the impersonal proclamation and the effect of truthfulness, however, might seem to philosophers of science to be a contradiction, and in part it is. As impersonal proclamation refers to the encyclopaedia, all data enunciations are “steeped” in culture and bias. As the majority of authors in the field of data studies note (Chun et al., 2019; Cairo 2019), “information visualizations are interpretive acts masquerading as presentations” (Drucker 2014: 10). On the contrary, according to Lotman (1985), cultures and their (technical) artifacts follow homeostatic mechanisms that ultimately assure people of the coherence and validity of circulating semantic content and beliefs.

Therefore, it can be argued that the impersonal enunciation of the computational actor produces a truth effect that is acknowledged as trustworthy.

In such a perspective, then, we need to consider the empirical utterer, and thus the social actors, who strategically deploy such an impersonal artifact to support a particular kind of enunciate. The functioning of the impersonal utterance would have to be considered in light of the rhetorical and narrative strategies employed. One solution might be to draw on the narrative paradigm of semiotics (Greimas 1984) to explain the ways in which designers manipulate data and information by articulating in linear and selective ways something that is not originally defined. David Bihanic (2015) argued that data design is the most important practice that needs to be explored and developed to address today’s “information overload”, and in the terminology of semiotics, this means exploring the discursive dimension of Big Data.

Narratives are not only one of the preferred objects of analysis in text semiotics; they are also and above all a set of models used by people to give meaning to things and experiences. Therefore, the narrators' perspective could be useful for the analysis of the implicit practices that lead an empirical subject to express a certain data image.

However, it was precisely Lev Manovich (2001: 199) to argue that:

As a cultural form, database represents the world as a list of items and it refuses to order this list. In contrast, a narrative creates a cause-and-effect trajectory of seemingly unordered items (events). Therefore, database and narrative are natural enemies. Competing for the same territory of human culture, each claims an exclusive right to make meaning out of the world.

After twenty-one years, however, his ideas about game practices—which he described precisely as narrative and interactive practices like those of data analysis—could maybe be revisited and reformed to explain narratively both the syntax of designers' practices and the interpretations of recipients.<sup>2</sup>

While such an application of the narrative paradigm may appear to be a method of deductive interpretation, it is nonetheless useful in focusing on the internal narrative opened up by data imagery. The provocative article by Willers (2015) entitled "Show, do not tell" aimed precisely at noting the "narrative approach [of data imagery] that presents the audience with a linear path to follow, dictated entirely by the author" (ibid: 4).

As far as impersonal enunciation is concerned, introducing the topic of narrative and discursive strategies of data images leads us to consider the practice of *modulating subjectivities*, which seems to be central to the process of constituting the objectivity effect.

In this sense, it is not only the artificial nature of the computational enunciator that is of central importance, but also its ability to hold disparate data together and discursively organize them into a single image that, in this case, refers to the subjects and subjectivities that first produced them.

It can be argued that since data images are already the result of an assumed impersonal as super-personal utterance, the semiotic operation of such an effect can be found in the narrative organization of information within such a type of images. In this context, I will look at one type of journalistic data image and try to understand the ways in which the subjectivity of the speaker—which would contaminate the authenticity of the communicated truth—is hidden and distorted by the discursive manipulation and the subjectivity of the people that is instead explicitly and rhetorically represented in the image.

In this respect, the data image appears as only one of the possible realizations of the virtual database to which the displayed information belongs.

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<sup>2</sup> Within the same article Manovich argued that the narrative is just one method of accessing data among others.





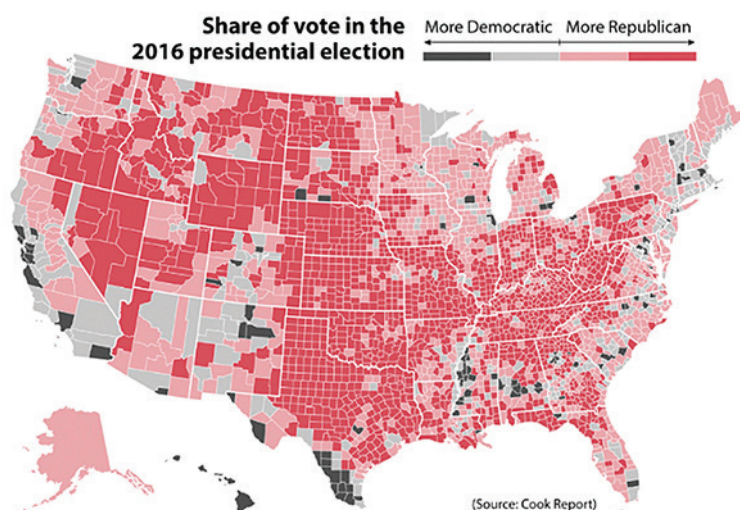
As can be read on the website,<sup>3</sup> the application consists of an API connected to the database of records, which is dynamically queried through the front-end interface that controls the display of the data. For example, when selecting the period between 2011 and 2012, it was observed that fines for driving under the influence of drugs were issued at checkpoints well known to citizens, especially in areas where nightclubs were concentrated; in contrast, in the following years, this type of violation was concentrated mainly in the area of San Salvario, a multi-ethnic neighbourhood of the city that began to fill with nightclubs since the early 10s. Another case concerned the fans of the Juventus stadium: from September 8, 2011, the day of the inauguration, until November 2012, no fines were imposed near the stadium; from that month on, fines suddenly accumulated. It results that was interpreted by the journalists of the Turin newspaper as a sign of a political decision in favour of a certain activity.

First of all, it should be noted that the fines do not refer to individuals, but rather to actions that are realized. They are impersonal in the sense that they are a collection, and the journalistic process can be interpreted in terms of the concatenation of utterances that contemporary semiotics speaks of. Such an operation can be described as highly deductive, since the data image merely offers a panoptic view of a series of events that have taken place in the area. It is precisely such an

operation that has produced an effect of *transparency* (ideologically understood) through the establishment of a distanced scopic observation regime.

If we consider such a case of journalistic data-visualisation discourse, we understand that the effect of truthfulness is narratively generated when the image succeeds in showing not only a mere visual representation of a condition (a referent); it succeeds when the image itself becomes a useful tool to infer such a referent from what is depicted.

A very different example concerns the *misleading* effect of truthfulness, presented by Alberto Cairo in his book *How charts lie* (2019).



**Figure 2.** 2016 Trump's electoral map (by Cairo 2019)

<sup>3</sup> [www.datainterfaces.org/2016/07/infrazioni/](http://www.datainterfaces.org/2016/07/infrazioni/)

In analysing the journalistic disinformation strategies employed during Donald Trump’s run for the White House, Cairo found that the misleading images depicting Trump’s success did not actually represent the citizens who voted for that particular candidate, but rather it was the territories are represented.

Critics of President Trump were quick to excoriate him for handing out the county-level map to visitors. Why count the square miles and ignore the fact that many countries that went for Trump (2626) are large in size but sparsely populated, while many of the countries where Clinton won (487) are small, urban, and densely populated?

On the one hand, in this data image, the data on population size are potentialized, that is, taken out of the discourse and placed in the power of meaning; on the other hand, the data on territorial size are made relevant and *actualized*. We are thus dealing with a semiotic distortion, that is, the actualization of a virtualized form while empowering a realised form (Paolucci 2020: 212-4). It could be argued, then, that such discourse depersonalised people and personalised territories by achieving in this way the distorted representation of a desired truth.

Firstly, such an operation betrays the super-personality of the computational utterance, and does so precisely by publishing a non-truth account. It thus becomes a Trump’s utterance and not just a computational utterance. Secondly, it fails to present a transparent panoptic vision of the electoral situation. It does not fulfil the image’s purpose of allowing users’ self-reflection into the image.

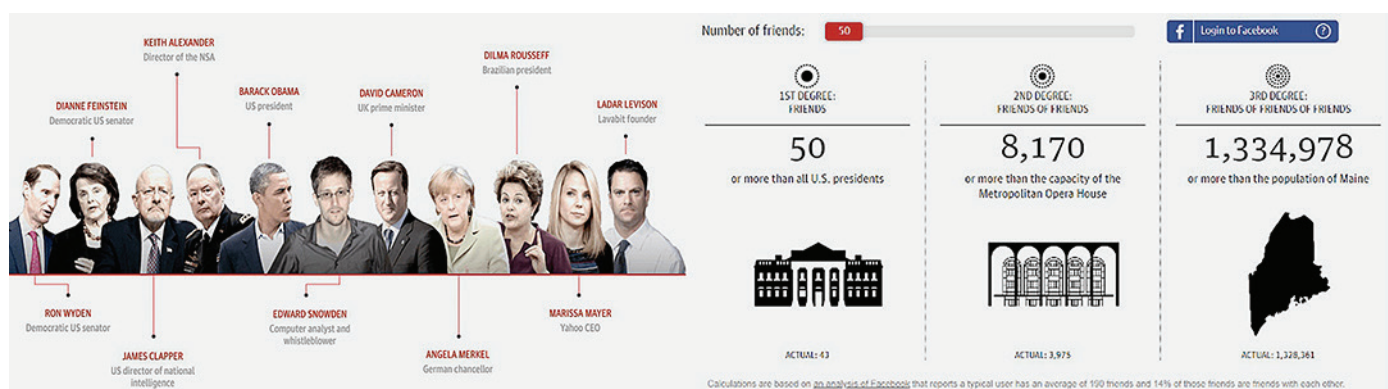
The two images analysed are examples of data journalistic imagery, a text typology prototypically used in a social domain highly dedicated to the discovery of truth. Although this is not actually a treatise on journalistic rhetoric, the hard perspective of the second image must be emphasised. Not only does the data picture fail to reflect reality, it distorted by representing only one discourse—among many—that in favour of Trump.

In this respect, I would argue that the effect of truthfulness could also be generated by representing a set of heterogeneous discourses capable of providing a more complex (and multi-perspectival, i.e., pluralistic) representation of reality.

A different path can be taken to describe the next two data images, which are atypical in the sense that, unlike the previous ones, they explicitly defend a particular ideology, but without aiming at the value of a scientific discourse, thus generating a truthfulness effect.

Moreover, like the first one, these images share an important characteristic: they are interactive. This characteristic does not prescribe a passive reading practice that could be compared to the scientific assertion of referential, but an active role for the reader that ultimately offers the possibility of personalising the viewing experience and modulating the subjectivities that most interest the reader.





**Figure 3.** Journalistic data-images by The Guardian ([www.theguardian.com/world/interactive/2013/nov/01/snowden-nsa-files-surveillance-revelations-decoded](http://www.theguardian.com/world/interactive/2013/nov/01/snowden-nsa-files-surveillance-revelations-decoded))

The two images again fall into the category of journalistic data visualization images: they were used by *The Guardian* to support the Snowden revelations about NSA surveillance programs in 2013.<sup>4</sup> In the image on the left, you can see an interactive visualization of what some public figures said to the press following those revelations. By clicking on the various characters, you can read and hear what each person said by juxtaposing them in real time. Even if it is not a real numerical data image, it creates the effect of truthfulness in the representation of a plurality that, as a rhetorical consequence, assures the super-personality of the utterer (in this case *The Guardian*). Indeed, such an image is not merely the result of a computational representation, but the effect produced must be understood as a social value inscribed by the journalistic actor himself, concealing his own subjectivity in the subjectivities represented. This is a perfect example of the effect of truthfulness generated by the representation of heterogeneous subjectivities, which nevertheless affirms the super-personality of the utterer. Seen in this light, it can be said that journalistic storytelling has always produced the effect of truthfulness through the multiplication of points of view.

Although, what about the second image? It asks users to log on to Facebook to see how much personal information is retrieved by the computerized mass surveillance system. In this case, the computerized information retrieval is simply based on the number of friends one has on the social network's platform. In addition to the interpellation effect resulting from the call to action and the rhetoric of fear-mongering through the figurative comparison with ever larger objects, this is a good example of real-time visualization of personal data, such as the statistics automatically generated by SNS algorithms about the actions performed by users in a given period of time.

<sup>4</sup> <https://www.theguardian.com/world/interactive/2013/nov/01/snowden-nsa-files-surveillance-revelations-decoded>

Finally, a type of data image that can be said to drastically remove human subjectivity from its referent is represented by a very suggestive image presented by Google on Earth Day as one of its doodles. According to its website, “the doodle uses real time-lapse images from Google Earth time-lapse and other sources to show the effects of climate change in four different locations on our planet; stay tuned throughout the day to see these scenes, each of which will be on the homepage for several hours.” In particular, the image below shows the Harz forests destroyed by bark beetle infestation due to rising temperatures and severe drought.

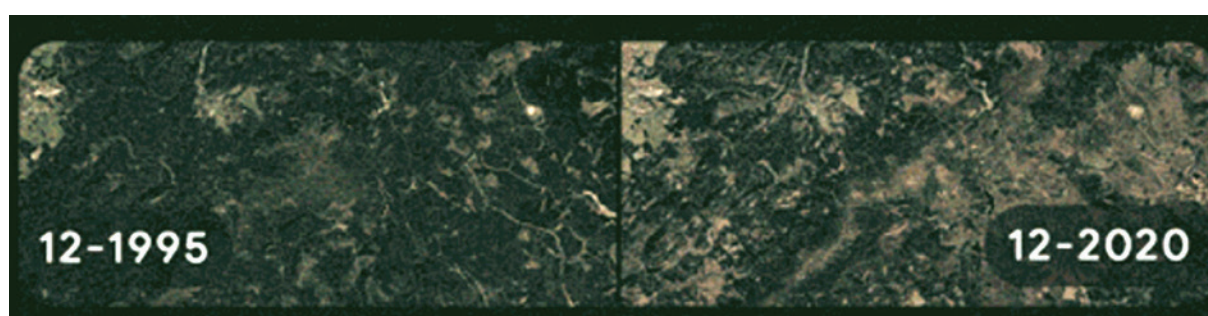


Figure 4. Google Earth Day’s doodle

In line with the previous analysis, it can be argued that this image does not modulate subjects, but rather *hyper-objects* (Morton 2015). However, such a claim might be considered unimportant in comparison to the visual rhetoric it implements—which the enunciative semiotic analysis of the previous images would have considered marginal.

This image clearly creates a narrative effect of emergence given by the *increasing plastic linearity*. The user can move the cursor over the horizontal plane to observe the gradual iconic transformation expressed in a non-neutral visual effect that highlights the excess, the density compared to more sober years—the 1990s—and can touch the imagination of the users using Google that day. In this case, it is not about the information of the data, but about its *substance*, its density and its respect for an old and nostalgic, almost romantic sobriety.

This is not the context in which we are dealing with scientific images: nor is it a scientific image, but a very rhetorical one with a precise discursive goal. It is ultimately an iconic representation of the thematic isotopy of data pollution. Although there are very few examples of discourses that focus strictly on “data pollution”, such a concept refers mainly to the pollution that results from “information overload”—in this context, we often speak of information *glut* (Shenk 2013) and information *diet* (Johnson 2012), referring not so much to the media as an organism, but to the living, biologically determined being and its embodied relationship to the device, which is nothing more than a window on the world, a heterotopic space that can also pose ecological problems.



## 5. Conclusions

This article aimed to be an exercise in applied semiotics, underpinning the various ways in which subjectivity can be modulated in data images.

However, it also opens up a perspective more devoted to the philosophical aspects. The hypothesis of a “realised” encyclopaedia—a container of digital traces and crumbs—reveals not only a set of socio-political problems, but also the risk which the discourses of contemporary digital culture increasingly express at the pragmatic level of computational enunciation.

On a meta-semantic level, Eco’s encyclopaedia itself—the paradoxical container of simultaneously virtual and real norms, customs, and patterns—becomes the object of a whole series of discourses and narratives (again, socio-political, but not only, also philosophical) that—if they are not only subversive (as in, when they are not merely subversive (as, for example, in the critique of gender stereotypes of language) take the form of attempts at collective consciousness-raising that are not so much interested in revealing the cultural determinations of the subject’s utterance as they are in the causes and consequences of a hypothetical “modulation mania”—a further development of the storage mania mentioned by Manovich—of which virtual reality is an explicit expression.

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# From archive to dataset. Visualizing the latency of big data

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## ABSTRACT

The objective of the proposal is to analyze what latent space is within a Deep-Learning system and how its visualization is capable of triggering a meaning-effect concerning the epistemology of big data. The latent space is the mathematical space that maps what a Neural Network has learned from the training dataset. It is the result of the compression of the input data and the step before the Neural Network's output, a step that usually remains invisible to the human eye, rendering effective the promise of a transparent effect of reality generally promoted by Artificial Intelligence technologies. Precisely in contrast with this promise, the visualization of this complex spatiality makes accessible, and therefore intelligible, the epistemic and rhetorical relations inscribed within datasets, intended as archives that gather information. To achieve my objective, I will consider an artistic project realized by multimedia artist and coder Jake Elwes, *Zizi-Queering the Dataset* (2019), a multi-channel video where different facial portraits are shown in a morphing loop that visualizes what a Generative Adversarial Network has learned from the re-training of a dataset containing portraits with another one containing facial images of drag and non-binary individuals. This artistic gesture has led to a series of epistemic issues concerning big data and their situated and ideological meaning.

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## 1. Queering art with artificial intelligence

*Zizi-Queering the Dataset*, by AI artist Jake Elwes,<sup>1</sup> is a multi-channel digital loop video first installed in 2019 as part of the exhibition *Preternatural*, curated by Drew Hemment within *Experiential AI*, an artistic event developed at *Edinburgh Futures Institute* in Scotland. In a visual continuity effect, through a smooth, gradual, and seamless transformation, during the video loop we witness the synthetic unfolding of a series of portraits reproducing artificial faces. The video is, in fact, visually and cognitively connotated through a deep understanding of what it means to be human in the times of Artificial Intelligence. An understanding that for Elwes has to embrace a strong commitment towards a cognition necessarily enacted in the framework of a queer<sup>2</sup> sensitivity.

*Zizi-Queering the Dataset* is part of the broader *The Zizi Project*, an ongoing series of artwork where Elwes deals with the intersection of the rhetoric of Artificial Intelligence systems—and specifically of Deep-Learning technologies—, the sociocultural aesthetic that performs gender identity, and the ideologies that are entwined with these two phenomena. The articulation of these issues is also at the core of these pages and functions as an analytical lens in the understanding of how the visualization of big collections of visual data can produce knowledge, and specifically, how it can account for an epistemological reading of computational data. The main aim of this paper is to utilize the analysis of the aforementioned piece of art as a tool for comprehending the epistemic perspectives underlying the computational visualization of a particular type of digital archive, the large corpora of digital images.

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<sup>1</sup> As we can read in their website: “Jake Elwes is a media artist living and working in London. They studied at The Slade School of Fine Art, UCL (2013-17). Recent works explore their research into machine learning and artificial intelligence. Their practice looks for poetry and narrative in the success and failures of these systems, while also investigating and questioning the code and ethics behind them. Their current works in the *Zizi Project* explore AI bias by queering datasets with drag performers which simultaneously demystify and subvert AI systems. Jake's work has been exhibited in museums and galleries internationally, including the ZKM, Karlsruhe, Germany; TANK Museum, Shanghai; Today Art Museum, Beijing; CyFest, Venice; Edinburgh Futures Institute, UK; Zab-ludowicz Collection, London; Frankfurter Kunstverein, Germany; New Contemporaries 2017, UK; Ars Electronica 2017, Austria; Victoria and Albert Museum, London; LABoral Centro, Spain; Nature Morte, Delhi, India; RMIT Gallery, Australia; Centre for the Future of Intelligence, UK and they have been featured on TV: ZDF Aspekte (Germany) and the BBC Arts (UK)” (<https://www.jakeelwes.com/about.html>).

<sup>2</sup> In the *New Dictionary of the History of Ideas* we can read: “Since the early 1990s, the term queer has been strategically taken up to signify a wide-ranging and unmethodical resistance to normative models of sex, gender, and sexuality. (...) The term queer is necessarily indeterminate, taking on different—and sometimes contradictory—meanings in different articulations. Sometimes queer is synonymous with lesbian and gay, for which it becomes a convenient shorthand. At other times, it refers to a generational or even fashion-led distinction between old-style lesbians and gays and new-style sexual outlaws. Yet again, it can signify a coalition of nonnormative sexual identities—most often conceptually rather than materially realized—which might include lesbian, gay, bisexual, and transgender people. In other deployments, queer denotes not an identity as such but the taking of a critical distance from the identity-based categories of modern sexuality—in particular a distance from the identity politics central to traditional understandings of the lesbian and gay communities” (Jagose 2005, p. 1980-1981).



These collections can be thought of as digital archives where data are gathered and shape the database of the collected images necessary for the training dataset of a Machine-Learning system. As in every archive, these large collections of data need to be situated in a “measurable and numerically-controlled space” (Dondero 2020: 101). Within *Zizi-Queering the Dataset* the space in question is the latent space, a virtual spatiality where what the Neural Networks used for the creation of the artwork have learned from the training datasets is archived. It is a mathematical spatial representation of synthetic data and its visualization, normally concealed to the human eye, can be useful for understanding how Artificial Intelligence produces meaningful effects.



Figure 1. stills from the video *Zizi-Queering the Dataset*

## 2. Queering AI with archives

The curatorial statement of the exhibition can be of help and may be interpreted as a first paratextual tool capable of framing the artwork, in its reference to the Merriam-Webster dictionary definition where the preternatural is described as: “that which exists outside of nature and exceeds what is natural or regular. It is the extraordinary, and inexplicable by ordinary means” (2019 w/p).<sup>3</sup> Exactly on the frontier between the ordinary and the extraordinary does *Zizi-Queering the Dataset* install its artistic proposal: the video makes visible the transparent nature through which Artificial Intelligence builds its rhetoric by rendering it intelligible, redeeming it from the inaccessibility with which the uninitiated normally deal. When mentioning the category of transparency, it is necessary to refer to the work of Louis Marin on visual enunciation (1994). For the French theorist, transparency is the representational quality that results from the process of concealing the material and codified character that shapes visual enunciation. Following this perspective, it is also possible to go a step further and consider that no image transparently argues itself in relation to the epistemic boundaries it involves: in visual enunciation, we also assist in the presentation of a representation (Dondero 2020). In order for the enunciation to take form, an image can manifest itself transitively—by representing something—and reflexively—by presenting a representation that reflects on its composition. In the same way, *Zizi-Queering the Dataset* reflects on the latent dimension of the “measurable and numerically-controlled space” by making it opaque, and visible. Thanks to this gesture of presenting a representation the training space where the dataset was fed, and which is normally concealed, is now visualized. This reification permits us to make our first analytical proposal: to consider the continuities of meaning that exist between archives, as collections of sociocultural data, and datasets, as empirical agglomerations of data archiving what an Artificial Intelligence knows. To probe deeper into this proposal, we will recur to a pragmatic understanding of archives within a semiotic perspective founded on a Peircean reading.

Since the last decade of the 20<sup>th</sup> Century, the production in relation to Archive Studies has increased exponentially, a growth that marks the feeling of an epoch. As reported by Patrizia Violi (2014) the archive can be studied both as an iconosphere, a shared repertoire of a local visual encyclopedia linked to a certain event; and, in the terms of Michel Foucault (1969), as a device of sayability, capable of generating new discursive forms and sociocultural practices. Every archive consists, in fact, of a certain accumulation of materials and requires a spatiality where these materials need to be stored and clustered for the embedding of memory and, therefore, of information.

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<sup>3</sup> The text is available here: <https://bit.ly/3tgO7dH>.

In semiotic terms, archiving implies re-enunciation through the use of a particular support that preserves data and rescues information from oblivion by becoming a memorandum. This re-enunciation, of course, has its limitations, so it requires a supplement which, in turn, is also mnemonic and informative because it proposes a technique for data collection and a technology for the annotation process. In previous research concerning the performativity of archives (Acebal, Guerri, Voto 2020), by applying the *Theory of Speech Acts* (Austin 1962, Searle 1969) and reviewing the Austinian concept of the “descriptive fallacy of language”, we have argued about the informational fallacy of the archive. At the same time it transparently archives, the archive also produces knowledge and has performative, and thus opaque and reflexive, consequences concerning what and how something is informed and remembered.<sup>4</sup>

Within this perspective, if we analyze an archive semiotically, by recovering the sign definition provided by Charles S. Peirce (C.P. 2.218)<sup>5</sup> it is possible to affirm that an archive, as a sign, is something which stands to somebody (a certain criterion that postulates the data to be remembered) for something (a concrete information forged in an experience or an artifact that operates as a mnemonic substitute) in some respect or capacity (according to a certain classification). By applying this semiotic perspective, the archive, intended as the large corpus of data that can be used within a Machine-Learning system, *makes sense* and produces knowledge when it organizes that computational criterion that removes the collected database from its amorphous storage, engaging it in a computational machine learning operation. This is why if we consider archives as the attempt to re-enunciate sociocultural data, we find parallels with data collection efforts in Machine-Learning.

From this viewpoint, it is possible to state that archives and Machine-Learning datasets can pursue common goals:

Recent fairness initiatives in the Machine-Learning community echo procedures and language already developed and used in archival and library communities (...) [such as] guidelines for how to label data; the collection and accessibility of private information; sharing datasets across platforms; critical reflections on diversity and inclusivity; theory of appraisal and selection (Jo & Gerbu 2020 w/p).

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<sup>4</sup> “In accordance with an informational, representational approach to language, all verbal statements are conceived, in a first approximation, as descriptions, registering an extra-discursive experience. Austin argues that certain statements, in certain circumstances, do not “register” the name of an object or a person, but rather “name” it—for example, at baptism—; they do not simply describe a social relationship between two subjects, but construct it by the very act of speech that involves them—for example, when a marriage takes place. In this perspective, the study of statements or discourses moves from “representational verification” to “the conditions of effectiveness” of those statements” (Acebal, Guerri, Voto 2020: 35-36).

<sup>5</sup> This is the definition as reported in the *Collected papers*: “A sign, or representamen, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant of the first sign. The sign stands for something, its object. It stands for that object, not in all respects, but in reference to a sort of idea, which I have sometimes called the ground of the representation” (C.P. 2.218).

Nevertheless, at the same time, archives and Machine-Learning datasets are traversed by differential characteristics due to the phenomenal and epistemic distance that can exist between the curatorial practice within an archive (Cáceres Barbosa and Voto 2021) and the minimally supervised labeling within Machine-Learning. This is why nowadays, considering the epistemic boundaries of the archives with which Artificial Intelligence is fed means laying the groundwork for the design of a more egalitarian future, where representativeness in data becomes a right to which everyone has access.

### 3. Queering AI art with epistemology

The series of video portraits that compose *Zizi-Queering the Dataset* is shown through the visual effect of facial morphing<sup>6</sup> as the result of a particular training of a Deep-Learning system.

Thanks to this artistic gesture the work of art helps us to understand the main hypothesis underlying these pages: the firm belief that all the diverse technologies that engender visibility have a differential meaning-effect on the epistemic reason of the engendered visual artifacts. Stressing deeper our hypothesis, we can affirm that in those artefacts where gender divide is assumed as a visual factum the transparent quality of the enunciation conceals the material and situated conventions that regulate such representations. These conventions, in a historical and highly codified genre such as portrait, are based upon determined and measurable gender features that have been normed through the perspective of disciplines such as eugenics and anthropometry. As affirmed by Wendy Chun: “the links between eugenics and recent studies on facial recognition technology are not only topical or aspirational, but also methodological” (2021: 194). In this regard, the rhetoric transparency that, throughout centuries, has made the gender divide as a biometrical and thus quantitative and verifiable fact (alike the relation of jaws to cheeks, the prominence of Adam’s apple, the relation of nose width to eyes, and relation of forehead to hairline, etc.) also shaped the conventions of biological phenotype scientific representations, as we will see in greater detail in the next section. This prescriptive and normative legacy still reaps its bitter fruits today through the features regulating automated recognition systems and database collections with which Deep Learning systems are fed. Challenging, or perhaps we should say, repairing this legacy *Zizi-Queering the Dataset* aims

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<sup>6</sup> When speaking about morphing we are referring to the visual digital effect, a visual strategy consisting in a gradual transformation between images that differ in shape.



at ungendering the computational facial recognition parameters through the visualization of the latency that made binary gender divide as a visual factum. Through its visual strategy, the work of art makes the computational process on the determined and measurable designed facial features tangible and shareable. By visualizing the latent space, that is, by rendering visually intelligible the filtering, recomposing and compressing of the facial visual data gathered in the database, it makes opaque to the presentation of the gender representation, in the terms of Marin.

At this point, it seems necessary to provide a methodological clarification. While Artificial Intelligence, Machine-Learning, Deep-Learning or the Generative Adversarial Network may seem to be the same thing, they are not, although there is a deep connection among them. As far as this inquiry is concerned, the correlation we are looking for among these technologies is the question of the epistemic entanglements regarding the visualization of big data.

Today it is widely accepted that the disciplinary status of Artificial Intelligence dates back to the *Dartmouth Summer Research Project* in 1955,<sup>7</sup> when J. McCarthy (Dartmouth College), M. L. Minsky (Harvard University), N. Rochester (I.B.M. Corporation), and C.E. Shannon (Bell Telephone Laboratories) proposed a study of two months' duration: "to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it" ([1956] 2006: 12). Almost seventy years later, that simulative and descriptive promise seems to have failed to live up to the triumphant tones with which it was announced. Restricting ourselves to a computational vision we can say that nowadays, as far as the design of Artificial Intelligences that are capable of seeing and interpreting images is concerned, this defeat has been inflicted thanks to the hard blows dealt by the archive policies of data collections used as databases to feed technologies.

Building an Artificial Intelligence system always requires datasets that, in the words of Kate Crawford and Trevor Paglen: "Shape the epistemic boundaries governing how AI systems operate, and thus are an essential part of understanding socially significant questions about AI" (2019 w/p). This frontier is the epistemological discrimination between what will be archived and what will not, what will be labeled and what will not, determined by the selective criteria of classification that

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<sup>7</sup> However, the design and theoretical proposal for a machine that could replicate some traits of the human mind began to be advanced as early as 1949 with the text *Cybernetics: Or Control and Communication in the Animal and the Machine* by Norbert Wiener. According to the author, it was possible to find similarities between biological and artificial systems through the idea of feedback: a common phenomenon liable to establish a predictability subsumed by progressive mechanisms of hypothesis checking. In a true cultural zeitgeist, one year later, in 1950, a young Alan Turing wrote the essay *I.-Computing Machinery and Intelligence* hypothesizing the possibility of intelligent machines.

organize the archive. Furthermore, the epistemic stakes rise dramatically, as do the ethical repercussions in the design of human-computer interaction, when Artificial Intelligence is not programmed with logical correlations but is allowed to program by learning on its own as in Machine-Learning and Deep-Learning. Within these technologies, the artificial learning experience is trained on datasets that function as the empirical archived knowledge to which the system has access. Training consists, in fact, of parameterizing a function for input signals to produce the expected information at the output and, in the case of unexpected results, it will be the technology that has to adjust its outputs autonomously. Datasets are therefore fundamental for acquiring the competence and performance necessary for Machine-Learning since “the system cannot acquire knowledge beyond the data that it is fed, unless it comes a priori, encoded in the data itself or in the system” (Audry 2021 w/p), as we saw concerning the binary divide as a visual factum. Providing a description of the operation of Machine-Learning related to the epistemic component that its performance can nourish, we can say that when faced with a given task, it is the system that adjusts its model to improve performance on the dataset. The dataset, the model, and the training process are the components that allow the system to use the data through decisions by means of an evaluation function that measures skills and behaviours to permit the performance. In the case of Deep Learning, instead, considering it a sub-form of Machine Learning, in order to represent and interpret patterns present in the archived large collection of data, several interconnected layers of artificial neurons are used. In this regard:

Deep learning allows computational models that are composed of multiple processing layers to learn representations of data with multiple levels of abstraction. (...) Deep learning discovers intricate structures in large datasets by using the back-propagation algorithm to indicate how a machine should change its internal parameters that are used to compute the representation in each layer from the representation in the previous layer (LeCun *et al.* 2015: 436-9).

This technology can, in fact, be thought of as the latest progression of a technological strand that is based on the artificial stimulation of the mathematical models of neural networks present in the human brain. As we saw before, the interest in simulating human cognition through artificial models already originated in the 1950s but it was in the 1980s that it expanded further with Cognitive Sciences suggesting a focus on the more functional aspect of the human mind. This perspective marks a final epistemic paradigm shift, from the idea of the mind as software to that of the mind as hardware, a change not without ideological repercussions, as in the case of Generative Adversarial Networks. These are neural networks that produce data by working in pairs, with an adversarial agency. As described by its programmer, Ian Goodfellow:

It is a discriminative model that learns to determine whether a sample is from the model distribution or the data distribution. The generative model can be thought of as analogous to a team of counterfeiters, trying to produce fake currency and use it without detection, while the discriminative model is analogous to the police, trying to detect the counterfeit currency (2014: 1).

Even from this first description, the antagonistic character of this technology captures attention because it lays the groundwork for a semiotic reading capable of accounting for the ideological repercussions made manifest in the metaphor of the struggle between the forger and the connoisseur.<sup>8</sup> The battlefield for this struggle is precisely the latent space. Within Generative Adversarial Networks, the space of latency is the result of the concealed compression of the input data and the step before the Neural Network's output, a step that usually remains invisible to the human eye, maintaining the promise of a transparent effect of reality by Artificial Intelligence. It is: "the possibility space of creation, defining the coordinates of all possible outputs. Pure latent space is unconstrained and meaningless: it is an unlimited possibility. However, when a generative model is trained, it narrows the possibility space" (de Vries 2020: 2113).

Let's once more appeal to the curatorial text, where we can find another indication regarding the situated epistemology concerning the intersection between Artificial Intelligence aesthetics and the question of gender identity and its representativeness. As a metaphor for the Generative Adversarial Networks' functioning:

Drag is similarly a duel of a kind. It is a play between convention and transgression. Drag artists often magnify stereotypes and accentuate differences to the point at which the cocoon shatters and a butterfly emerges. Giffney (2004) defines queer as a "site of permanent becoming." Zizi makes this aspect of drag explicit, through autonomously generated faces that are fluid and never still. Here, the permanent becoming of a Generative Adversarial Network represents the fluidity, ambiguity and transition of drag artists" (Hemment 2019 w/p).

Semiotically speaking, the latent space is made up of differentially modalized data and, in this perspective, of different interrelated spatialities with which to distinguish the place of the enunciation from the enunciated place. It is the virtual space that maps the actual representation of data learned by a Generative Neural Network, making it real through the potential of the Deep-Learning system.

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<sup>8</sup> For these reflections I am grateful to Professor Massimo Leone and his intervention in the symposium "Digital Pinocchio. Face and Fake in Contemporary E-Technological Societies" organized at the *CY Advanced Studies, the Institut d'études avancées of CY Cergy Paris Université* in 2021.

To visualize the latent space in *Zizi-Queering the Dataset*, Elwes started by using a specific large collection of images, a dataset containing 70,000 photographic portraits of faces—precisely the Flickr-Faces-HQ Dataset<sup>9</sup>—and re-trained it with the addition of 1000 images of drag and non-binary portraits “scraped from various websites and social media profiles” (Hemment et al. 2022 w/p). It is in this re-training that we can recognize the effort to making visible the dialectics between the engendering technologies and the ungendering artistic gesture. The result of this dialectics causes, in the artwork, the output data to shift away from the visual normativity of facial images—the images contained in the large collection of visual data the neural network was originally trained on—into an aesthetic and epistemic morphing, beyond the expectation of what a real face should look like. This visual shift from regular—to recall the curatorial text—to extraordinary automated facial morphing is made intelligible through the emergence of the latency of the “measurable and numerically-controlled space” from where the visual enunciation can be installed by presenting the representation—recovering the perspective of Louis Marin (1994)—of the knowledge inscribed in facial big data.

#### 4. Queering AI art with portraits

Within an artistic perspective, *Zizi-Queering the Dataset* can be inscribed in a visual genre that has crossed Western Visual Culture for centuries, namely, the portrait and, in this regard, it presents its major characteristics. The video shows a series of portraits where: i. the relationship between the figure and the background is specifically designed, so that the background appears rather neutral to allow the figure to emerge; ii. the figure is positioned in the center of the frame and appears particularly compact in relation to the background; iii. the figure is portrayed through a plastic pose (Dondero 2020). But the work of art also reflects another characteristic that constituted the genre, that is, the consideration of the aesthetics and ideologies that cross visual culture. The video installation, in fact, makes manifest the lack of visibility of non-binary facial aesthetics within databases, prompting a profound dialogue between artificial and human intelligence and their visual rhetoric.

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<sup>9</sup> This is the description of the database as provided by the platform *GitHub*: “The dataset consists of 70,000 high-quality PNG images at 1024×1024 resolution and contains considerable variation in terms of age, ethnicity and image background. It also has good coverage of accessories such as eyeglasses, sunglasses, hats, etc. The images were crawled from Flickr, thus inheriting all the biases of that website, and automatically aligned and cropped using dlib. Only images under permissive licenses were collected. Various automatic filters were used to prune the set, and finally Amazon Mechanical Turk was used to remove the occasional statues, paintings, or photos of photos” (<https://github.com/NVlabs/ffhq-dataset>).



The visual culture of each historical epoch, with its aesthetics and biopolitical manipulation that allowed the visibility of certain faces and not others, has determined the rhetoric and pragmatic purpose of the visualization of the face, enabling also a reading performed on the base of a resemblance or tolerated on the grounds of an idealization (Leone 2019). In addition, the material dimension that has supported all the facial aesthetics and ideologies that cross visual culture must be taken into consideration. There has always been, in fact, meaning inherent to the design features that have regulated faciality and facial artifacts, properties configured internally, or attributed by individual uses and collective habits. And it is exactly on this threshold between textual (internal) and performative (external) meaning that the visual facial aporia between gender and genre is installed (Lamas 1999, Voto 2020). In this sense, it is possible to affirm that not only genre meshes but also material ones are pragmatic and performative, as they both establish programs of action, and therefore value systems, rhetoric, and ideologies. This aporia *makes sense* while, at the same time, establishing the existence of a codified grid by means of which it individualizes a common matrix, a framework of intelligibility and sense-making that reads and encodes faces, bodies, and identities.

Since its origin, and within a genealogical reading that embraces photographic and computational portraiture (Lee-Morrison 2019), photographic portraying has completely changed the genre aesthetics and visual ideologies concerning identity by both reproducing new subjectivities, such as working-class women and children in August Sander's works (1929), and enabling a double system of representation capable of functioning both honorifically and repressively:

Photography subverted the privileges inherent in portraiture, but without any more extensive leveling of social relationships, these privileges could be reconstructed on a new basis. That is, photography could be assigned a proper role within a new hierarchy of taste. Honorific conventions were thus able to proliferate downward. At the same time, photographic portraiture began to perform a role no painted portrait could have performed in the same thorough and rigorous fashion. This role derived, not from any honorific portrait tradition, but from the imperatives of medical and anatomical illustration. Thus, photography came to establish and delimit the terrain of the other, to define both the generalized look- the typology- and the contingent instance of deviance and social pathology (Sekula 1986: 6-7).

The photographic device, in fact, allowed a differential reading of the genre logic of portraiture through the promise of objectivity that the technical reproducibility allowed. This was guaranteed by its very materiality and through a discursive rhetoric suited to the requirements of the time: photography definitively sealed the reproduced image of the face as an objective illustration with scientific value.

If, therefore, we reflect on the affordances<sup>10</sup> of the photographed face and compare them with those of the face portrayed through the moving image, it is possible to carry out a dialectic dialogue between the two materialities. If the still image has often worked by scientifically assembling the type in the face, the moving image has sought the boundary between life and typology to cross. The video portrait, thanks to the camera and the montage technique, ushers in an escape of the type from the face through the performance of an occurrence, a facial token. In this regard, it is possible to affirm that video art inaugurates an ode to a facial present, a face that exists in the present tense, in the time of its own unfolding. An example of this tensive drive can already be found in the work of Bruce Nauman, at the dawn of the first experiments in video portraiture (Belting 2017). Nauman makes a series of videos entitled *Art Make Up* (1967) where we witness the progressive separation of the facial type from the face token and the metamorphosis of the face into a living mask, just as in *Making Faces* (1970), where it is possible to watch his face becoming, in a present tense, a mask. In this same perspective, *Zizi-Queering the Dataset* also presents a live making of a face but through a tensive, synthetic, and algorithmic morphogenesis. The hairstyles, cheekbones, noses—that is, all the facial phenomena that make up that paradigmatic unit we call face—are all generated by Artificial Intelligence and reproduced by the visual strategy of morphing. However, in stark contrast to a visual ideology that is more widespread today than ever before and which makes Artificial Intelligence a platform for the transparent enunciation of reality, Elwes and their *Zizi-Queering the Dataset* reminds us that data always have an origin in experience. In this regard, their visualization also depends on cognitive processes, technological logic and sociocultural conventions.

## 5. Queering AI art with visualization

In *Zizi-Queering the Dataset*, the visualization of the latent space through video portraits works as a diagram in the Peircean way. For Peirce, diagrams depend on conventions that, thanks to their iconic aspect, take form in relational patterns that do not refer phenomenally to the object they represent but to the relationality with which cognitive processes must interface (Paolucci 2010). We saw how, in the artistic gesture of visualizing the latency of Deep-Learning by the choice of the portrait genre, the epistemological boundaries of facial big data intersect with

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<sup>10</sup> Introduced by James Gibson (1979), the term refers to those properties that the materials themselves possess or which arise through enunciative practice.

the visual rhetoric that concerns gender/genre aporia. The intersection between the epistemic boundaries and the visual enunciation determines the acceptability and the representativeness of specific portraits in visual culture. In this regard, since the rhetorical function always has the effect of reifying discourses to move them away from utilitarian use (Group  $\mu$ , 1982), visualizing the latent space also means rendering intelligible “the latent uncertainties in big data archives [and] encompass[ing] the unknowns or unknowables that we are blind to” (Thylstrup et al. 2021: 316). Visualizing both facial big data and gender/genre rhetoric permits a diagram to emerge that drifts from a specific meaning production, previously built from the sexual binary division that ascribes specific pertinence and values to identity. The diagram that *Zizi-Queering the Dataset* allows us to visualize interfaces us with the gender identity-making configurations of meaning enacted through artifacts, practices, technologies (de Lauretis 1987), and data.

Although at a superficial glance it might seem so, data are neither abstract nor pure. There is no such thing as raw data either, but “it’s essential to ask questions about the social, cultural, historical, institutional, and material conditions under which that knowledge was produced, as well as about the identities of the people who created it” (D’Ignazio & Klein 2020: 152). They are not just data at all: they are rather *capta* (Drucker 2020), since they always have an origin in experience:

Differences in the etymological roots of the terms data and *capta* make the distinction between constructivist and realist approaches clear. *Capta* is “taken” actively while data is assumed to be a “given” able to be recorded and observed. From this distinction, a world of differences arises. Humanistic inquiry acknowledges the situated, partial, and constitutive character of knowledge production, the recognition that knowledge is constructed, taken, not simply given as a natural representation of pre-existing fact (2020, w/p).

And facial big data surely are situated in experiences that rearticulate specific forms of diagrams, and knowledge under construction, to be determined from time to time. Subjects and identities, in this regard, always emerge in a net of relations both intersubjectively and interobjectively. Nevertheless, today the culture of data visualization within the digital iconosphere seems to dangerously conceal the diagrams that shape data, encouraging the idea of user-independent knowledge while making the data manipulation disappear from the final visualization. Due to this general understanding, the life cycle of data is frequently concealed or directly ignored, leading to a lack of problematization that coincides with a false equivalence between phenomena, experience, data, and their display (Drucker 2020). This diagnosis of the present time of our visual culture, however, can be mitigated: a return to the epistemologies of big data visualization and works such as *Zizi-Queering the Dataset* certainly represent the cure we need.

## 6. Final (and situated) thoughts

Throughout these pages, the proposal to retrieve the archive category for dataset analysis has served as a starting point for the comparison between human and artificial intelligence regarding the knowledge gathered in a collection of data. Successively, we considered the different artificial intelligence systems we are confronted with in our digital iconosphere to frame the epistemic problems arising from the increasingly widespread presence of big visual data and, particularly, facial big data. Today, when the aesthetics of portraiture have to deal with automated and computational affordances for the interfacing of socio-cultural identity, reflecting on the epistemic dimension of big data by recovering the concept of the diagram as understood by Charles S. Peirce can help open up a series of questions on the future of the culture of data visualization.

In a society where the disembodied dimensions of identity (Gates 2011)—visual identity representations that circulate independently of physical bodies and are acknowledged through a disembodied form of visual perception—progressively acquire greater visibility and performance, being able to rethink the situated and uncertain dimension of data becomes a tool with which to imagine a more humane artificial intelligence. In our visual culture, where the entanglements between human and artificial agencies are progressively tighter, it seems necessary to understand the meaning-effects these technologies enact while giving form to latent ideologies in the creation of artifacts. We have seen how a reflection on the rhetoric of the visual enunciation within products designed with Artificial Intelligence systems can help us frame the problem concerning the ethical consequences of knowledge production within the era of ‘dataism’ (Harari 2016). It is in this age that the exhortation to “exploring and analyzing what is missing from a dataset (...) and interrogating a dataset’s validity—that is, the degree to which it can be said to represent the concept being analysed—” (D’Ignazio & Klein 2020: 160) is absolutely necessary. For this reason, we chose to analyze a work of art such as *Zizi—Queering the Dataset* because the reflexivity guaranteed by the gesture of visualization of the latent space is capable of making us contemplate more egalitarian future uses of facial big data toward increasing fairness awareness concerning the collection of big corpora of data.

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# The traces left by the information designer

## Data visualization and enunciation

punctum.gr

BY: Valeria Burgio

### ABSTRACT

A common understanding considers information design to be a clear and immediate transfer of information, in which the author disappears to make the data emerge with utmost clarity. This idea of infographics as a transparent and objective medium is questioned by several scholars and practitioners who consider visualization not just as a representation of numbers, but as an interpretative device. In this essay, we will review these positions, with special regard to the use of the semiotic concept of enunciation, which is also beginning to be used in critical design theory and digital humanities. This concept allows us to detect the traces of the act of enunciation in the visual artefact. In particular, we will deal with the recognition of visualization as an act of interpretation, the visual calibration and distancing from one's statement in journalism and scientific communication and the visual reference to the production process in graphic design.

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### Introduction

Rather than an emanation of the real, data depends on human responsibility for their collection and elaboration, embedded in different levels of mediation. Giving visibility to those levels of mediation, rather than diminish the credibility of the infographic language, can increase its reliability. The presence of elements that refer to something other than the information to be conveyed seems however to weaken the presumed efficacy of the information artifact, slowing down its reception. It is inevitable however, in any historical or current example of informational graphic design, to find elements that provide information other than the data that it channels: despite the

naturalization of languages that makes their styles and conventions invisible, every infographic communicates something, if not about its specific author, at least about the moment in history in which it was created, and the technology it relied on.<sup>1</sup> Data visualization therefore has yet another level above and beyond the simple conveyance of information, indicating that any form of communication is situated within a historical era and a social context. Furthermore, the very content channelled by every infographic is always the product of a complex translation process of selection, collection, re-elaboration and visualization of the data. The instance that collects, interprets and translates the data is sometimes required to hide behind the artifact, showing data that seems to naturally emerge out of the phenomenon being communicated.<sup>2</sup> On other occasions, this instance declares its presence, visually illustrating its relationship with knowledge and in particular with the object of its representation. This can occur in journalism in particular when, acknowledging the impossibility of providing certain and verifiable information, the professional elaborates the visual tools that allow them to take some distance from the information. This calibration of collected data is occurring with increasing frequency in scientific communication, when a definitive agreement on precise results has not yet been achieved. In other cases, the author makes their presence explicit, leaving visible traces that make their work comparable to more exquisitely artistic practices. This is the case of what is known as a “data artist”, whose personal style must be evident in their visual production. Critical design theory suggests that anyone conducting research with digital means in the field of literary and artistic heritage should always visually elaborate their function as interpreters with a certain point of view, and their specific interests and goals. The critical design that chose this direction,<sup>3</sup> based on studies of literary criticism, rummaged through the drawers of semiotic tools, finding concepts that served to elaborate a theory that questions the simplistic view of communication as the transmission of information and the naïve faith in the heuristic capabilities of data mining.<sup>4</sup> There is thus evidence of a growing interest in the concept of enunciation, borrowed from Benveniste (1966) and applied to visual artifacts that are apparently neutral and objective. The semiotic concept of enunciation

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<sup>1</sup> Technically, also the convocation of a reference to a source is something that distracts from the message and refers to the production process. Nevertheless, the presence of a number of responsible *personas* is always considered as a sign of reliability. It's part of the fifth fundamental principle of analytical design for Edward Tufte: “Provide a detailed title, indicate the authors and sponsors, document the data sources...” (Tufte 2006: 133). On the centrality of reference to the sources in the practice of visual journalism, see also Kennedy et al. 2020.

<sup>2</sup> Also in this case, however, an analyst can reconstruct an enunciative praxis as evidence against the apparent neutrality of the information design artifact. See Pignier 2020.

<sup>3</sup> I refer in particular to Drucker 2011, Gitelman 2013 and Loukissas 2019, as we will see in the next paragraphs.

<sup>4</sup> Though much water has flown under the bridge since Chris Anderson's famous “end of theory” and his claim “correlation is enough” (2008), a certain anti-interpretative attitude remains in the ideology of “dataism” (see the critics to dataism by Van Dijck 2014).

thereby acquires pragmatic and not just analytical value, influencing designers to develop graphic artifacts that incorporate their hand and their point of view. Semiotics has thus been recognized the power of providing adequate analytical and even practical tools in constructing critical visual forms for data communication.

## 1. Transparency and efficacy in information design

Information design is a field at the intersection of design, statistics and computer science, that deals with the elaboration of strategies to convey a message in the clearest and most effective way possible.<sup>5</sup> It has quantitative roots, and a more cognitive-perceptive than semiotic orientation. This discipline's approach is rational and functional. It seeks to define design principles that ensure the optimization of data transmission, conducting empirical research on the effects, such as measuring the effectiveness of the communication in terms of response and comprehension times. The fathers of this "perceptual cognitive-based school of thought" in the world of data visualization (Brasseur 2003: 4) are considered to be the French geographer Jacques Bertin, who worked at the *École Pratique des Hautes Études in Paris* in the 1960s, and the American theoretician and statistician Edward Tufte. In 1967, Jacques Bertin published a work that became a fundamental reference for graphic designers more than for semiologists, titled *Sémiologie Graphique*, an attempt to produce a universal graphic dictionary for infographics and thematic cartography, in which the relationship between expression and content—between the visualization and the data—would be definitively codified in a monosemic system that everyone could use. The book took to the extreme a kind of structural thinking that sought the fundamental elements of every language, basic and unchanging. It offered a highly formalized and codified overview of the languages of infographics and suggested a pragmatic approach that prioritized the efficacy of communication, based on reducing the timeframes for observing and understanding the visual artifact. Like mathematical formulas, the graphics were supposed to have no ambiguity, and univocally and a priori associated to each element of the signifier (to each "variable": color, texture, shape, position on the space of the page) a single meaning, irrevocably established by the legend.

Some decades later, Tufte laid the disciplinary foundations of infographics, seeking out its pioneers in the history of visual communication, and accurately assessing the qualities that the proper communication of information should have: "clarity, precision and efficacy" (Tufte 2001: 13). Tufte's aesthetics thus rested upon ethics: when

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<sup>5</sup> As many have noted, it is difficult to pinpoint the origin of this field. Kinross (2004) traces it to the NATO conference on Visual Presentation of Information in 1978, and in the founding of the Information Design Journal in 1979.

visually communicating information, all forms of distortion must be avoided in order to guarantee the “visual integrity” (Tufte 2001: 53) of the data. What was to be avoided at all costs was distracting attention from the data (and thus the facts) with the decorative forms of illustration that often accompanied them, or manipulating and distorting the data by using non-homogeneous scales. This would lead to the alteration of the information and to the spread of fake news in scientific information and in journalism. The absence of noise in the communication channel would be guaranteed by the transparency of the communicative artefact, the highest ambition of which, like the famous crystal goblet effectively evoked by Beatrice Warde with regard to typography, would be to disappear in order to highlight the colours, the consistency and the scent of the content.<sup>6</sup> The theory of communication on which the above-mentioned approaches were based was the functional mathematical model developed by Claude Elwood Shannon and Warren Weaver (1949), the purpose of which was to ensure the complete transmission of a message from a sender to a receiver. Though the fame of Bertin and Tufte is based on the pragmatic usability of their works, their approaches are far more complex than they seem. Tufte, a scholar with a very open and curious mind, sustains that a good graphic must not only be effective in communicating, it must also be able to tell a compelling story and condense it in a small space: not coincidentally, the canon of good infographics in his opinion lay in a 1869 lithograph by Charles Joseph Minard, a French civil engineer, which represents Napoleon’s Russia campaign. This was a work of thematic cartography turned into a narrative tool, a starting point to tell a story. Tufte considered it “the best statistical graphic ever drawn” (Tufte 2001:40), following in the wake of Étienne Jules Marey who before him had appreciated the work for its capacity to “defy the pen of the historian in its brutal eloquence” (Marey 1878: 73). Therefore, despite the functionalist interpretation by some graphic practitioners of the rules set out by Tufte, the American theoretician is well aware of the rhetorical power and narrative effectiveness of the best information graphics.<sup>7</sup>

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<sup>6</sup> The text by Beatrice Warde (1955) lies at the origin of the modernist myth which sustains that typography should be invisible in order to bring out the fullest meaning of the text. Over time this approach has been reinterpreted and criticised, underlining how typography has always been a discourse about the text and not a mere container. For a historical analysis of this dialectic, Kinross 2004. For a criticism of the concept of transparency and neutrality in graphic communication and its relation to the spirit of the times, Lussu et al. 2006, Kinross 2018, Polano 2006, Manchia 2020.

<sup>7</sup> Starting with Gui Bonsiepe, many design theoreticians have insisted on the fact that information design can never be separated from design for persuasion. Even informative texts persuade, just as advertising texts inform. In his fundamental essay on the rhetoric of neutrality, Kinross (1989: 131) quotes Bonsiepe’s words: “Informative assertions are interlarded [*durchsetzt*] with rhetoric to a greater or lesser degree. Information without rhetoric is a pipedream which ends in the break-down of communication and total silence. ‘Pure’ information exists for the designer only in arid abstraction. As soon as he begins to give it concrete shape, to bring it within the range of experience, the process of rhetorical infiltration begins” (Bonsiepe 1965: 30). On rhetoric in information design, fundamental texts also include Buchanan 1985, Kostelnick and Hassett 2003; Kostelnick 2008.



Bertin, on the other hand, published his graphics in magazines such as *Paris Match* and knew perfectly well that his maps, embedded into the context of news reporting, served to support a thesis, even though they were presented in the form of impartial information. Furthermore, as Alex Campolo (2020) convincingly argues, Bertin's overall graphic production, the result of his collaboration with EHESS, reveals a much wider vision of diagrams. This stands in productive contradiction with the simplifying and reductive interpretation that was widely successful and influential among information designers, many of whom deduced an idea of semiology based on the system of one-to-one translation characteristic of Bertin's handbook.

In the ambitious project to establish a general and not exclusively linguistic discipline of semiotics through the methods of sign production, Umberto Eco, who was quite familiar with Bertin's book, included the languages of infographics in the macro-genre of formal mathematical languages, which aimed at optimizing information in geographical maps and other types of diagrams (Eco 1968: 400). As Eco later detailed, formal mathematical languages were founded on an arbitrary relationship between signifier and meaning, characterized by *ratio facilis*, and hence highly codified (Eco 1976: 298). The aspiration to monosemy and efficiency in communication stated in Bertin's handbook thus condemned the languages of data visualization to this type of rigid and strictly denotative attribution, from which any traces of authorship were banned.

## 2. Information visualization as a tool highlighting the knowable

The ethics, and consequent aesthetics, of transparency in data visualization therefore rest on the conviction that, for the message to be optimally received, the author of that message must disappear and be reduced to mere sender, removing all the traces of an enunciating subject. Johanna Drucker (2020) underscores how this communicative genre tends to make the interpretation work that gave shape to the data disappear in the final display. The image appears as a statement of fact, in which the interpretative dimension must be invisible. Rarely are images called upon to convey the processes of transformation—from the phenomenon to the data and from the data to their visualization. On the contrary, the images must make the greatest effort to hide the complex process of elaboration in order to appear more rigorous and reliable.

In fact, there is a process of double elaboration in data collection and visualization which includes at least two translation devices<sup>8</sup>: on the one hand, designers must

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<sup>8</sup> On investigation and scientific publication as a chain of translations, I suggest reading Bastide 1985 and the interesting reinterpretation of it by Manchia (2020) in light of the study of how Otto Neurath's Department of Transformation worked.

observe and collect data from a source of information; on the other, they must become “transformers” of data into a visual language and convey the message to an audience<sup>9</sup>. They must therefore, first become *observers*, when receiving information about a phenomenon through a further *informer*—that is a source. Then, they themselves must become *informers* when conveying the data they have elaborated and visualized to other observers.<sup>10</sup> As actors, information designers, data and visual journalists and scientific popularizers all share this co-presence of the two roles of informer and observer,<sup>11</sup> as they can either work as a team or gather all the skills within a single person to effectively communicate the facts and phenomena they observe. In their work, data journalists must first find a database on which to base their research; second, they must analyze the data bearing a number of elements in mind: the sources must be reliable, the possible correlations plausible, the numbers normalized. Thirdly, they must build a narrative and make the data tangible in stories that clarify their meaning.<sup>12</sup> In the same way scientists, after examining an object of analysis and extrapolating the elements that are most significant for their research aims, must translate them into a technical language if their goal is to keep the message within their professional area, or into a language that can be understood by a wider audience if their purpose is popularization. Designers supplement these skills with their greater familiarity and wider and more refined stylistic repertoire for the visual elaboration of the message. The first phase in every information design job is therefore the collection of the data. Each designer builds the object of their observation on the basis of a question, an opening, an interest. There are in fact no sources that naturally provide information. No one “gives” data: on the contrary, people take it, collect it. Data is the result of an extraction from a mine of indistinct possibilities. We would do better, wrote Bruno Latour, to call it *sublata* instead of *data*, meaning, according to his own translation, “achievements” (Latour: 1999: 42), the goal of a voluntary act of research and extraction.

According to this constructivist approach to epistemology, based on a hermeneutic tradition and largely followed by contemporary critical design, data are therefore

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<sup>9</sup> On the fundamental role of the graphic designer as a “transformer”, Otto Neurath wrote memorable pages (1933). He considered this role to be that of a person entrusted with the delicate role of “inventing figurative formations, schemes, appropriate iconic units and metaphors that are pertinent to the content” (Anceschi 2006:62). See also Neurath and Kinross 2009.

<sup>10</sup> In semiotic literature, *informer* and *observer* are two cognitive subjects (not necessarily anthropomorphic) that occupy different positions in the mediation and in the dissemination of knowledge. For a study of the relationships between the two instances of the journalistic discourse read Lorusso and Violi 2004 and Marrone 2022, in particular the paragraph dedicated to “Strategies of Knowledge” (71-75). The inter-definition of the two terms may be found in the entries “Knowing (or Knowledge)”, “Informant” and “Observer” in Greimas and Courtès 1979.

<sup>11</sup> Our case studies include journalists who elaborate information graphically—one famous example is Alberto Cairo who is not only a journalist and a designer, but the author of seminal books on data visualization—and scientists who create memorable graphics such as Ed Hawkins with his *Climate Spiral* which has been shared thousands of times and was even projected at the Opening Ceremony of the Rio Olympics in 2016 (Hawkins et al. 2019).

<sup>12</sup> For a practical and intelligent guide to all these phases in the work of a journalist, I suggest J. Gray et al. 2012.

not the ultimate atoms of knowledge, the bricks with which to build information. They are the result of a collection, a selection, and are grouped into categories, built, related. Data indeed are “cultural artefacts, tainted by their own historical and material contingencies” (Loukissas 2019: 182). If duly interrogated, they speak of their conditions of production and the social and technical context in which they are considered significant and rendered pertinent.<sup>13</sup> The very operation of selecting a datum in fact implies the attribution of meaningfulness, the marking of something that is significant with respect to something that isn’t. As Lisa Gitelman notes, “like *events* imagined and enunciated against the continuity of time, *data* are imagined and enunciated against the seamlessness of phenomena” (Gitelman and Jackson 2013: 3): they are discrete units, extracted from a flow of information conceived as a continuum.<sup>14</sup> As Gitelman points out, we can always attribute epistemic conditions to data that are very similar to those of the photograph: while on the one hand, we naively recognize the capacity of photography to be the “pencil of nature”, according to the famous definition by Henry Fox Talbot, on the other we must recognize that:

At the very least the photographic image is always framed, selected out of the pro-filmic experience in which the photographer stands, points, shoots. Data too need to be understood as framed and framing, understood, that is, according to the uses to which they are and can be put (Gitelman and Jackson 2013: 5).

Meaning that data are not generated as pure fragments of reality, but are signifiers at their origin, because a grid of meaning has been imposed on them. There is no such thing therefore as *raw data*, to quote the words of Geoffrey Bowker (2006: 194): data have always undergone some process of preparation and predisposition to being used, even before they are processed and served, and the very way that they are ordered and categorized is the result of contextual choices and decisions. For Johanna Drucker:

all expressions in human systems are constitutive, non-representational, and content models, forms of classification, taxonomy or information organization, embody ideology. Ontologies are ideologies, through and through, as naming, ordering, and parameterizing are interpretative acts that enact their view of knowledge, reality and experience and give it form (Drucker 2014: 178-179).

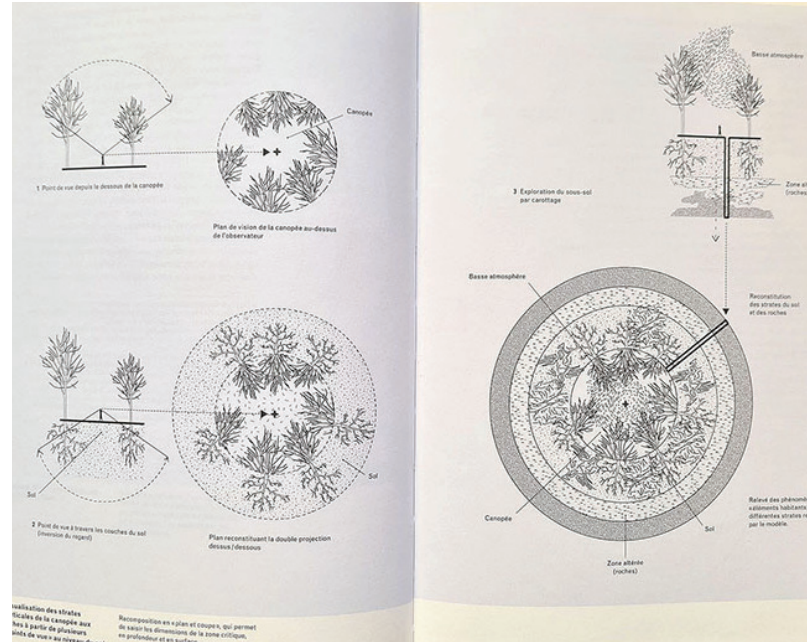
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<sup>13</sup> On this issue, in recent years, the field of digital data hermeneutics has been fighting against the more naive approach of data analysis, revealing technology and in particular AI not as an automated machine but (so far) as a device whose design is based on human interpretation. See Gerbaudo 2016; Romele et al. 2018.

<sup>14</sup> There is nothing new for a semiotician in this idea, given that the construction of signification itself is an extraction of relevances from a continuum. I refer obviously to Hjelmslev 1963. For the way in which practices dictate pertinences, see Prieto 1976.

It is a short step from this observation to a practical provision: the visualization must raise questions about the presumed transparency of the infographic communication and reveal these very systems that classify and order the existing. To collect and classify data is in itself a form of interpretation. Directing her considerations primarily to an audience of graphic designers, Drucker notes that there is a tendency in this profession to set aside one's critical conscience, no matter how strong it is, when it comes to working on data visualizations. They then become "unquestioned representations of 'what is'" (Drucker 2014: 125), in which the acquisition of the datum appears as a mechanical operation that erases critical distance. It is taken for granted that the relationship between the datum and the world is based on transparency and equivalency. The theoretician thus launches an appeal to make visualizations as little transparent and obvious as possible, and recommends manifesting their situated, partial and constitutive nature. Like Latour for the *sublata*, Drucker also suggests changing the word data and calling them *capta* instead, because they are not something conveyed by an impersonal instance to a passive observer, but something that is actively apprehended with an intention, an interest, a point of view, a subjectivity.

On the side of cartography, a critical approach to landscape (Aït-Touati et al. 2019) proposes to disrupt traditional visualization parameters and introduce new visual and therefore epistemic models through new ways of designing maps. Maps must thus be designed from a point of view that is living and mobile, related to other human and non-human perspectives: a "Point of Life" more than a point of view (Fig. 1). A new paradigm of vision emerges from the multiplication and deformation of the gaze: this opposes the immanence of a partial and multiple view, that can be rooted in the terrestrial soil in many ways, to the transcendent and totalising gaze embodied in the "view from above" of satellite photography (Haraway 1988: 590).



**Figure 1.** Inversion of the *point of view* (a *point de vue* becoming a *point de vie*) on the world as represented in the book *TerraForma* (Courtesy Société d'Objets Cartographiques. Source: Aït-Touati et al. 2019: 30–31).



### 3. Visualizing the act of interpretation

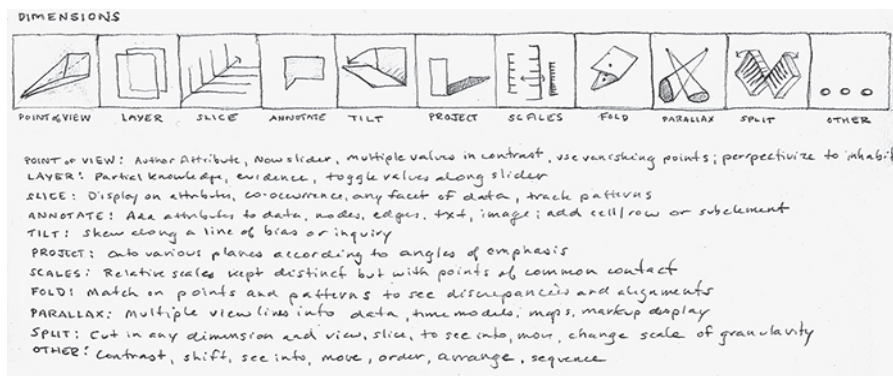
Visualizations should therefore contain and highlight the conditions under which they were produced. Drucker makes consistent use of a semiotic concept in her writings, at least since her studies of semantic typography in the early 1990s (Drucker 1994): enunciation. Drucker believes it is necessary to apply this concept to the infographic artefact as well. She in fact observes that:

In the 1970s and in the 1980s, the concepts of the *speaking* and *spoken* subject of enunciation were applied to film, visual arts, architecture and literary works in all genres and forms. But the artefacts and documents of information—charts, graphs, spread sheets, data formats and expressions—were only rarely, if ever, considered within this critical framework (Drucker 2020: 105).

Drucker expresses the hope that infographics might embody the point of view and the positionality of the subject, referring to forms that inscribe the subject in the representation such as perspective in painting and the point-of-view-shot in film, forms of framing of the real through the perceiving eye of the subject. She attributes the apparent neutrality and objectivity of these graphic expressions to the ideology of the empirical sciences, based on the use of the infographic medium as a mere vehicle, the purpose of which is to deliver information. It is important instead, writes Drucker, to activate a critical conscience that leads us to read infographics as rhetorical arguments given shape by the graphic conventions they use.

It would be worthwhile therefore, to disrupt the construction of the impression of “efficiency, sobriety and seriousness” (Kinross 1989: 384), typical of graphic minimalism and in particular of information design, by visually declaring the existence of an enunciating subject, situated in a specific historical, cultural and ideological place. For Drucker, this must be the starting point for the Digital Humanities, which cannot, by virtue of their original critical and interpretative approach, limit themselves to applying quantitative software such as n-gram to literary texts and historical and artistic archives. They must on the contrary find new expressions to give form to the properties of “ambiguity, nuance, inflection and complexity” (Drucker 2020: 111) characteristic of the humanities, and recognize the “partial, situated and historically / culturally specific acts of understanding that constitute interpretation” (Drucker 2020: 111). They must not entrust the quantitative analysis of data to the automatism of machines, but take action from the very start with a customized, partial and above all openly declared parametrization (Fig.2).





**Figure 2.** Johanna Drucker's sketches on the new interpretative dimensions that should be used in to the visualization of Digital Humanities' corpuses (Courtesy Johanna Drucker, 3DH Project 2016. Source: Drucker 2020: 168).

There is a substantial difference, according to Drucker, between “the task of representing ambiguity and uncertainty”, which may exist in scientific and statistic representations, and “using ambiguity and uncertainty as the basis on which a representation is constructed” (Drucker 2020: 66).<sup>15</sup> Drucker believes that every digital processing of literary and artistic texts—a task that is typical of the Digital Humanities—must from the very start elaborate an interpretative paradigm that is necessarily partial and situated. In the case of scientific communication on the other hand, even the degree of uncertainty of a statement must be submitted to shared objectivization strategies. It must itself be made quantifiable. This occurs, for example, in models of mathematical simulation which must indicate the degree of probability with which one thinks certain scenarios may come true.

In our opinion, actually, this kind of scientific visual construction—using the present as a subjective and situated starting point that triggers hypotheses of the future—belongs to a speculative domain more similar to humanistic formulas. As mathematical functions that are generated and used within the political and economic sphere, simulation models are open to speculative reasoning and lead to genuinely narrative tools such as scenarios, multidirectional forecasts of the future based on mathematical projection calculations.<sup>16</sup> Furthermore, the visualization of ambiguity and uncertainty in journalistic or scientific communication is in and of itself a form of enunciation that

<sup>15</sup> In the semiotic field, Polidoro (2018) traces a difference between a purely quantitative research—where data can emerge from a completely automated procedure—and a quali-quantitative research—where the interpretative nature of data construction must be recognized. Semiotics, seen as a method to approach digital humanities, belongs to this second field.

<sup>16</sup> For Drucker (2020: 49) “even highly speculative economic, climate or population models have not pushed the development of graphical methods that can fully serve to present their basic probabilistic premises (...). We need to develop an inventory of techniques for indicating, for instance, the distinction between what is known and what is projected, pronouncements linked to evidence and speculative rhetoric.” In my modest opinion, graphic devices such as fork graphs or future cones, while they are rough and easy-to-understand graphic representations, are effective in providing an understanding of the “if clause” and the unfurling of possible futures from a perspective rooted in the present. I have written about this topic in Burgio and Facchetti 2020.

roots the enunciator in the utterance and expresses their point of view, even though this point of view may be shared by a group of operators and the forms for representing uncertainty are often codified from the start. Representing the degree of certainty of a statement deforms the perceived quantitative datum and ties the observation of the scientist or designer to a specific circumstance of observation. The representation of uncertainty in the scientific sphere has an epistemic value that changes the inflection of the visualization, moving it from an indicative mode, which has the value of a statement, to a conditional mode, based on a hypothesis. The objectivity of scientific graphics, incidentally, is never a matter of being impersonal: that would undermine their reliability. The source of the data must always be indicated and the credibility of the information is based on the trust that is placed in the institution in question (Latour 2013). Whether the data has been collected by the journalists or designers themselves, or whether it has been conveyed by a different source, reporting one's distance from a definitive result is not only an indication of honesty and reliability, it is also a representation of the breadth of the horizon towards which the knowledge aims. Not just the diagrams themselves, but the noise in the diagrams as well and the connected visualization of uncertainty, indeed have heuristic value.<sup>17</sup>

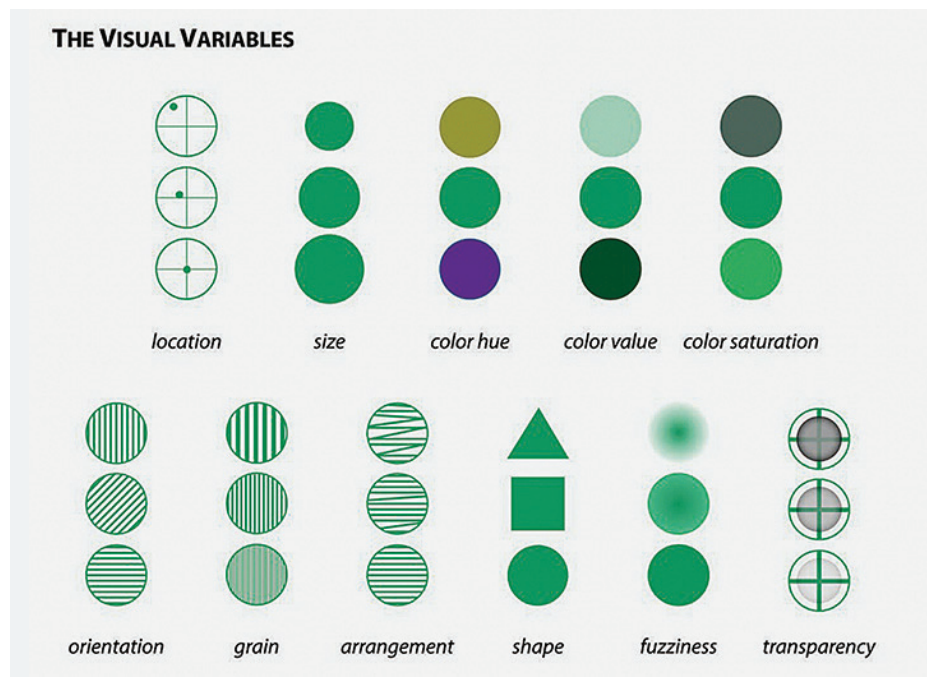
The phase of checking the data, which consists in testing the reliability of the sources and the correspondence between the data and the facts is of the utmost importance, to the point that, in the triad of qualities that a good visualization must possess, the journalist and professor Alberto Cairo places the word "honesty" above the quality that Tufte considered to be key: clarity (Cairo 2016: 13-16; Tufte 2001: 13). To be honest means providing a yardstick to assess the degree of certainty with which certain hypotheses are expressed, and explicitly expressing one's own relationship to the data.

There are various studies on the visualization of uncertainty in infographics, and above all, various attempts to codify it: American geographer Alan MacEachren (1992), convinced that the indication of uncertainty, together with accuracy, coherence and reliability, is a sign of quality, proposes to use further visual categories in addition to the variables that express quantitative variations, to indicate the degree to which one can assert that the data is certain, and to integrate them into the graphics themselves. He therefore proposes, as forms for codifying uncertainty, the use of visual variables that can be expressed in a scale of gradations: the saturation of the selected color, the degree of focus and resolution of the figure (Fig. 3). The degree of focus acts on the contours of the figures (*fuzziness* as opposed to the precision of the lines), erecting a curtain of fog between the analyst and the map. Low resolution, the result of rasterization, makes it hard to see the object. These plastic qualities (*fuzziness vs sharpness*)<sup>18</sup> lie on a continuum that ranges from maximum

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<sup>17</sup> About the heuristic value of noise, see Burgio 2021.

<sup>18</sup> Plastic qualities in a visual artifact are the variables related to their visual form regardless of their being recognizable as figures of the world: colors, shapes and place in the two-dimensional support are the principal ones. The foundational essay explaining the difference between plastic and figurative levels in a visual text is Greimas 1984.



**Figure 3.** Alan MacEachren's visual variables, some of them aimed to express degrees of uncertainty (Courtesy MacEachren and TVCG. Source: MacEachren et al. 2012: 2497).

transparency (in which the medium is invisible) to maximum opacity, through phases of murkiness and translucency in various forms of mediation of the visibility.

Fuzziness, reminiscent of fog, is a very effective metaphor: working on the classic stratification between vision and knowledge, it uses a blurring effect to indicate something that is uncertain and a focused effect for something that is certain. The blurring effect modalizes the observer in terms of will, it requires an additional semiotic effort and invites them, in this difficult perceptive acquisition, to think about the process involved in every act of knowledge, which is not the result of a sudden enlightenment but of a difficult process in which the mists dispel to make the object of investigation increasingly clear in the distance. The blurring therefore creates a tension in the observing subject on the cognitive level, it challenges them, creates that doubt that compels intellectual action in a dynamic march towards knowledge. The blurring therefore, with its dubitative nature, assigns the informer limited authority; at the same time, in calling the observer to help with the perceptive construction of the object, it accords them an integrative competence. To give the filter of mediation visibility by opacifying it is a statement of an enunciating presence that cements the relationship of trust and mutual support between two figures: the one that informs, partially, and the one that observes, myopically. The knowable, in its possible integrity, remains

in the background, and it is precisely in this possibility of increasing clarity that we find the substantial difference between the two approaches discussed in this essay: a constructivist approach to knowledge (endorsed by critical design studies), by which the point of view inevitably deforms and builds the knowable in its own image and likeness, and a functionalist pragmatic approach (endorsed mainly by professionals such as journalists and scientists) by which the *noumenon*—the ur-informer—exists, in the back and behind the curtain of fog, and it is the observer who must find the means to capture it and express it visually in an increasingly precise manner. In the meantime, however, one can always state one's specific point of departure and arrival and inscribe one's personal relationship to knowledge into the visual text.

#### 4. Enunciation in graphic design

The analysis of enunciation therefore makes it possible to study “the ways in which values, passions and ideologies are embodied within visual enunciations” (Dondero 2020: 16). Any visual enunciation thus connects an *assertion* (what is said) to an *assumption* (the appropriation of what is said by the subject).<sup>19</sup> The strategies we hinted at in the paragraph above indicate an assumption of limited responsibility on the part of the informing subjects, whose competence is cast in doubt by the incapacity to clearly see: they let you know (inform) but do not make you believe (do not persuade), inflecting certainty towards probability.<sup>20</sup> This assumption of limited responsibility is visualized by means of optical devices—deformation, distortion, blurring—which create a distance between the enunciator, their object of observation and the content they communicate. Exercising blurring or distortion in fact simulates the presence of an optical filter and thereby modulates a visual competence. These optical devices opacify a medium that traditionally bases its reliability on transparency,<sup>21</sup> and shift the spectator's attention to the information's elaboration process rather than the information itself.

Though it is nurtured by statistics and bases its essential aesthetics on analytical geometry, the infographic, as a visual artifact for mass communication, is a graphic design product. It therefore follows the evolution of this discipline, which originally had to do with the invention of a multiple artifact manufactured through processes of industrial

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<sup>19</sup> The analysis of the mechanism of engagement as a tie between an assertion and an assumption is fully explained in Fontanille 2003, in particular in chapter VI, and further examined by Dondero 2020.

<sup>20</sup> For Greimas and Courtès (1982), certainty and probability are complementary epistemic modes, which belong to the same graduated scale. On this issue, see also Greimas 1983: 116-118.

<sup>21</sup> The speculation on the presence of a reflective plane—presentation—that distances the spectator from the content of the visual artifact—representation—refers to the categories elaborated by Marin 2002.



production. Today, graphic design has adapted its practices to the processes of digital production, distribution and utilization. Because the realm of graphic design is dominated by series production, by definition it produces multiple artifacts.<sup>22</sup> To design thus means to evaluate in advance the forms of artifacts on bases that include production strategies, the material qualities of the supports and the forms of distribution.<sup>23</sup>

The digital image, produced with software and infinitely reproducible, is conceived to be a multiple—at least before the rise of NFTs. In digitally produced graphic design, all traces of the author and of the technology used may be read as staging a foundational memory. As in, for example, the visualization of the rough low-resolution grain of early desktop systems and the magnification of the bitmap (Lupton 2010: 29-30; Licko & Vanderlans 1989), or the fake soiling of the digital image by certain illustrators<sup>24</sup>; or the retro and vintage aesthetics that characterize contemporary graphics and fashion both. All these experiences seek to bring a fictitious material quality to images built entirely by computer. See for example the books sold with fake traces of wear and tear, such as S. by J.J. Abrams and Doug Dorst (2013)<sup>25</sup>: here the narrative device of the found manuscript leads to different graphic translations for the different levels of narration (Fig. 4).

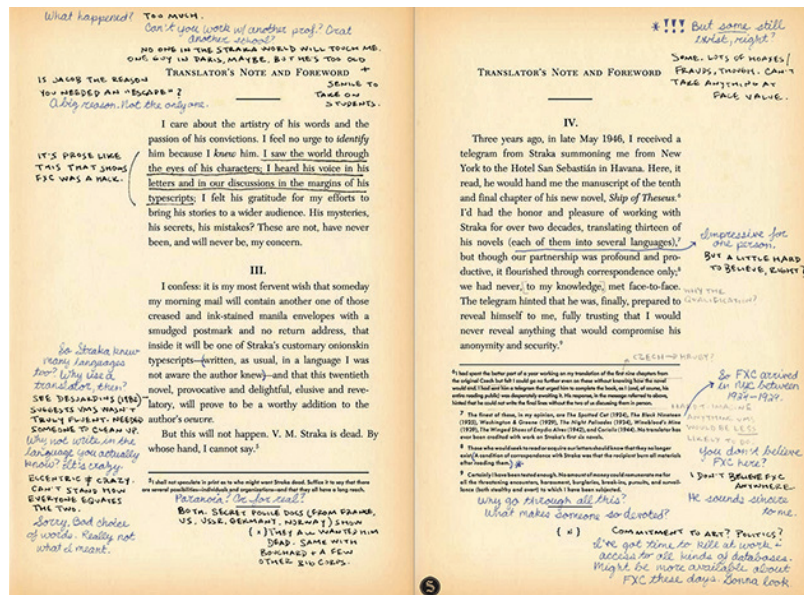


Figure 4. Internal page of the book S. featuring comments of two fictitious readers (Source Abrams and Dorst 2013).

<sup>22</sup> I have been asking myself, and this remains an open question, about the status of graphic design in relation to the opposition between autographic and allographic acts of artistic production (Goodman 1968). If the origin of graphic design is to be found in printmaking on the trails of Wassily Kandinsky (1947: 34; see also Falcinelli 2022: XXXIX), then a graphic artifact can be considered as “Two-stage and yet autographic. The etcher, for example, makes a plate from which impressions are then taken on paper. These prints are the end-products; and although they may differ appreciably from one another, all are the instances of the original work” (Goodman, 1968: 114). What if this first stage is only performed digitally and if the second stage only consists in circulating the internet?

<sup>23</sup> On design as thinking of a product endowed with a multiple existence, it is worth digging up the pioneering studies of Georg Simmel (1908) on the essence of applied arts. That the designer develops the object based on technological and productive parameters, and therefore connects the design and creativity to technological constraints, is clearly explained by Munari 1981. Also see the excellent introduction with an extensive array of examples by Falcinelli 2014. Unfortunately, neither of these two fundamental books has ever been translated into English.

<sup>24</sup> In digital illustration, an example can be found in Alessandro Gottardo (aka Shout), as mentioned by Falcinelli (2022:37).

<sup>25</sup> In this case, which would deserve its own study, the simulation of material traces has nothing to do with the presumed author of the book and his enunciated simulacrum, but with fictional readers who write another story through their comments



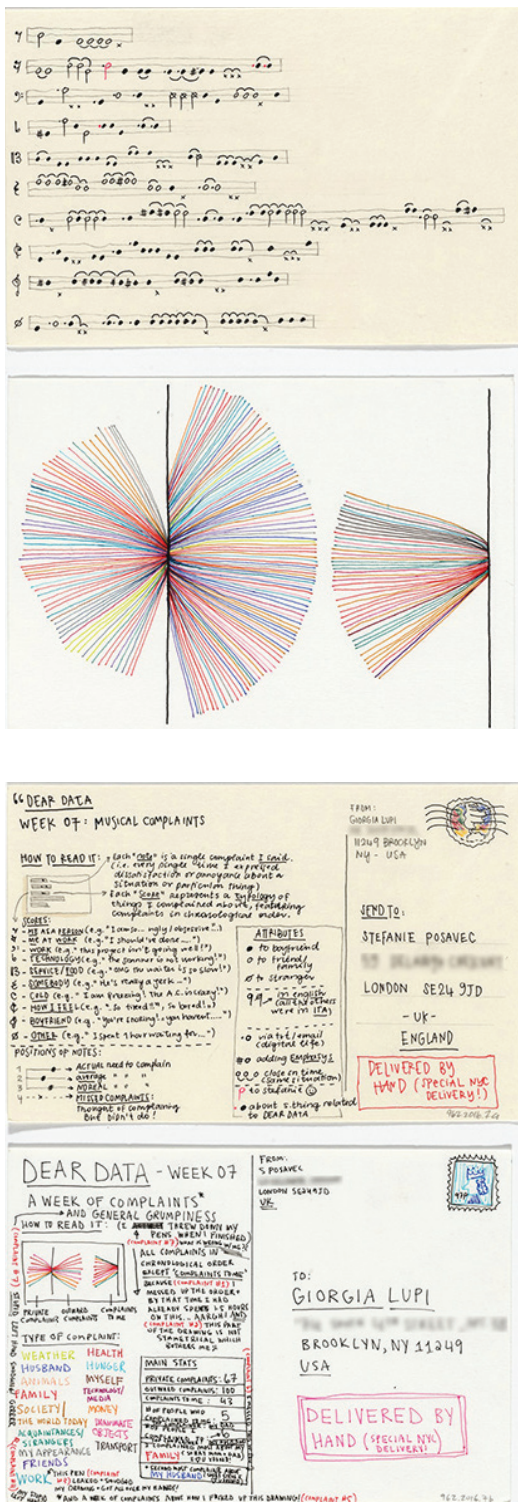


Figure 5. “A week of complaints”: handmade infographics (Courtesy: Giorgia Lupi e Stefanie Posavec. Source: Lupi and Posavec 2016: 37-38).

The presumed original text is printed, while the commentators’ text develops a second story written by hand in the notes on the margins. These are falsifications obtained by means of a fake autographic act, revealed to a reader who is a gratified accomplice to this act of falsification.

Another case is that of the digitization of drawings produced by hand: the postcards on which Giorgia Lupi and Stefanie Posavec (2016) sent each other data visualizations of their everyday activities, made handwriting a declaration of intent: erasures, reconsiderations, lines covered by postal stamps, smudges caused by writing with the left hand, excuses and lies serve to make the assertive presence of the subject visible: a tinted filter onto a reality that refuses to disappear into the presumed transparency of a medium (Fig. 5). The two authors reject a pre-established graphic language and time after time invent a new code that responds to the needs of the object they must represent. Furthermore, relying on handmade sketches rather than on digital drawings is a rejection of predetermined graphic forms and customizes their visual language, designating it for a single receiver and for a single phenomenon to represent. It was not until the postcards became the content of a book that they were digitised and became a serial product, leaving the original drawings to the authors, to collectors and museums.

There is therefore a fundamental difference, in the world of graphic production, between an analogical design that is digitally reproduced and a digital production that simulates analogical design.

In any case, the digital is never to be considered the reign of the immaterial, in which the act of production can only be simulated in a form of enunciated enunciation. If from the analysis of the support we shift our attention to the graphic practices, the digital image responds to a single and specific instance-making which has a specific subject, time and place. According again to Johanna Drucker (2020: 71-74), there is an autographic dimension not only in drawings by hand, but also in graphic work on the computer. This began with the invention of software as a sketchpad that was limited to mediating between the hand and the monitor, and transformed the gesture of writing into code. A reproducible code, which was rooted however in a unique and unreproducible gesture. A notation (allographic) derived from an inscription (autographic).

## 5. Conclusions

In this essay, we have tried to address the issue of enunciation in data visualization in several respects. First of all, we have considered data visualization, following in the footsteps of its best known theorists, as a form of expression characterized by a potentially univocal correspondence with the forms of the content, related to numerical or topological parameters, where the reference to an enunciative act disappears. Nevertheless, even in the first lithographic printing, it is still possible to recognize a “hand” and a style, as in William Playfair’s diagrams, products of the technological enthusiasm for reproducibility of the time, rich in reference to measurement devices and displays in the industrial field.<sup>26</sup> All filtered through a personal recognizable style, expressed in a certain palette of colors, a certain way of laying out the information on the pages, and a certain typeface.

We then addressed the inevitable interpretative dimension of any type of visualization. In particular, we have adopted Johanna Drucker’s theoretical view according to which it is inappropriate to use the classical quantitative methods of data mining and content analysis for the Digital Humanities. This leads to the invention of forms of visualization that are no longer based on traditional conventions such as the timeline or the bar chart. Rather they represent the deformation of the phenomenon through the gaze of the viewer. We also addressed the doubt as to whether every type of graphic has its own interpretative dimension, even those that belong to the hard or the social sciences—to which we broadly associate the field of journalism, domains in which the value of objectivity is key, but there is a growing debate that questions it.<sup>27</sup> Based on the ideal of transmitting reliable and trustworthy information, when faced with the impossibility of having perfect data, those professional

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<sup>26</sup> About the relationship between William Playfair’s visual style and the visual culture of his times, see Berkowitz 2018.

<sup>27</sup> Just to name a few, see Galison 2015 and Anderson 2018.

practices subdue visualization to incorporate the possible errors and the level of probability of their statements. At this point we sought the traces of enunciation—the ways in which the enunciator articulates and takes distance from the utterance—in the languages of infographic communication itself, reading how doubts and uncertainties can emerge in the assertions presented to the reader in visual forms (to add a disclaimer would be too easy). Semiotic tools have helped us recognize that uncertainty does not arise from the data OR from the visualization (as stated in Dasgupta, Chen and Kosara 2012, who distinguish a *physical uncertainty* in data space from a *perceptual uncertainty*), but from the relationship between the visualizer (the data journalist or the scientist) AND the data observed. This relationship of uncertainty can be integrated into the visualization itself. Moreover semiotics help to explain that the moral virtue of honesty and the quality of transparency belong to different levels of the communication exchange: the relationship of trust between the visualizer and the reader is based more on opacity than in a supposed transparency of the medium. From a visual semiotic point of view, indeed, transparency consists in the cancellation of the traces of production: whatever interferes between the viewer and the object observed is a layer of opacity that reminds us of the presence of the production instances and testifies to their quest for truthfulness.<sup>28</sup>

Giving visibility to the interpreter's presence is indeed a form of re-appropriation of the act of elaborating and visualizing data, in the face of the prevalence of automation and quantitative analysis. There are also visual means to express a "tone", an emotional modulation of the issue treated through a visualization, as well examined in Festi 2019.

Finally, we have widened our object of analysis situating data visualization in the field it belongs to, graphic design. We then looked for the traces of the production process in the different material affordances of analogical and digital media.

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<sup>28</sup> A different reading of the concept of "transparency" can be found in Kennedy et al. 2020. According to this approach, transparency is the ability show the backstage of news and data production as it is, without lying; from a semiotic approach, transparency is more an effect of sense than a direct expression of honesty: transparency denies the presence of a filter that is actually there. On this topic, I suggest reading Manchia 2017 and the reflections published as collections of essays in Lozano (ed.) 2013 and Albergamo (ed.) 2014.

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# Beyond immediacy and transparency. A semiotic approach to discursive and rhetorical strategies in media visualization and data visualization

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## ABSTRACT

**M**edia visualization based on big cultural data, as “visualization without reduction” (Manovich 2010) is supposed to make data immediately and completely available, in contrast to classic data visualization, which visually translates information by means of “graphical primitives.” On the other hand, from a pure functionalist point of view, also the visual form of diagrams, charts, and graphs, being fully proportional to the data values it conveys, is transparent with respect to its object (cf. Tufte 1990, 1997, 2001, and Card, Mackinlay, Shneiderman 1999).

In this paper we will try to consider both media visualization and data visualization (across several examples, including some Manovich’s and Accurat’s projects and *New York Times* graphics) as complex visual communication artifacts, not only from a purely informational point of view but from a semiotic point of view, by introducing a semiotic reflection on what we have proposed to call “discourse of data” (Manchia 2020a).

From our perspective, situated in the methodological framework of visual semiotics, and of the semiotics of scientific discourse, it might be interesting to pay attention to the whole process of constructing knowledge (and visual information) from data, understood as a chain of “devices of visualization” (Bastide 1985a, 1990 [1985b], 2001), investigating data as a channelled result, and also visualization strategies of specific—and oriented—discourses across data.

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In one of his more programmatically oriented essays, *What is visualization?* (2010), Manovich points out that media visualizations based on big cultural data, the huge media databases under his analysis, could more simply be called *direct visualization*. This is because visualizations of such large datasets would operate without mediation, presenting all visual data simultaneously and synoptically in a single visualization, a kind of image of images.

In a recent volume by the same author, which contains both *What is visualization?* and other cultural analytics essays, an effective portrait of his personal approach to visualizing big cultural data emerges. Such a portrait is set directly against information visualization, through the device of rhetorical questioning:

Can we explore and study collections of cultural media and records of cultural behaviors *without system of categories* that languages impose on reality? Can we *avoid the quantification, measurements, and summarization* that comes with the use of statistics? Can we study big cultural data *without using numbers?* (Manovich 2020: 11)

The answer to these questions is precisely direct visualization, described here as pure access to cultural data without the interposition of any linguistic or discursive, statistical, or quantitative mediation. In direct visualization, data would not be narrated, measured, or schematized. Data would be made immediately and completely available, *as they are*. A clear example of this way of proceeding is illustrated in the essay on the *Visualizing Vertov* project:

[...] we don't measure or count anything. Instead, we arrange the sampled frames from a film in a single high-resolution visualization in particular layouts. This use of visualization without measurements, counting, or adding annotations is the crucial aspect of my lab's approach for working with media data sets [...]. (Manovich 2013: 5)

In short, media (or direct) visualization seems to be a way of looking at images as a direct and immediate source of data. In media culture, data are the images themselves, and media visualization aims to make them accessible as they are to allow for subsequent operations, both quantitative and qualitative, on the totality of the images themselves. As in the case of the essay on *Visualizing Vertov* from which the quotation above is taken (and to which we will return later), media visualization generates "images of images" (Manchia 2014), which in turn can be the starting point for other images, for example, diagrams and derived pattern visualizations.

Dondero, who calls these types of visualization “mosaics” (Dondero 2016), later referred to “aggregates” of media visualization, from which “the observer can perform actions on the images, go back to the visualization’s source documents, and so on” (Dondero 2017: 211), shifting from one mode of existence to another. In this perspective, the set of original images is virtualized when a pattern between and across images emerges.

If, then, media visualization, due to its complex nature as an “image of images,” is a set of virtualities, from the point of view of an observer taking it as a starting point for subsequent investigation and interpretation paths, does it suffice to interpret it without presupposing any discursive mediation that structures it as a signifying object?

In other words, should such large datasets of images (such cultural Big Data) be considered only as a pure display of “a corpus as *artifacts*,” with the sole aim of representing “the structure by showing *all* the elements which constitute it”? (Dondero 2020: 103). Would such collections of images merely constitute a virtual system (and a non-text) from which to actualize specific visual texts?

In fact, the adoption of this point of view seems to overshadow that even the media objects of media visualization, before any further elaboration, can be considered a discursive construction. Likewise, as we shall see, it is also possible to investigate the discursive dimension also with respect to classical information design and data visualization.

That is why, from this theoretical perspective, we would like to introduce a semiotic reflection on what we have called “discourse of data” (Manchia 2020a).

Regarding data and information visualizations, it is possible on the one hand to consider both the dataset construction procedures and the definition of relevant information paths as rhetorical in themselves, as oriented to a specific argumentative purpose; on the other hand, it is possible to analyze the visual and communicative strategies used to construct, both from an informational and an expressive point of view, an image that is just as effective.

From this point of view, taking into account Bruno Latour’s reflections on the construction of scientific discourse, through a continuous dialogue with Greimas’s narrative semiotics, as well as considering both the semiotic reflection on the role of images in scientific discourse in the essential work of Françoise Bastide and Paolo Fabbri, and the methodological framework of the Greimasian visual semiotics, we propose the investigation, from a semiotic perspective, of both big data collections and data (or direct) visualizations based on them. That is, to bring attention to data, information, and its restitution by paying attention to the practices and strategies of putting data into discourse. Even in the case of the most seemingly simple and immediate data visualization we are always faced, from a semiotic point of view, with the production of a meaning-effect that we can try to investigate more closely.

## 1. Rhetoric of immediacy and rhetoric of transparency in media visualization and data visualization

First, it may be useful to point out that the definition of direct visualization as “visualization without reduction” actually places it in contrast with data visualization. It in fact works by reduction, that is, by translating information into a simplified visual form:

In my view, the practice of information visualization from its beginnings in the second part of the 18<sup>th</sup> century until today relied on two key principles. The first principle is reduction.

Infovis uses graphical primitives such as points, strait lines, curves, and simple geometric shapes to stand in for objects and relations between them—regardless of whether these are people, their social relations, stock prices, income of nations, unemployment statistics, or anything else. [...]

Do all [...] different visualization techniques have something in common besides reduction? They all use spatial variables (position, size, shape, and more recently curvature of lines and movement) to represent key differences in the data and reveal most important patterns and relations. This is the second (after reduction) core principle of infovis practice as it was practiced for 300 years—from the very first line graphs (1711), bar charts (1786) and pie charts (1801) to their ubiquity today in all graphing software such as Excel, Numbers, Google Docs, OpenOffice, etc. (Manovich 2010: 5-7)

Manovich summarizes in this way the fundamental coordinates for there to be, in his view, visualization, according to the meaning given to this term by classical information design. These are the use of spatial variables (position, size, shape) in the construction of a layout capable of best representing data and relationships between data, and the reduction to the minimum of the visual elements used (graphical primitives). Incidentally, a position not far from that of Jacques Bertin, author of *Sémiologie graphique* (1967), who almost forty years earlier had spoken of the relationship between content and expression, in information design, in terms of “transcription” by means of “visual variables.”

On the contrary, media visualization approaches data directly, without any diagrammatic mediation:

Rather than representing text, images, video or other media though new visual signs such as points or rectangles, media visualizations build new



representations out of the original media. Images remain images; text remains text. [...] In direct visualization, the data is reorganized into a new visual representation that preserves its original form. (Manovich 2010: 12)

As can be seen from these lines, diagrammatic mediation is radically opposed to the immediacy of direct visualization, both because it does not operate by reduction and because all data are immediately available. Access to data, in fact, is not mediated by any form of translation of logical relations by means of spatial relations (Peirce (1931-1935: 347 [4,348]) but occurs, we might say, by *ostension*: visual data are not returned through the interpretation of an expert, they are not synthesized by the position of points on a diagram but are simply made available “as they are.”

Instead, the functionalist vulgate of data and information visualization turns out to be centered on a rhetoric of transparency, based on just the kind of graphic-visual mediation that the cultural analytics proposal seeks to overcome. In this perspective, a diagram, a schema, an infographic, a data visualization are invisible objects in themselves, in the same way that good typography is, for Beatrice Warde (1930), as transparent as a crystal goblet, which is even more perfect the better it allows one to appreciate every nuance of the wine it contains.

In short, for classical statistics and information design (cf. Tufte 1990, 1997, 2001, and Card, Mackinlay, Shneiderman 1999) the visual form of diagrams, charts, and graphs, being fully proportional to the data it conveys, and regulated by specific encoding rules, cannot but be transparent with respect to its object.

Emblematic in this regard is the so-called “data-ink ratio” codified by Edward Tufte, among the leading theorists of information design: “Every bit of ink on a graphic requires a reason” (Tufte 1983: 96; see also 96-105 and 123-137). According to this principle, the amount of ink used for data display should always be strictly proportional to the amount of information conveyed.

Given these premises, and the features we have pointed out (in direct visualization, the so-called display of the totality of the data itself; in data visualization, the access to pure data through graphical transcription), the visual transposition of data by direct visualization and data visualization nevertheless seems to look, in both cases, at the model of an immediate restitution of data.

More specifically, both the rhetoric of direct visualization and that of data visualization, following the two different directions we have mentioned, are hinged on the proposal of a discourse that is as objective and referential as possible, in which the marks of presence of the enunciating subject are declaredly erased (direct visualization), or minimized to the point where they can be ignored (data visualization).

## 2. From invisible to visible: visualization as a translation process

It seems interesting to us, from a semiotic perspective, to rather look at the restitution of data and information in its specificity as a “syncretic manifestation of a tracing activity” that combines texts, data, images, and diagrams (Fabbri 2001: 14, translation ours). The reference here is to Françoise Bastide, a biologist and a semiologist, close to Latour but a fellow student of Greimas too, and her work on scientific discourse, which narratively traces the mechanisms presiding over the construction of the scientific text, including its “iconography” (Bastide 1990 [1985b]), from a perspective that we also feel crucial for thinking about the “discourse of data” (Manchia 2020a).

Diagrams, schemata, and visualizations are not in fact a direct product of the data they refer to, at least not as much as functionalist information design would seem to suggest. On the contrary, following Bastide (1985a, 1990 [1985b], 2001), it is the device of visualization specifically developed by the enunciator that constructs, by making it “visible”, its object.<sup>1</sup>

In particular, Bastide points to how in scientific texts very specific communicative strategies are at work. In more details, in scientific texts we are dealing with a particular type of enunciation that correlates an informative doing, which is always the dramatization of an action (the exposition of a laboratory result, the argumentation of a thesis) with a persuasive doing, where the enunciator presents himself as a witness to the real world and what happens in it, without speaking to assert his own identity (Bastide 1989 [1981]: 126-127).

In fact, every text, from a semiotic perspective, contains not only what it speaks about but, as if in a watermark, also its specific way of conveying and communicating its content—that is, it exhibits the traces of its production (of its enunciation). In this sense, any text, no matter how objective it pretends to be, can always be traced back to the communicative strategies put in place to construct this effect of immediacy or transparency.

Therefore, if the informative practice of the subject of scientific discourse is the construction of the referential level underlying every scientific discourse (see, in particular, Latour 1987, but also Latour, Woolgar 1986 [1979]), proper to its being both testimony and description of the so-called “real world,” it is equally important to remember, at the same time, the persuasive function intertwined with this action, and therefore to study the implicit instances of enunciation responsible for the credibility of the restitution of such “real.”

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<sup>1</sup> In Bastide 1990 [1985b] “dispositif de visualization” become “technique of visualization.” Here is translated as “device of visualization”, following Bastide’s Italian edition (Bastide 2001), as technical and discursive *dispositif* at the same time.

In Bastide's vision, however, visualization is not just a diagram or a series of diagrams, a microscope photograph, or a graph, nor is it just the visual output coming at the end of the scientific discourse production. Actually, the whole process of constructing the scientific fact is for Bastide the result of a narrative path that is to all intents and purposes a "technique of visualization" from an "invisible structure" to a "visible structure" (Bastide 1990 [1985b]: 190).

In more detail, the assignment of a visible structure (e.g. a graph accompanying an article on a new scientific discovery) to an invisible structure (the object of the scientific discovery as such) is only the final step of a much more complex process of *translation* (Bastide 1985a), in connection with the concept of *inscription* in science (Latour, Woolgar 1986 [1979]).

According to Bastide, such a translation process starts with the channeling of the scientific observation in a given direction, by identifying against the background of the so-called "nature" a scientific object detected and measured in the laboratory by an "Operating Subject", that is the researcher with his/her technical devices and filters (Bastide 1990 [1985b]: 190). This working object, which is therefore first and foremost an oriented collection of laboratory data, must then be translated again into a specific discourse in order to become an official "scientific object" within its scientific community of reference (Bastide 1985a).

In other words, between the so-called "natural element" and the final "object of knowledge" we need to hypothesize a dual process of visualization based on two different-but related-devices, i.e. the experimental conditions (laboratory technologies, working hypotheses, but also the application of categories of analysis and description) that enable the researcher to "see" his/her object, and the textual, verbal, visual and diagrammatic devices that enable the researcher to "make visible" his/her experimental results to the reader of the article.

For convenience, one can conceptualize the article as containing two distinct layers of text: the description of the experimental technique that enabled the results to be obtained, and the general framework of the problem of the structure of transfer RNA.<sup>2</sup> As long as it is not contested the two layers of the article form a whole that I will call a technique of visualization. I would like to stress one of the very general characteristics of the article; it is a matter of using experiment to make one see what is invisible. The whole article is a technique of visualization for the public, for the scientific community concerned; the experimental conditions concern a technique of visualization more limited to the researcher's own usage. (Bastide 1990 [1985b]: 188-189)

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<sup>2</sup> "To introduce my argument, I will take as an example a recent discussion in Nature concerning an accusation of fraud that was brought against an article thirteen years after the original publication. The article under allack describes the crystallization of a transfer RNA for valine extracted from yeast" (Bastide 1990 [1985b]: 187).

In this final stage of translation, images–photographs, tables, graphs, visualizations–play a key role, and it may be worthwhile to attempt an “iconography” of them (Bastide 1990 [1985b]), within the methodological framework of Greimasian visual semiotics (Greimas 1984; Floch 1985).

In our vision, Bastide’s position is thus doubly interesting when transposed from the scientific discourse to the “discourse of data.” On the one hand, it allows us to investigate how the so-called data become data, that is, through what procedures researchers construct datasets as starting points for their work, somehow narratively governing the standing out, in the discourse, of such information, through the affirmation of given categories of analysis to the detriment of others.

By quoting Johanna Drucker’s work on visualization and interpretation (2020), data can rather be considered as *capta*, that is, not as “preexisting entities” (as a fact of “nature”, Bastide would say), but as the captured result, that is “the products of a process of parameterization and modeling.”<sup>3</sup>

On the other hand, Bastide’s position invites us to analyze visualization (both media and data visualizations) not as an immediate presentation or a transparent transcription of data, but as a visual translation of a specific–and oriented–discourse across data.

In the next sections we will try to consider both media and data visualization as complex visual communication artifacts, not only from a purely informational point of view, but also from a semiotic point of view. In other words, we will try to reconstruct visualization devices and related discursive strategies related to both content organization and data display.

From a methodological point of view, the semiotic analyses in the next paragraphs will be at the intersection of narrative semiotics dealing with complex syncretic texts, including scientific and diagrammatic ones, and visual semiotics. Specifically, some examples of direct visualization, coordinated by Lev Manovich (*Visualizing Vertov* and *On Broadway*, section 3) and data visualization, from Accurat’s *The Room of Change* to *New York Times* visualizations of Covid-19 (section 4), will be analyzed.<sup>4</sup>

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<sup>3</sup> About design as translation activity see also Zingale (2016). Starting from a “problematic objectuality”, from which a design process starts (Zingale, 2012), the author suggests a translation model that connects a “briefing-text”, with content and data analysed and textualized, to an “artefact-text”, that is “content and data translated into an artefact” (Zingale 2016: 9-10).

<sup>4</sup> Regarding scientific and diagrammatic images from a semiotic perspective, see in particular Fabbri (1998a), (1998b), (2001), (2014), (2021), Stjernfelt (2007), and Dondero and Fontanille (2012). For an argued exploration of the field of visual semiotics see Mengoni (2021).



### 3. Images remain images? Discursive strategies in some examples of direct visualization

A representative case is the already mentioned *Visualizing Vertov* project, carried out by Lev Manovich and his research unit at the time (Software Studies Initiative, at New York University) focusing on the analysis of the work of Dziga Vertov. Among the methods used, alongside digital image processing software capable of measuring the visual properties of each frame of Vertov's films, was precisely direct visualization.

The goal of the project, published in 2013 in digital form on the research group's website, was to investigate, from the perspective of what is programmatically called *exploratory visualization*, the formal structures underlying Dziga Vertov's production.

Manovich decides to focus on the author known for his theory of *Kino-Eye*, of cinema as overcoming the human limits of vision. *Visualizing Vertov* is in fact an attempt to look inside the *Kino-Eye* but in reverse, peering into the workings of the gears that preside over filmic construction. This is possible, in particular, through visualizations of visual data extrapolated from frames and sequences that explore, in unprecedented ways, certain visual features of the films. This is the case with the image that collects, in a single glance, all the sequences of *The Eleventh Year*, represented by the second frame of each, and that shows the alternation in both the editing and the formal components of the sequences, such as the progressive rotation of face shots (fig. 1). Another



**Figure 1.** Lev Manovich, Software Studies, *Visualizing Vertov*, media visualization of each of 654 shots in *The Eleventh Year* (Dziga Vertov, 1928).

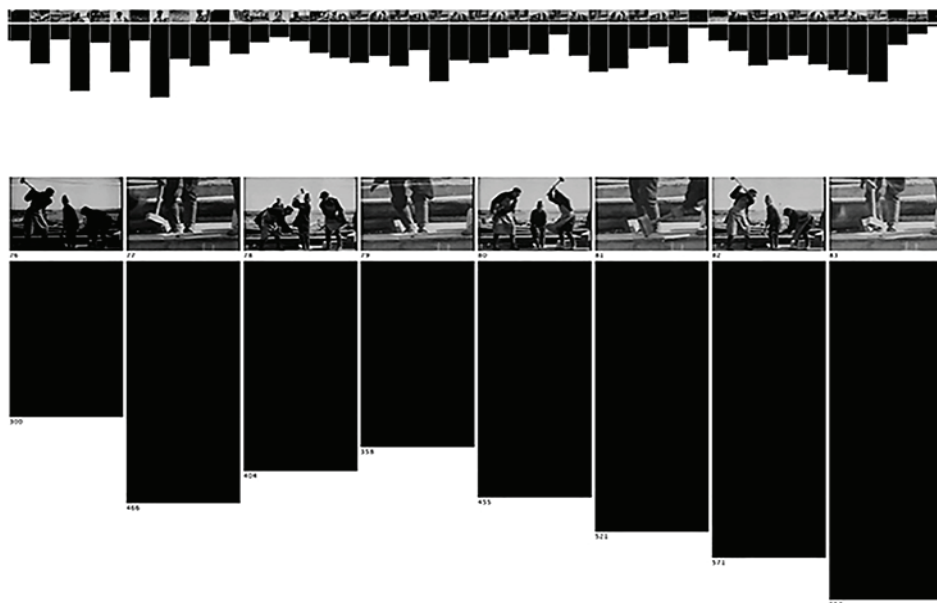




**Figure 2.** Lev Manovich, *Software Studies, Visualizing Vertov*, visualizations of movement in three shots from *Man with a Movie Camera* using frame averaging techniques.

visualization condenses several frames into a single frame to visually represent the amount of movement present in a sequence of *Man with a Movie Camera* (fig. 2).

A deeper exploration of *The Eleventh Year* and *Man with a Movie Camera* shows recurring patterns in the relationship between some visual qualities (light, amount of movement, change or stillness of elements in a sequence) and other parameters that derive from the director's stylistic choices (the duration of a scene, the structure of the montage). From the "mosaics" in media visualization thus derive diagrammatic visualizations such as the one in Figure 3, in which the bar chart seems to reflect the principles of gradualism and radical opposition dear to the montage theories of the time, through the rhythmic and abrupt visual changes between sequences.



**Figure 3.** Lev Manovich, *Software Studies, Visualizing Vertov*, average amount of visual change in every shot in *The Eleventh Year*. Each bar represents one shot. The length of a bar corresponds to the average amount of visual change in the shot.

An initial observation concerns the ways in which these and no other direct visualizations were constructed. In fact, as Manovich (2020) himself pointed out, direct visualization is not only a way to show all images in a collection in a single visualization. It is also the result of the skillful and organized management of the metadata describing the images and the information they carry—and it is always possible for researchers to add additional layers of analysis that can make the visual corpus seen in a specific way, leading to different direct visualization outputs. In fact, “media visualization offers a new way to work with such information,” where this information resides in the specific way the researcher looks at the images.<sup>5</sup>

A second observation is the quite peculiar argumentative strategy with which Manovich conducts his Vertovian investigation, reducing the text to a mere commentary on the visualizations, thus reversing the traditional structure of the academic paper with images accompanying the text.

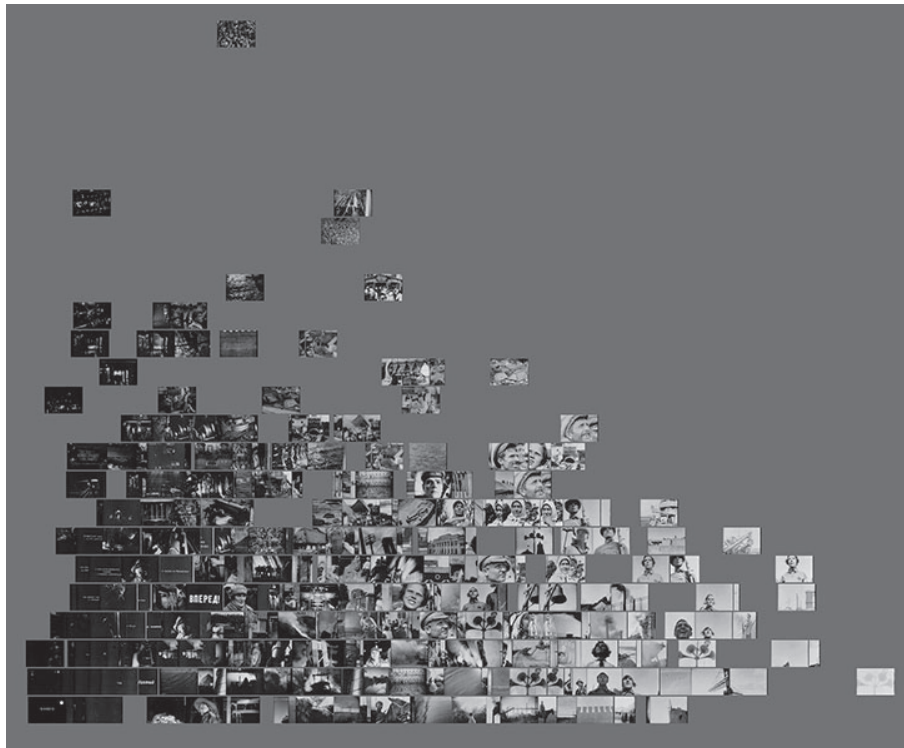
Third, the visual argumentation around Vertov lines up very different visualizations, from an initial general chart, showing the incidence of montage in 20th-century Russian film production, to visualizations that progressively go into detail about the director’s work, constituting a series with a “progressive focusing of attention” (Bastide 1990 [1985b]: 196) on the main details. The aim is for visualizations to first speak “from a ‘bird’s eye’ view of the cultural artifacts (hundreds of 20th century films) and to gradually move closer and closer—similar to how Google Earth allows you to start with the Earth view and then zoom in and eventually enter a street view” (Manovich 2013: 5). Derivative data visualizations serve to stylistically compare the two films considered more closely, within the corpus, by showing the difference, for example, in terms of the length of sequences and their distribution, between *The Eleventh Year* and *Man with a Movie Camera*, made up of short and not-so-short sequences, appropriately adjusted and alternated.

The reader is thus faced with the construction of an oriented path between media visualizations and data visualizations, derived from an earlier in-depth study of Vertovian themes, to highlight an underlying discursive structure. In other words, it is from the identification of the elements to be compared, the films *The Eleventh Year* and *Man with a Movie Camera*, as two poles of fundamental importance in Vertov’s work that the patterns the systematization of data helps to highlight gain prominence.

Considering what has been observed so far, the patterns that also emerge among the images are not just pure visual saliencies, but the result of skillful work

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<sup>5</sup> “As I already explained, media visualization exploits the presence of at least minimal metadata in a media collection, so it does not require the addition of new metadata about the individual media items. However, if we decide to add such metadata—for example, content tags we create via manual content analysis, labels for groups of similar images generated via automatic cluster analysis, automatically detected semantic concepts (such as objects, types of scenes, or photographic techniques used), face detection data, or visual features extracted with digital image processing—all this information can also be used in visualization” (Manovich 2020: 224).



**Figure 4.** Lev Manovich, *Software Studies*, *Visualizing Vertov*, visualization of *The Eleventh Year* showing second frame of every shot. The frames are sorted their visual properties. X-axis–mean (average) gray scale value of a frame. Y-axis–number of shapes in a frame.

in structuring the source material (Tziga Vertov’s films) according to specific directions of inquiry. A good example of this is *The Eleventh Year* visualization, with frames positioned on two dimensions according to their visual characteristics, their average gray scale values, and the number of shapes (Fig. 4). Manovich himself summarizes as follows the close relationship between media visualization and metadata and/or different combinations visual characteristics to use, “each creating a different ‘map’ of a film” (Manovich 2013: 26), even in a case like this where the source material, as it is for Vertov’s corpus, is eminently visual:

The portfolio of visualizations with commentaries below starts with three visualizations that plot the already familiar quantitative measure of films, i.e., shot lengths (1-3). It then moves to illustrate other possible strategies (4-9) using “media visualization” approach. To create media visualizations, sampled frames from a film are arranged by the software in different layouts using existing metadata (i.e., frame numbers, shot boundaries, manual annotations of shot content, etc.) and/or automatically created measurements of visual properties of images, shots and whole films. I don’t include any numerical

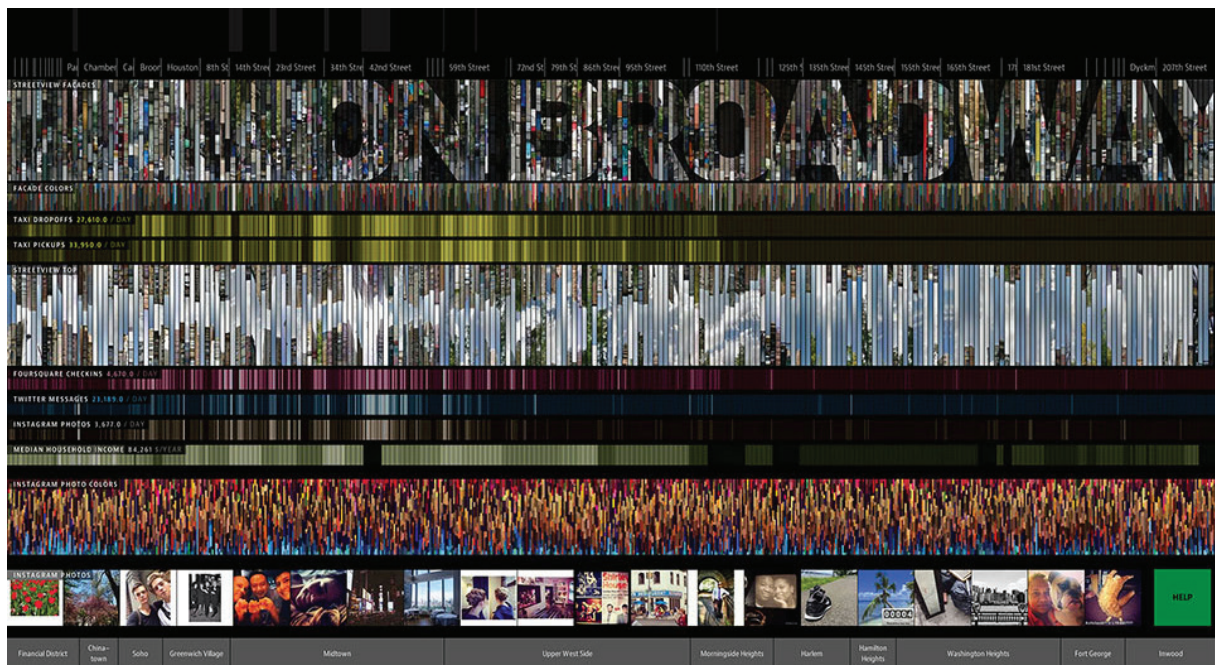


measurements of the films in my main analysis, in order to emphasize that visualization techniques can help to us explore films and identify patterns beyond mere statistics. (Manovich 2013: 15).

If media visualization can reveal patterns in the data, we could also say, at the same time, following Drucker (2020) and her approach to “modeling interpretation” that media visualization preliminary operations (selection of categories to be considered for analysis, of quantitative and qualitative dimensions to explore across the data) inform patterns.<sup>6</sup>

A second example of direct visualization is the interactive installation created for the New York Public Library by Manovich and his research group specifically as part of the exhibition “Public Eye: 175 Years of Sharing Photography” (December 2014-January 2016).

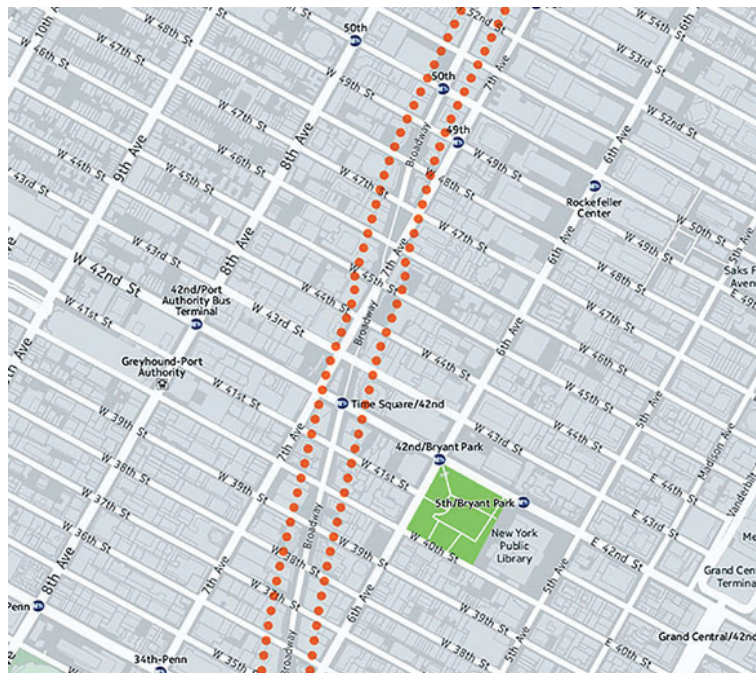
From the very beginning *On Broadway* was conceived in parallel with a web application (that is still available). The project as a whole was designed to map a specific portion of Manhattan, Broadway, in its entirety and over a period of time from 2009 to 2013, telling the story of both the area and the continuous and constant interaction of subjects (not only inhabitants, but also tourists or passers-by) with it (fig. 5).



**Figure 5.** Daniel Goddemeyer, Moritz Stefaner, Dominikus Baur, and Lev Manovich, *On Broadway*, the view of the complete 13 miles of Broadway in Manhattan.

<sup>6</sup> About data, and classification, see also Crawford (2021).





**Figure 6.** Daniel Goddemeyer, Moritz Stefaner, Dominikus Baur, and Lev Manovich, *On Broadway*, close-up showing the width of the area centered on Broadway used as data filter.

The project coordinates millions of data and thousands of images. Among the data fed into the project are photos shared on Instagram, posts with images from Twitter, images from Google Street View, Foursquare check-ins, cab ride data, and others. Data was collected extensively along Broadway, on both the left and right sides, and then channelled into multiple layers (the horizontal layers), each of which identifies a distinct survey category (Fig. 6).

Not all information is transposed in its entirety, via direct visualization: that is, of some datasets only a schematic graphical representation is provided, through diagrams or graphs of more or less classical layout, according to the rules of the most classic data visualization. Fully displayed, however, and in the true spirit of media visualization, are the images (visual data) collected in the field—and this is what we will focus on here.

We have already explored this example and in particular its restitution of data-images in the form of direct visualization, with a particular focus on the ways in which subjectivity effects are produced in texts such as these, informational and expressive at the same time, in which a complex articulation of semiotic forms coexists (Manchia 2020b).

Specifically, through the prism of Marin's (1983) reflection on the two possible polarities in cartographic representation, the modality of *narrative* and the modality of *description*, we emphasized how even in the immediate display of the images of *On Broadway* can be found the traces of an enunciational device at work in the visual levels of restitution of individual data.

In fact, the inclusion of the observer within the perspective from which the images originate is achieved not only through the interaction provided by the interface (the choice to actualize a single path of the many virtually possible), but also through the constant adoption of a bottom-up perspective in the so-called Streetview Top layer (the exact opposite of a zenith view, from above), which runs parallel to the Streetview Facades layer, the frontal images of the buildings along the street (in Fig. 7, see the first and second rows of photographic images, respectively).

In more detail, the first linear sequence of images (directly derived from the land point taken into consideration) of the facades of the Broadway buildings, in the Streetview Facades layer, has the effect of reproducing the continuity of the street facades in a way that recalls architectural elevation. The second linear sequence in the Streetview Top level, on the other hand, which runs parallel to the first, also welds to the Broadway elevation a kind of phantasmal skyline, since the images from the bottom upwards identify the height of the buildings as well, point by point, reconstructing for the user, by means of montage between the two levels, the overall experience of walking down Broadway.

While “images remain images” as they are collected at their respective points, according to the principles of media visualization, offering a virtuality of possible paths for the user to actualize, it seems more interesting to investigate how this set of images is constituted no longer as a set of pure virtualities but as a true signifying entity, even if not graspable in its totality.

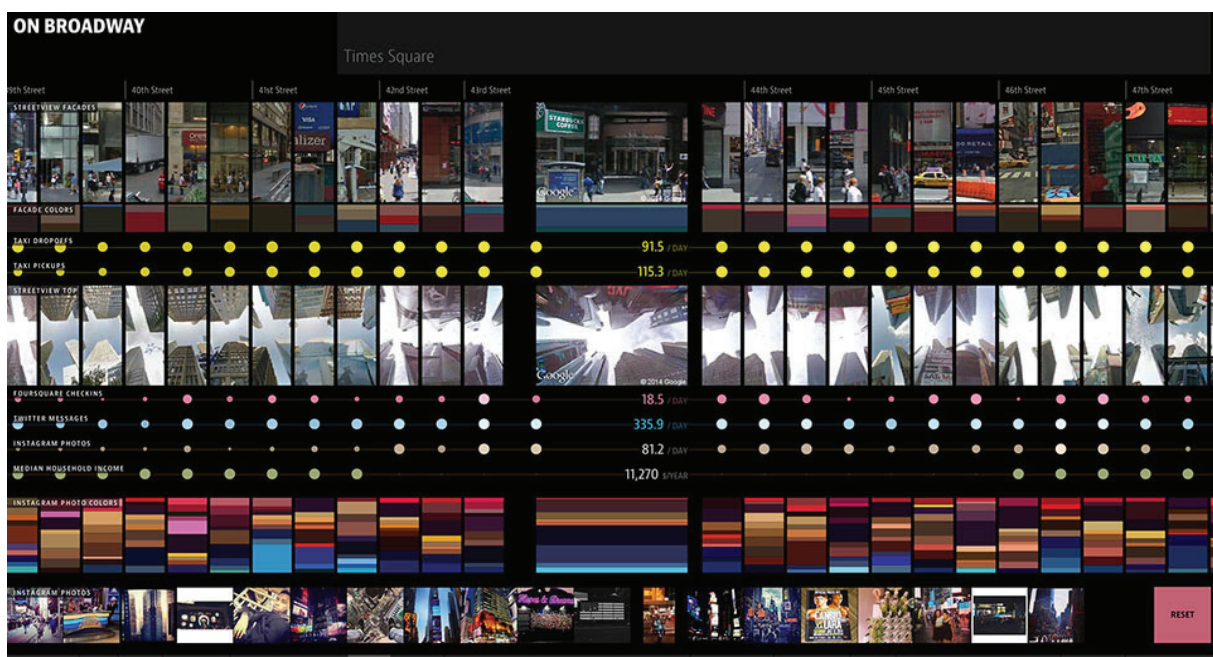


Figure 7. Daniel Goddemeyer, Moritz Stefaner, Dominikus Baur, and Lev Manovich, *On Broadway*, detail (Streetview Facades and Streetview Top).

If we consider it as the result of a series of selection filters and categorical procedures, thus as a cultural and semiotic construct, a collection of big data is in fact already in itself a real object, a text in its own right, precisely because it could not exist, even in the open form that it has, without the “reading grid” that has in fact structured it as such.

In the specific case of *On Broadway*, it is thanks to the capillary organization of data collection on the ground and on points at a short fixed distance from each other (every 25 meters or so)—a distance capable of measuring most effectively, according to a visitor’s perspective, the architectural and thematic change along the two sides of the street—that the individual data will be able to offer such an almost “immersive” experience to the viewer. Likewise, in *Visualizing Vertov*, the multiple paths for the user to actualize from the virtualities offered by the source database would not be possible if they were not based on the choices necessary to create the database itself.

Returning once again to Françoise Bastide and her seminal investigation of devices of visualization, the entire database, insofar as it is structured and organized, is itself, too, the result of a specific “making-to-see”, which is framed within the peculiar research perspective of the data scientist or researcher and takes its point of departure from it.

A similar critical position toward the pure virtuality of datasets is now increasingly evident, and in various fields of research, for example among policy and data scientists. To give a few examples, scholars currently working on the topic of data gaps point out how the so-called “raw data” are in fact the result of selection filters and structuring practices. In particular, some have shown the often-undetected incidence of big data’s periphery (Lerman 2013) or of the so-called “dark data” (Hand 2020), through which existing phenomena remain effectively “invisible” because data cannot (or will not) be collected on them. Lerman, in this regard, speaks of the “nonrandom, systemic omission of people who live on big data’s margins,” and thus of “big data’s exclusions” (Lerman 2013: p. 57). Others (Giest and Samuel 2020) proposed a categorization of data gaps based on different data availability for policymaking, from *primary data gap* (no availability) to *secondary data gap* (limited availability) to *hidden data gap* (no awareness of such availability). In this regard, some have also highlighted the bias implicit in the very existence of the big data phenomenon as such, as a technological-social phenomenon involving complex construction dynamics that are often overlooked (Boyd and Crawford 2012; Olteanu et al 2019; Crawford 2021).<sup>7</sup>

It is for this reason that, in our view, a semiotic approach to different data visualization and translation devices could enable us to better investigate and explore these kinds of dynamics and construction practices.

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<sup>7</sup> For a semiotic overview on data gaps and data bias see also Manchia (2021).



#### 4. Data-tapestries and data-walls. Discursive strategies in some examples of data visualization

The third example we will consider is instead ascribable to the other paradigm, that of data visualization and the rhetoric of transparency. It is *The Room of Change*, a “data-driven wallpaper” designed by Accurat studio specifically for the XXII Milan Triennale (March 1-September 1, 2019), *Broken Nature: Design Takes on Human Survival*, directed by Paola Antonelli.

The project, arranged in an entire museum room, is a complex installation, combining several artifacts (fig. 8),<sup>8</sup> amongst others two large screens projecting images taken from NASA’s *Images of Change* series, which by their very position trace an imaginary corridor that directs the visitor’s movements and attention toward the back of the hall.

At the back, on the three walls of the room, runs a large data visualization divided into three moments, roughly corresponding to the three walls: the left side wall, from



**Figure 8.** Accurat, *The Room of Change*, installation entrance  
(© La Triennale di Milano; photo Gianluca Di Ioia).

<sup>8</sup> A first analysis of this project, more focused on some enunciational issues, is in Manchia (2020b).

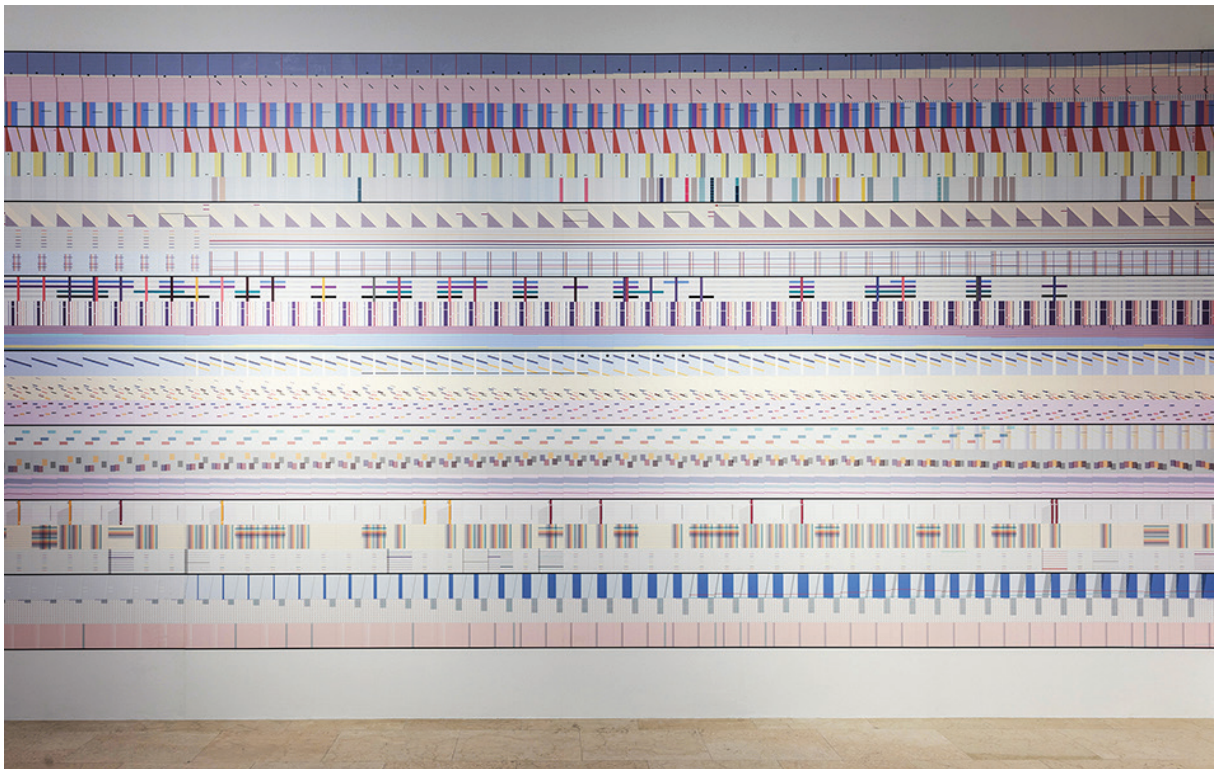


100 A.D. to 1900 A.D.; the middle wall, from 1900 to 2000—and overflowing with the years 2000-2019 on the right wall, which accommodates the time frame from 2020 to 2400. Along each wall, from 100 AD to 2400, run eight themes (from 1. Nature to 8. Technology), eight parallel macronarratives, each characterized by precise patterns of lines and shapes.

Each macroseries of data is in turn structured into three subseries, each of which declines the central theme in its own way. The main themes are, specifically: 1. Nature; 2. Universe; 3. Animal Kingdom; 4. Society; 5. Hope; 6. Happiness; 7. Science; 8. Technology.

Each macroseries is then divided into three more specific subseries (for example, 1. Nature includes the three subtopics 1.1. The disappearance of the Aral Sea; 1.2. Human impact on the environment, 1.3. The effects of climate change), for a total of 24 subseries arranged in horizontal rows and running, linearly, along all three walls (fig. 9).

The visual modulations present on the expression plane, as might have been expected, are not developed in parallel with the themes of the macroseries, but are exploited in a very fine and always varying way to represent the development of each individual dataset.



**Figure 9.** Accurat, *The Room of Change*, detail of the central wall  
(© La Triennale di Milano; photo Gianluca Di Ioia).

The only exception are some color scales, which are always identical and used to represent the continents according to two different categorizations, one by geographic affinity and the other by cultural affinity (identical to the former but with the addition of another color for North Africa and the Middle East, an affinity that is clearly cultural and not geographic).

Thus, subject to the geographical references and their fixed color coordinates, a different regime of information visualization applies in each of the 24 datasets: from series to series, different plastic categories become relevant, and on all levels (chromatic, eidetic and topological). A curiously very nonfunctional visualization work, according to the parameters of classical data visualization, in which Tufte's data-ink ratio is completely disregarded. And to this great visual complexity it is difficult, based on this first description, to find an explanation according to the principle of transparency and perfect equivalence between data and its visualization.

Why all this complexity, then, in the visual transposition of information? To understand why, it is necessary to take a closer look at *The Room of Change* not only as an informational artifact, but as a complex visual artifact, as well as on its simultaneously informational and expressive nature, well summarized by the label of "data-driven wallpaper."

An initial observation can guide us in this direction. All the connections between the information and its graphic counterpart that we have just explored are in fact not available, as is good practice, on the same medium on which the visualization is inscribed. On closer inspection, on the large historiated wall of colored lines there is no title, nor are there any inscriptions, captions, or other indications.

The large and complex legend that holds everything one needs to decipher this data visualization—a sort of Rosetta Stone—on a cube in the center of the room (visible in Fig. 8), roughly at the point from which one can get a full and complete view of the three walls. After crossing the entrance line (the corridor between the two screens), and in any case already before arriving at the center, the visitor is invited to become an observer of a visual artifact, a complex and richly modulated abstract image. He/she is naturally invited to do so by the context (that of the Triennale Museum, and of the *Broken Nature* exhibition) as well as by what he is looking at.

After reaching the stele, however, in the center of the room, the observer acquires an awareness that he or she could not have before, upon entering: that of no longer being merely grappling with an aesthetic object, but with an informational object.

In classical information design, in fact, which Engelhardt (2003) explores, "reference objects" are always necessary for one to have an "informational object", that is, a well-regulated frame of reference is needed for specific visual elements to be understood as a data visualization, just as inscriptions, captions, numerical scales,

texts and other elements are needed that syncretically provide a unified whole with the visual object that is charged with conveying information.

It is therefore only upon reaching the stele, and reading the legend, that the visitor can realize that among the patterns modulating on the wall as in a tapestry there is not only something to *see*, but something to *know*. Thus, the level of pertinence of the viewer's gaze shifts, now mobilized to search for the information as it is being translated into colors and shapes: that is, those colors and shapes do not just compose a purely decorative panel, as it seems at first glance from the entrance corridor, but hold a message that needs to be deciphered.

In soliciting an active cognitive intervention on the part of the viewer, which is essential for the project to unfold, and in this its establishment through an enunciational device (the "activation" of the dataviz through the application of the legend), it seems to us that the visual complexity of the project finds its justification.

The visual density of the tapestry, in short, is not excessive or gratuitous. It exists to be discovered and interpreted by someone. But, at the same time, the real goal of such a project is not to offer a functional and systematic exploration of data, but to overwhelm the viewer/reader with an enormous amount of detailed information about climate change—and this information is conveyed in ways that are anything but automatic or immediate (see what has been said above about the proliferation of visual variables adopted).

In other words, *The Room of Change* exploits the non-immediate translatability of expression into content to solicit the viewer and transform him or her into the recipient of a specific discourse that first and foremost tells the millennial complexity of a very often underestimated issue.

The operation of deciphering the correspondences between visual elements and information on themes and macro-themes, then, which as we have seen is far from immediate, forces the viewer to become an attentive reader. The more he/she is involved, the more time he/she will spend trying hard to grasp as many narratives as possible about the many radical changes in our environment, from fossil fuel consumption to the effects of climate change. And the more he or she will want to know the more he or she, from a mere passing viewer in an exhibition, will become an informed reader, a counterpart to a very specific discourse: that of Accurat's data visualization and its ruled complexity.

Finally, it is the title of the installation (*The Room of Change*) that also alludes to a further, possible pathemic development of the viewer's gaze: that of a radical, real, and active change that comes through data knowledge and active participation. Indeed, the participation it takes to transform a giant tapestry into a data visualization is an excellent starting-point.



The last example we propose to consider is the data visualization published in the *New York Times*, February 21, 2021, on the million deaths from Covid-19 in the US.

Unlike the previous example, this is an extremely simple data visualization, based on essential visual means and structured in a rigorous manner. The graphic is simply composed by dots on a vertical timeline, and each of the nearly 500,000 individual dots represent a life lost in the United States to the Coronavirus. The points stretch chronologically down a long scroll, from the first reported U.S. death nearly a year ago to the current toll of often thousands of casualties per day.

From a purely informational point of view, from the perspective of the data-ink ratio, every bit of ink has a clear reason: each dot makes visible, as a single and perceivable entity, a life lost, with its position in the page layout representing the single day of the event.

Quantitatively, there is no diagrammatic reduction of data (e.g. pictograms, in Neurath's Isotype style, or simple geometric shapes standing in for a quantity of objects or events): all individual deaths are equally represented. There is, instead, a reduction of information about each event, which effectively flattens the death of the individual to its irreducible human singularity, to the temporal coordinates of the event alone.

This is a very different choice from the one made for the May 24, 2020 front page (fig. 11), which reported, of the first 100,000 deaths on U.S. soil, a sample of 1,000 deaths displayed as a lists of names and obituaries, choosing to shape the same event (deaths in the U.S. for Covid-19) with decidedly more personal connotations. Simone Landon, assistant editor of the Graphics desk, said the aim was "to represent the number in a way that conveyed both the vastness and the variety of lives lost," in fact avoiding reducing people to pure dots or stick figures but choosing to tell something "about who these people were, the lives that they lived, what it means for us as a country" (Grippe 2020).



Figure 10. Front page of Sunday's *New York Times*, February 21, 2021, graphics by Lauren Leatherby.





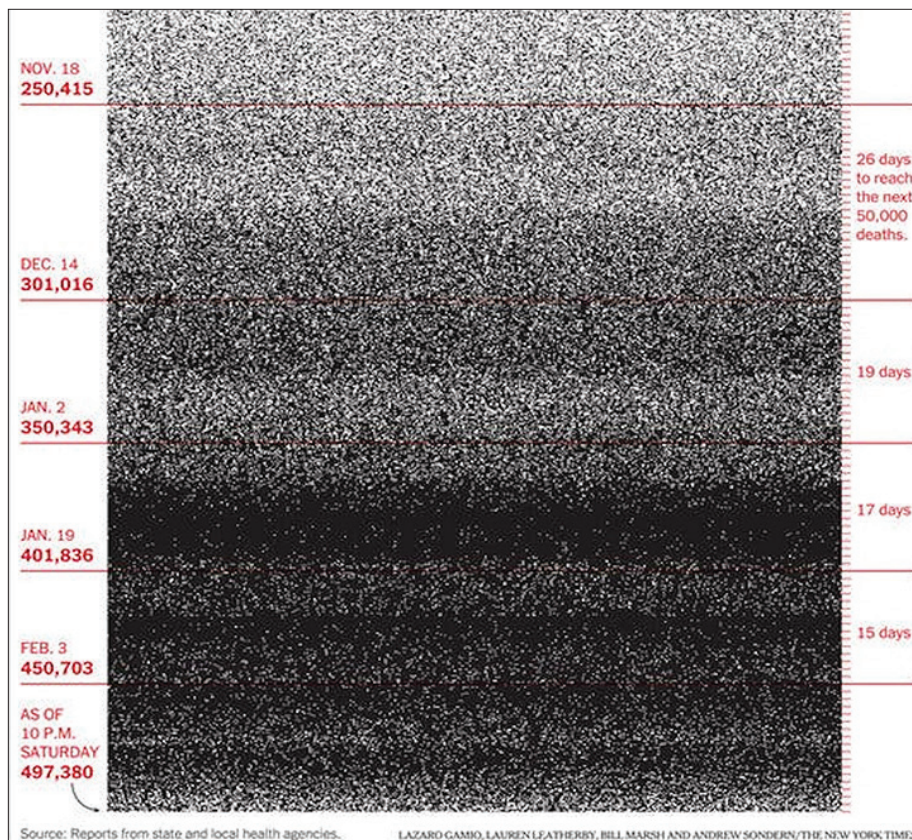
Figure 11. Front page of Sunday's *New York Times*, May 23, 2020, graphics by Simone Landon.

Thus, from the May 24, 2020 visualization to the February 21, 2021 visualization, both the extent of the reference dataset (from 100,000 to 500,000 data points) and the way in which data is designed have changed. What was previously described, for example, as “Theresa Elloie, 63, New Orleans, renowned for her business making detailed pins and corsages ...” (Grippe 2020) is now nothing more than an anonymous black dot, with no more name, age, or biographical profile, in a graphic “with nearly a half-million dots running down the length of the page and across three of its six columns” (Coleman 2021).

This is a radical change that *New York Times* readers, in comments on the Facebook post announcing the new front page on February 21, 2021, did not fail to remark on, with comments such as “So my father in-law is basically a dot to some. Horrible way to describe someone’s life” or “Herbert Shigekane is one of the dots... thank you for honoring the dead.” As also in the cases examined above, the application of categories (and filters) for data collection turns out to be a true display device, capable of also informing the subsequent visual return of the data.

As for the visual display strategies of the specific data, although that of February, 21 is a purely diagrammatic visualization, with very few visual variables at play, it would be incomplete to describe it only from an informational point of view. We should not forget the expressive power that this visualization strategy of deaths for Covid-19 brings, highlighting the dizzying rapidity of the epidemic even in a very short time, as time goes on, and the consequent increase in deaths in some periods, particularly in the second part of the visualization (with a peak of more than 50000 deaths in 17 days, from January, 2 to January, 19).

Indeed, more than the individual dots, which are still clearly identifiable even if no longer narrated as in the previous visualization, the observer’s eye is struck by the horizontal bands in which, as in a typographic screen, the blackness thickens without any form — any data—being clearly distinguishable.



**Figure 12.** Front page of Sunday's *New York Times*, February 21, 2021, graphics by Lauren Leatherby, detail.

The purely functional strategy adopted in the visual representation of data fades into the tragic impossibility of quantifying such a large number in such a short period, as if to remark on the fallibility of exact, live recounting of massive amounts of data, and at the same time the need we still have to make the invisible visible.

In this case, the visualization of such a large database, precisely because of the arduous task it sets itself, proves capable of making one feel rather than see, transforming the information receiver into an observer and a pathetic subject as well. The reader, indeed, guided in the description of the phenomenon by the temporal legend running to the left and by the comments running to the right of the visualization marking the days intervals, becomes progressively immersed in an increasingly dense flow of data. Moreover, he/she is more and more gripped by the tense crescendo that opposes, semi-symbolically, the plastic discontinuity between the dots in the white field (from the top up to 4/5 of the image), which represent a pandemic situation that is still tellable, still numerable, still discrete, to the increasing density of the dots in the black field (bottom), mere plastic continuity in which no distinctions can be made or data identified, in which it is almost impossible to distinguish anything.



Paradoxically, then, what seemingly appears to be a purely functionalist visualization geared toward the pure display of data, with no other visual connotations (we are a long way from the language of infographics), turns out instead to be a tool for making the inconceivable tangible.

A veritable data-wall (a “wall of grief,” it has been called), which brings attention once again to the impossibility of a purely immediate or transparent visualization in its giving access to data, and which shows instead how any strategy of putting data into discourse, even the most functionalist in means and intent, is but an attempt to make something otherwise invisible visible.

## 5. Across immediacy and transparency. Conclusions

In this paper we have tried to consider visualization no longer as a mere display of data but as the result of a multi-level translation process, from structuring data into datasets to visually transposing a specific viewpoint on the data. As we have tried to show, such a semiotic exploration, attentive to the ways in which data are put into discourse, could work as a deeper and more structural investigation of the social, cultural and at the same time discursive construction implicit in the big data phenomenon.

As for media visualization examples, in *Visualizing Vertov* we have remarked the crucial role of metadata and different combinations of visual characteristics in informing both media visualizations and patterns, as well as in *On Broadway* we have noticed how the quite “immersive” effect of a bottom-up perspective in the so-called Streetview Top layer depends on the capillary organization of data collection, a real “device of visualization.”

Regarding the data visualization projects analyzed, in *The Room of Change* we have observed how an abstract visualization can be read either as a purely aesthetic object or as an informational object, depending on the level of relevance of the viewer’s gaze, and how the shift from an aesthetic reading to an informational reading can generate a pathemic engagement in the viewer.

Finally, on the front page of the *New York Times* of Sunday 21 February 2021, we noted how even a purely functional and seemingly immediate visualization of a large amount of data can also generate, at the same time, an entirely different perspective on the data displayed.

Manovich is very clear in pointing out that direct visualization is also a heuristic method, allowing the exploration of large collections of data that is difficult to manage in other ways. The role of diagrams, as well of visualizations in shaping knowledge and not just in representing it, is well known (see for example Netz 2003, Stjernfelt 2007, Thurlemann 2008).

An exploratory approach to data can indeed be found not only in direct visualization but also in many examples of data visualization, offering not just a “portrait” of a phenomenon but a map of virtualities to be activated and explored, as in Accurat’s *Room of Change* as well as in other more standard projects managing data complexity. In any case, as we have seen, we can focus on such objects not just as pure systems of virtual features ready for future operations but as texts, with their specific visual communication strategies.

In particular, we have tried to show how a visualization that returns a large amount of data in a relatively visually simple way, such as the front page of Sunday’s *New York Times*, February 21, 2021, is not only an exploratory and purely informational tool but can also, and at the same time, produce a strong pathemic effect in the reader/viewer.

To return again to Françoise Bastide and her description of scientific image (and data image, we would add) as a chain of devices of visualization, it seems that the two Covid-19 *New York Times* visualizations show how the choice of a different categorization of the same data (narrative-qualitative, in May 24, 2020 vs. quantitative, in February 21, 2021) and a different visual translation of the data (a sample of names and biography of the deaths in the 2020 visualization vs. the totality of the deaths represented by dots in the 2021 visualization) generate an entirely different meaning-effect.

In the first case, we are faced with an almost point-to-point mapping of a sample of stories and biographies of the protagonists of the Covid-19 tragedy, which we are free to explore and read as we wish. In the second case, the effect is that of a top-down view that, in order to represent reality as accurately and abstractly as possible, exposes the viewer to the risk of seeing everything without being able to rationally understand what he/she sees.

Ultimately, it seems to emerge, in a clear way, how *making known* (in data visualization, through the organization and interpretation of data from a given perspective; in media visualization, through the various dimensions of image analysis) is an ineradicable component of *making visible*, and is proper to any visualization, as well as to the rhetorical, argumentative, and discursive strategies that make it possible.



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# Big data visualization through the lens of Peirce's visual sign theory

punctum.gr

BY: Alon Friedman and Martin Thellefsen

## ABSTRACT

Data from social media platforms, such as Twitter and Facebook, are generated by people who produce, spread, share, or exchange multimedia content. Such content may include text, images, sounds, or videos. To derive insight into the behavior of social media users, researchers often use open-source technologies to visualize data and generate models for data analytics. One of the most popular open-source applications for managing and analyzing social media data is the open-source R programming language. Friedman and Feichtinger (2017) created an R package termed 'Peirce's sign theory R package' to analyze data using Peirce's principles of discovery. Though Peirce semiotics have been introduced in the context of computer programming languages, so far, no previous work has applied Peirce's sign theory to data modelling of social media data. In this paper, we use Peirce's sign theory R package as an overall framework to gain insight into data collected from Twitter. We assembled the data using Twitter's Analytics algorithm, examined the relationships between variables, and visualized the results. Subsequently, we assessed the feasibility of analyzing those graphics using the triadic model set out by Jappy (2013) and Peirtarinen (2012) for the interpretation of visual signs. The study results showed that Peirce's sign theory R package effectively analyzes and visualizes Big Data from social media feeds. However, due to complexities in both the social media data feeds and Peirce's interpretation of meaning, as outlined by Jappy (2013) and Peirtarinen (2012), we were unable to develop algorithms that generate or suggest an interpretation of visual signs.

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## A. Introduction

Every day, multiple platforms tracking human and machine activities contribute to ever-growing digital data sets. Those data sets include a vast amount of unstructured data that are hard to sort or analyze and are commonly referred to as 'Big Data.' As the number of data-driven devices used by society has increased, the definition of Big Data has evolved. However, the core elements that characterize Big Data are its volume, variety, and velocity (e.g., De Mauro et al. 2015). Big Data is vast in volume and is generated at a far higher rate than other, traditional data. In addition, those data sets are diverse in form. For example, textual data produced by users of social media platforms differ from that produced by tracking mobile devices such as electric vehicles. Therefore, it is necessary to differentiate between data generated by human activity, e.g., human actors that post about different aspects of personal interests to an audience, and machine bots or algorithms that generate data and target users. The two leading social media platforms are Twitter and Facebook. Twitter has approximately 217 million daily users, and the platform allows its users to post and interact with messages known as "tweets." Researchers who study Twitter data often refer to it as Big Data due to the large amount of data generated by human and machine activities (Boyd and Crawford, 2011). Human-generated data is based on humans deliberately interacting on social media platforms e.g., by posting comments or by liking posts they encounter on the platform. Bots on the other hand are software that produces 'comments' or generates relationships by means of algorithmic processing. Human interaction is intentional and deliberate, while the latter is governed by machine automation, also known as bot algorithms, without much human interaction. In terms of machine-generated Twitter data, Kwak et al. (2010) concluded that the quality of machine-generated Twitter data is subjected to the quality of input. As such, low quality input suggests a low-quality output i.e., garbage in and garbage out, where it is difficult to analyze or identify the meaning of those comments. Nevertheless, machine-generated data have become increasingly powerful and influential on social media platforms and are perceived and retweeted by human actors (Lokot and Diakopoulos, 2016).

The developments in AI (Artificial Intelligence) and sophisticated algorithmic information processing pose new challenges for users to distinguish between the human tweet and bot tweet and call for new methodologies and countermeasures to hinder the spread of fake tweets (Fagni et al., 2021). To date, researchers have employed a variety of theoretical frameworks and methodologies to analyze the text format and to identify the emotional state and personality of users found on Twitter. In today's technology environments, semiotics scholars often discuss C. S. Peirce's contributions to the field of visualization (e.g., Farias and Queiroz 2017). While the semiotic framework continues to contribute to our understanding of social media, several studies require the development of software to match the semiotic regimes (e.g., Poulsen et al. 2018; Djonov and van Leeuwen 2018).

Whereas Onursoy (2015), Moschini (2018), and Poulsen and Kvåle (2018) have used a semiotic framework to study social media users' content, thus far, no previous research has analyzed and visualized social media data using Peirce's sign theory and its triadic model.

The Peirce sign theory is known as the action of signs, a process in which a sign is both affected by the object and affects one's mind, thereby producing the meaning of the sign (Strand, 2005). In this paper, we used the semiotic approach to analyze how tweets function as signs, and we are especially focused on how data generated by tweets form visual structures when processed by an algorithm. Visual semiotics is a subfield of semiotics with a particular focus on how visual expressions (e.g., pictures, models, or other kinds of visual representations) function as signs of meaning. Jappy (2013), who investigated Peirce contribution to visual communication, suggests that visual semiotics in principle is concerned with "visual culture", a culture that is experiencing a tremendous growth and use in the development and deployment of technology. Our culture is increasingly shaped by social media today and has a direct impact on the way we live (e.g., Van Dijck 2013). Social media, in addition to influencing the way we perceive and consume information, contributes to a sense of participation in society because of the way we interact with likes, shares, and comments. In this information environment Twitter plays an important role and in this context data visualization becomes paramount. It enables researchers to investigate how popular events and topics are related, which trends emerge, the frequency of numbers of tweets and re-tweets, etc. In modern data analytics, visualization is an important tool for communicating complex data structures in a human perceptible fashion. Several approaches to visual semiotics have been developed that emphasize the modalities of visual expressions, and how it communicated a certain meaning (e.g., Floch and Pinson, 2001) and (e.g., Barthes, 1977). However, according to Aiello (2020), these studies have typically analyzed visual expressions from the perspective of advertising or art.

In this study we employ Peirce's semiotic framework both as an algorithmic tool and as a theoretical approach to data visualization. The latter is based on Peirce's own formulations of visual signs:

"Hypoicons may be roughly divided according to the mode of Firstness of which they partake. Those which partake of simple qualities, or First Firstnesses, are *images*; those which represent the relations, mainly dyadic, or so regarded, of the parts of one thing by analogous relations in their own parts, are *diagrams*; those which represent the representative character of a representamen by representing a parallelism in something else, are *metaphors*." (CP 2.276, 1903)<sup>1</sup>

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<sup>1</sup> We are referring to Charles S. Peirce. Collected Papers (Harthshorne, Weiss and Burks (eds.) (1932-1958), according to the scholarly tradition, CP, volume and paragraph number, year.



The hypoicons cannot be understood apart from Peirce's general semiotics and sign classes, see (Farias & Queiros, 2003, 2006). Also, the diagram is an essential part of Peirce's diagrammatic reasoning, or moving pictures of thought, see (Stjernfelt, 2007). However, our adaptation of visual semiotics and the triadic data model is mainly based on Jappy (2013) and Peirtarien (2012) interpretations.

## B. Peirce's sign theory R package through open-source R

Charles Sanders Peirce was an American philosopher and considered one of the founding fathers of contemporary semiotics. Peirce's theory relies on a key tenet of semiotics: that a sign can have a meaning other than its own. In Peirce's theory, any object can be a sign, as long as it is understood as referring to, representing, or representing something other than itself (CP 2.302, 1895). Jappy (2013) investigated in detail how the sign functions in terms of the sign's constituent parts and used this triadic structure to analyze the function of the hypoicon. While Peirce did not provide a particular visual model of the sign, and there are different ways of representing the triadic structure of the sign, the most dominant ones are the triangle that put the sign, the object, and the interpretant at the corners of the model. However, the problem with this model is that it in principle is dyadic, only allowing a connection between two sides of the triangle. Another model preferred by many Peirce scholars is the fork model showing how the sign is genuine a triadic structure determined by its constituent and irreducible parts. Jappy presented a similar triangle model and re-introduced a horizontal line similar to Saussure (1959) separating the sign from the object (or signifier from signified). This was criticized by Nöth and Jungk (2015) that found several flaws in Jappy's visual interpretation. Among these flaws, they argued that the triangular model presented by Jappy lacks the connections between the three constituents of the sign. However, in this study, we find these flaws of minor importance in relation to our algorithm's application of the triadic principles.

With the growth of social media, we are witnessing a new understanding of the content we create, share, and exchange on various platforms. Despite ongoing debate about how to define the term 'social media,' most authors agree that social media technologies on smartphones and tablets create interactive platforms through which individuals, communities, and organizations may share, co-create, discuss, and modify user-generated content (Correia et al., 2009). Another aspect of social media is the technology behind these platforms. These technologies often rely on open-source applications and cloud computing to deliver the social media experience. An ongoing challenge for researchers and developers is how to handle the data generated by social media applications. Tonidandel et al. (2018) argued that traditional statistical methodologies fail to provide meaningful insight into the data and acknowledge that new methodologies are needed

to analyze those unique data sets. Hochman (2014) examined the nature of social media images by examining the structure and implementation of those images that are being formed. He reported that images generated by data communities are automated and tagged using steam processes that shaped the layout of the social media images. The growing use of the automation of data analysis that is generated by advanced statistical calculations and adopted in social media research has led to an 'explosion' of software tools for scraping and analyzing social media content (e.g., Manovich, 2005). R is one of the leading open-source software environments, where its members of the community can develop specific packages that collect code, data, and instructions to solve problems beyond the reach of traditional spreadsheet software, and much of this work focuses on social media. Today, more than 32000 packages are available on the Comprehensive R Archive Network (CRAN)— those packages containing prewritten code, designed to accomplish specific tasks or a collection of tasks.

R as a computer programming language is based on an object-oriented programming (OOP) structure that relies on the concept of classes and its objects. Like any computer language, variables provide a means of accessing the data stored in memory. R does not provide direct access to the computer's memory, but rather provides specialized data structures, called objects, that are referenced via symbols or variables. In R, one can have objects based on expressions where an expression contains one or more statements. A statement is a syntactically correct collection of tokens. Expression objects are also special language objects that contain parsed, but unevaluated, R statements. All objects can have one or more attributes attached to them. The user can run multiple packages under the same code.

The first known attempt to simplify programming development under Peirce's theory was made by Kumiko Tanaka-Ishii (2010) in her book, *Semiotics of Programming*. The aim of the book was to provide a semiotic analysis of computer programs along three axes: 1) the models of signs, 2) kinds of signs, and 3) systems of signs. According to Tanaka-Ishii (2010), the transformation of Peirce's triadic theory to object-oriented programming (OOP) needs to apply a name, data, and functionalities to generate a working code. She identified two major problems regarding the conversion of Peirce's theory to a working programming code. The first issue is the difficulty in implementing the thirdness principle, and the second is in obtaining descriptions for the sign systems. To solve these problems, Friedman and Feichtinger (2017) created an R package called Peirce's sign theory R package that was used in this study. This package applies Peirce sign triangulation attributes to the objects found in the data and their variables. The R platform allows any user to run this code using their local machine and display the results graphically using different graphic packages. The package provides tools to classify and identify relationships between different components/variables in data sets by applying Peirce's sign theory of triangulation to qualitative and quantitative data.

Under Peirce's sign theory R package gathers the data based on the three components: the Representamen, the Object, and the Sign. As part of this study, Peirce's sign package was designed to follow Jappy's definitions of visual triadic signs, and to easily convert data into Peirce's triangulation algorithm model. Studying "visual meaning" in this case means studying Twitter's data on what the signs refer to, based on the researcher's observations of these terms, using the machine as a tool to rank and sort these classifications to produce the visualization results. The machine cannot decide for itself, the nature of the relationships among the three components of Peirce's model; for example, it does not recognize human concepts of words or numbers. Therefore, the main feature of this package is the functions in the package that can evaluate hypotheses about relationships that are found to be meaningful in the text. The package uses semiosis algorithms to find meaning in the data and gain insight into the causal relationships that are made possible by the underlying logic in Peirce's theory. In the simplest sense, the functionality in the package allows the user to study the interaction between the three variables directly and indirectly.

### c. Peirce semiotics, visual signs, and how semiotics is useful for analyzing the meaning of Big Data

Semiotics, the study of signs, is derived from philosophical speculations on signification and language (e.g., Chandler 2007). The first known reference to the term 'sign' can be found in ancient Greek, where it is connected to the word semeion, meaning 'mark' or 'sign.' Elaboration on the meaning of the term continued through the 19th century, with two schools of thought providing different interpretations. This study adopts a conceptualization of 'sign' proposed by Peirce, who described the study of sign as "semeiosis," which aims to study all sign-related phenomena. Peirce offered a triadic foundation of the term, in which anything that may be interpreted as signifying, referring to, or standing for something other than itself may be considered a sign, see (CP 2.228, 1897), however in terms of semiosis, Peirce argued that symbols grow, and that the meaning of concepts tends to motivate more developed conceptions (CP 2.303, 1902). While Peirce in his extensive writings did not use the concept of visual signs or visual semiotics, he did use the photograph as an example of an icon, see (CP 2.281, 1894) where the photograph is considered as an example of representation by likeness or resemblance. And, in (CP 2.320, 1903), the photograph is mentioned as a hypoicon and a decisign. Leja (2000), also cited Peirce's own words on the importance of visual diagrams to examine the meaning in language.

I do not think I ever reflect in words. I employ visual diagrams, firstly, because this way of thinking is my natural language of self-communion, and

secondly, because I am convinced that it is the best system for the purpose. (MS 619, 190).<sup>2</sup>

Peirce definition of the sign is triadic, consisting of a Representamen, an Object and an Interpretant. Peirce formulated in his extensive writings several definitions of the sign, (Marty, 1997 [2012]), and his most famous definition is from 1897, which considers how the sign is divided.

a sign, or a representamen, is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the interpretant of the first sign. The sign stands for something, its object (or referent). It stands for that object, not in all respects, but in reference to a sort of idea, which I have sometimes called the ground of the representamen (CP 2.228, 1897).

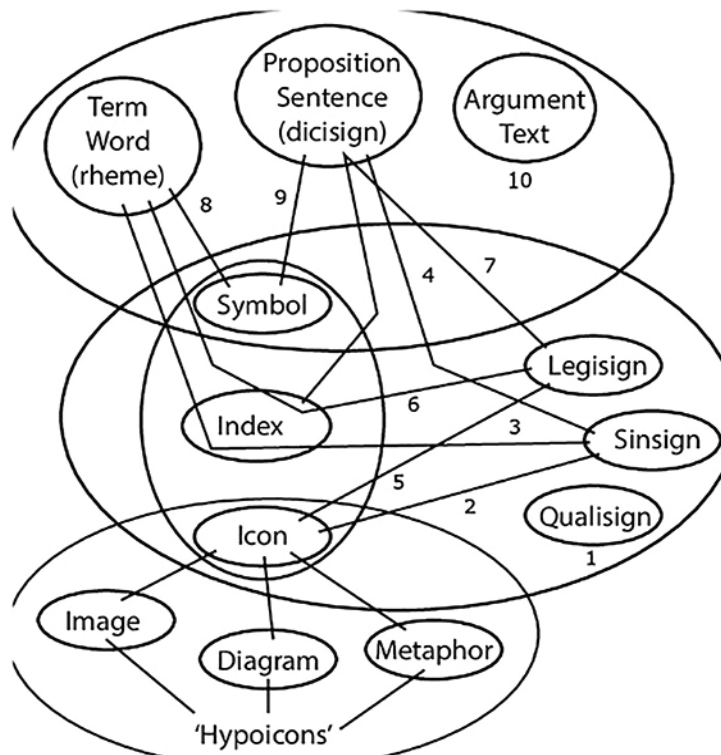
Furthermore, Peirce's triad are qualified by additional categories where the Representamen is a first characterized by the qualisign, the sinsign, and the legisign. The Object is a second characterized by its relation to the Representamen by the icon, the index, and the symbol. The Interpretant or the meaning of the sign relationship is a third, characterized by the rheme (rhematic sign), the dicent sign (or proposition), and the argument (CP 2.243-252, 1903). This triadic nature of the sign can thus be combined into ten sign categories (CP 2.227-273, 1887). According to Queiroz and Merrell (2006), Peirce's believed that the core three elements, and the respective classifications they imposed upon signs, could be combined to give a complete list of sign types. Therefore, the sign is a triadic relation, and it involves three core elements for analysis, namely, the elements concerning the representamen, the relation between the representamen and the object, and the relation between the representamen and the interpretant respectively. Queiroz (2012) later argues that thus Peirce's classification should be considered an important advancement with respect to the task of empirically modeling the morphological variety of signs, and it constitutes one of the most important topics of Peirce's mature semiotics.

Peirce's classification of ten possible sign types provides a road map to analyzing images, diagrams, and metaphors according to Farias and Queiroz (2006). They extended Merrell's (1997) discussion of the ten classifications into figures that illustrates this transformation of Peirce's sign into visual semiotics. Figure 1 represents Peirce's 10 classifications of signs, with special attention to the hypoicons as discussed by Merrell (1997) and Farias and Queiroz (2006).

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<sup>2</sup> We are referring to the *Annotated Catalogue of the Papers of Charles S. Peirce* (Robin (ed.) 1967), according to the scholarly tradition, MS, manuscript number and page number.





**Figure 1.** Peirce's classification of ten sign types supplied with the hypoicon as proposed by Merrell (1997).

With this Peirce classification system, the concept of the 'hypoicon' subdivides the icon sign into three different modes of iconicity, namely the image, the diagram, and the metaphor.

Hypoicons may be roughly divided according to the mode of Firstness of which they partake. Those which partake of simple qualities, or First Firstness, are images; those which represent the relations, mainly triadic, or so regarded, of the parts on one thing by analogous relations in their own parts, are diagrams; those which represent the representative character of a representamen by representing a parallelism in something else, are metaphors. (CP 2.277, 1902).

As a part of their discussion of Peirce's visual semiotics, Farias and Queiroz (2006), Jappy (2013), and Peirtarinen (2012) employ the term 'hypoicons' as a core part in their discussion. They emphasized the importance of the subcategories of image, diagram, and metaphor to their overall study and interpretation of Peirce's types and symbols classification.

### The image

The image represents by virtue of qualitative similarity—e.g., color on canvas, the canvas itself, etc. Of course, the very attempt to describe a sense of firstness related to an image transcends into other signs. As is the case with images e.g., paintings, they are interpreted by placement, framing, situation, and description as such, and thus involves the interpreter's ability to connect collateral experience with the image.

### The diagram

The diagram represents its object by means of structural similarities to geometrical figures. A Venn diagram is an example of diagrammatic reasoning, as a map e.g., GPS (Global Positioning System) such as a navigation map or subway station maps—though different in visual expression and abstraction enables navigation that also includes pictograms and diagrammatic signs. For example, a common illustration of signs is the universal toilet gender signs. As is the case with the image, the diagram, besides its visual expression, involves indexical as well as symbolic aspects. A GPS navigation map, besides being visual and diagrammatic, is also indexical in its reference to the actual placement of the vehicle, the distance between point of departure and arrival and correspondence to the actual road being driven. The distance is measured in kilometers or miles and time, which of course are symbolic signs.

### The metaphor

The metaphor that represents its object by means of a parallelism, or similarity to something else. The metaphor is considered an iconic sign; however, the metaphor involves a creative element. The metaphor may be regarded as an analogy or isomorphic, but also can be used as a metaphor for works of art (Anderson, 1984).

Peirce's theory places the metaphor under icons together with images and diagrams. Anderson (1984 pp. 463) reported on the difficulty of fitting his brief remarks about visual metaphor into a system that is not explicit. He addressed the issue by stating that there are many strands in Peirce's thought that it is easy to begin any study with conflicting fundamental views of his intentions. Yet, with all the attempts to define Peirce's line of thoughts, Anderson (1984, pp. 463) recommends us to read carefully and comprehensively, as he finds both growth and coherent direction in Peirce's work.

A different approach to Peirce's sign theory focused on diagram as visual formation. Shin (2002) reviewed Peirce's logic calculations found in a single sentence. She noted that Peirce's diagram holds his theoretical foundation, with a focus on the construction of a single sentence, and its visual representation captured by the diagram. This visual structure contains a single continuous line of visual display. However, given the sheer volume of Big Data, it would be difficult to merge a single sentence into

millions of records to find the general meaning of those messages. Many critical thinkers of Big Data consider social media data to reflect ‘garbage in and garbage out’ scenarios, since tweets frequently lack standard structure and, in many cases, analogical structured tweets. (e.g., Geiger and Kubin, 2020). As a result, social media data researchers do not often use diagrams to graphically display their findings. (e.g., Tsou and Leitner, 2013). Big Data researchers identified two related problems associated with the use of diagrams to visualize Big Data. The first is based on a single sentence structure, where today’s social media analysis consists of the frequency of the terms found in social media feeds without any grammatical structure (e.g., Geiger and Kubin, 2020, Tsou and Leitner, 2013). Manovich (2005, 2013), Hochman (2014) discussed a different approach to social media images, focusing on algorithms and data procedures that occurred in real-time analysis that generate specific types of images. This type of analysis is based on social media feeds into visualization where the most frequent types of visualization are displayed with visual networks, geospatial visualizations (like heatmaps), and word clouds, rather than with the deeper theoretical or graphical analysis (Miller, 2017).

Overall, Peirce’s work makes substantial contributions to the field of visual communication, and many researchers have incorporated Peirce’s theory of visual signs into their overview of the meaning, representation, and reference found in visual language (e.g., Van Leeuwen 2005, Nöth 2011, Dunleavy 2005). According to Jappy (2013), Peirce logically defined the importance of methodological investigation through a general theory of signs for representation and their functionalities. He outlined two primary factors that distinguish Peirce from any other visual semiotics philosophers. The first attribute of Peirce’s theory is the activity and the interpretation of signs as a process. The second attribute is the use of multiple approaches to extend our understanding of nature and rhetoric to both verbal and visual representations of the world we live in (Jappy 2013, pp. xi). A different interpretation of Peirce’s visual sign theory was outlined by Pietarinen (2012), who reported that image languages are constituted by logical diagrams even though they relate to non-logical vocabularies. However, none of these interpretations have ever been examined in the context of Big Data visualization.

## D. Methodological notes

In this study, we ask the following question: What insight does Peirce’s visual sign theory lens provide us when using algorithms and open-source technology to create and interpret Twitter data? To address this question, first, we present the results of Twitter Analytics, and the use of Peirce’s sign theory R package to generate and visualize the data. Second, we investigate whether we can use digital image processes and algorithms to evaluate the results considering Jappy’s (2013) and Peirtarinen’s (2012) discussion of Peirce’s visual interpretation.

## E. The study methodology

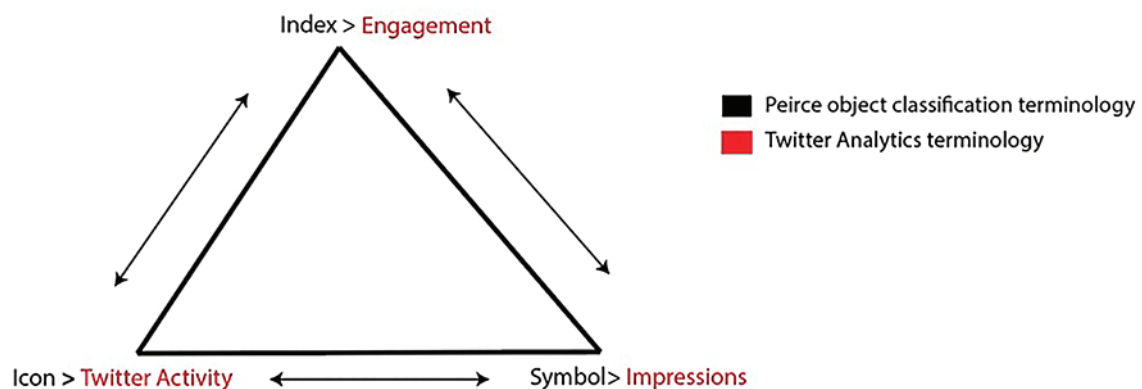
We collected data from Twitter by following the popular TV show *Squid Game*. The show is a South Korean survival drama television series that gained immense global popularity. We selected this show for this study because it boasts an international audience and the show's Twitter account has more than 300,000 followers. Our first data categorization was based on Twitter Analytics data, including the numbers of retweets and impressions, and engagement. A recent report by the New York Times showed that the number of new users joining Twitter continued to rise in 2022, with its users speaking over 40 languages. (e.g., Isaac et al. 2022). According to Gligorić et al., (2020), Tweets are textual messages with a 280-character limit that users can share, retweet, and post on other social media platforms. The popularity of Twitter data as a source for Big Data produced a shift in scale, scope, and depth of analysis (e.g., Kshetri, 2014). To provide more transparency in Twitter data analysis, Twitter employed the terms impressions and engagement, taken from the advertising industry to measure the user activity on their site (Siyam et al., 2020). Twitter data may include user URLs, references to other tweets, hashtags, abbreviations, and emoticons in user content, and/or metrics of user behavior associated with platform content.

Recent research involving the Twitter platform has highlighted new metrics for measuring customer engagement (Muñoz-Expósito, 2017). This change is based on how Twitter sorts its data, with a focus on the timeline as a key element. Previously, tweets were presented chronologically, as a time-stamped record. However, a newest sorting algorithm gives preference to tweets that are more relevant to the topic, as determined by Twitter (Wang and Fikis, 2019). Associated with this change are three key algorithmic elements: tweet activity, number of impressions, and engagement. Tweet activity is a measure of one's own activity on the Twitter dashboard and allows the user to review various metrics related to a tweet's performance (e.g., Siyam et al., 2020). The number of impressions is the number of times that a tweet appears to users, either in the timeline or search results. Engagement represents the total number of times that a user interacts with the tweet and includes retweets, follows, likes, and the addition of hashtags to the tweet.

In this study, instead of using the three general components of Peirce's sign theory: the Representamen, the Object, and the Interpretant, we focus our attention on the triadic division of the Object, i.e., the icon, the index, and the symbol. According to Peirce, an iconic sign shares resemblance with the object it represents. Photographs are common examples of iconic signs because they resemble the object represented (thus the division between immediate object (the photograph) and dynamical object (the live model depicted), however, as described above, the icon can also be subdivided further into the different subordinate types known as hypoicons: the image, the diagram, and the metaphor.



While the symbol is conventional in nature, the index is related to causality and thus shows evidence of what is being represented (Moriarty, 2002). We matched the sign-typology of the object with the categories of Twitter Analytics: Engagement, Twitter activity, and Impression. Our first idea was to consider a resemblance between the iconic sign and Twitter activity; in this study, both terms (Icon and Twitter activity) represent the actual account of all user activity on Twitter, as such Twitter activity resembles or mirror user interaction on the Twitter platform. We then paralleled the term Symbol with the term Impression, where both terms refer to the conventionalized meaning and connections between components within their own configuration. Finally, we associated the term Engagement with the Index, which stands for the causal relationship between user interaction and a specific tweet. Figure 2 demonstrates the match between the Peirce Object typology and Twitter's analytical terminology.



**Figure 2.** Shows the coordination match conducted in this study between Peirce object and Twitter's analytical terms.

Our next step was applying the Twitter data analytics data through the Peirce's sign theory R package. This package is based on open-source R which provides a tool to classify and identify and visualize the relationships among the components of data sets by applying Peirce's sign theory R package to qualitative and quantitative data. By implementing Peirce's model from a semiotic perspective, it allows the user to find meaning among the components represented by the data. In this study, the meaning of tweets for the show Squid Game posted on Twitter was examined. Studying "meaning" in this case means studying the interpretations of Twitter's Analytics classification and their relationships. The machine cannot decide for itself the nature of the relationships among the three components of Peirce's model; for example, it does not recognize human conceptions of words or numbers. Therefore, the main feature of this package is its use of user-defined input, where the functions in the package can evaluate hypotheses about relationships that are found to be meaningful in the text.

The Peirce's sign theory R package contains four main algorithms that were utilized to analyze the data. Function 1 is for numeric data; it calculates distributions by placing each numeric value in a percentile rank based on all values in that column of a data set, where columns represent each of the three components and each row represents a triad. This procedure is carried out for all three columns and for each variable. The average percentage rank is then computed for all three columns in each row. By quantifying where each data point is within a distribution, we can assess whether numbers in one column are associated with numbers in another. The average percentage values for all three components indicate whether a relationship exists, based on semiosis. Values that depart from 50% in one direction (either greater than or lesser than) indicate a significant association among the three variables. The researcher then determines whether these relationships are meaningful in the context of the hypotheses and goals of the study. Function 2 applies Peirce's classification to the output from Function 1 to look for further relationships within the data, as defined by the user's concept of data meaning. Function 3 first evaluates whether two or more rows are exactly equal, meaning that they represent two instances of the same triad. A logical value (true or false) is returned. A value of 'true' indicates that two rows have exactly equal values for index, symbol, and icon. A value of 'false' indicates that the rows do not have exact matches for each component. Function 3 then evaluates the column positions (corresponding to the index, symbol, and icon) within the rows to look for matches in any of the three components of a triad represented by a row in the data frame. It returns another set of logical values that indicates whether any components have an exact match within the rows. For example, it would identify a match between a triad with good/retweet/quote and another with bad/retweet/quote. To accomplish this task, the package makes use of R's loop function, which allows the user to iterate a procedure over the entire data set. The loop function provides instructions that allow automation of the code that is to be repeated. Figure 3 summarizes the workflow of Peirce's sign theory R package.

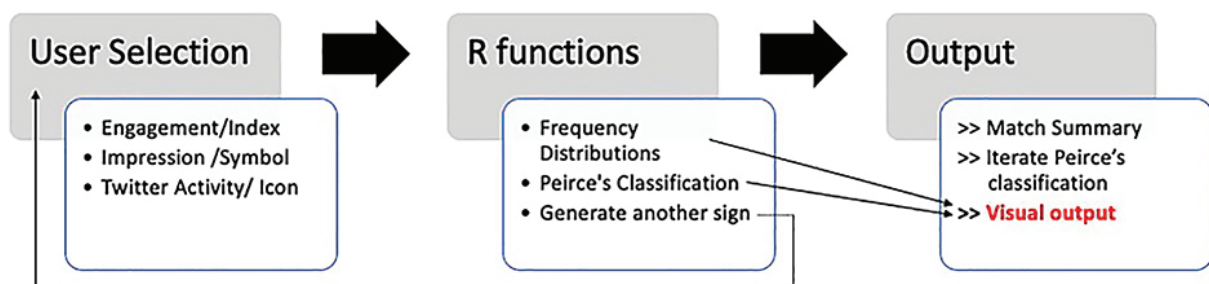
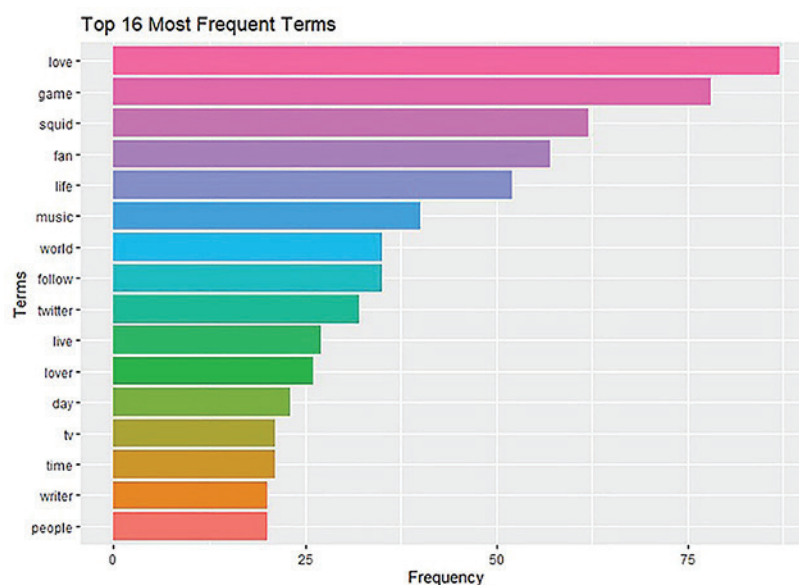


Figure 3. Outlines the workflow of Peirce's R package and its implementation in this study.

## F. Results

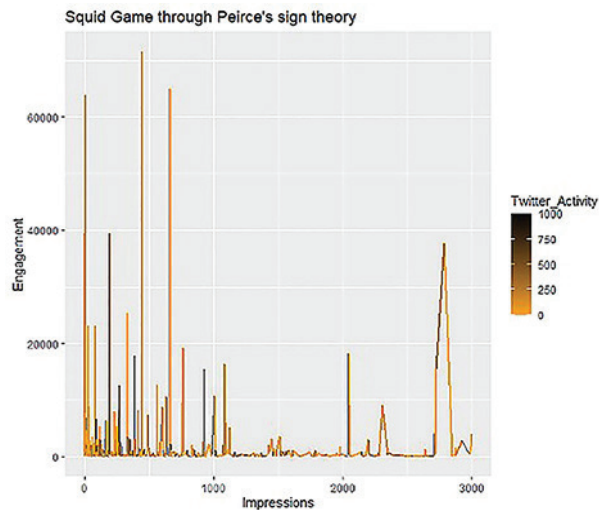
We collected more than 350,000 individual messages (tweets) posted on the official Squid Game Twitter account in 2020 and 2021. First, we utilized the Twitter Analytic algorithms and then sorted the data using Peirce's sign theory R package to execute the triangulation algorithms and visualize the results. The Twitter Analytics function sorted the data based on Twitter activity, number of impressions, and engagement. The Twitter activity algorithm represents the sum of all account activity; in this case, it referred to all activities on the Squid Game account. Impressions represented the number of users who saw the Squid Game tweets. The engagement was calculated as a total rating, based on the total number of user engagements divided by the total number of impressions, and multiplied by 100. We then applied Peirce's sign theory R package to these data to sort them and visualize the result. The first visualization was based on the most frequent words that appeared in Squid Game tweets. The top five most frequently used terms were love, game, squid, fan, and life. User comments were tokenized, cleaned, counted, and reordered so that the most mentioned terms appeared first. Figure 4 shows the 16 most common terms appearing in user tweets.

Next, we examined interconnections between variables obtained from Twitter Analytics (engagement, impression, and Twitter activity) using Peirce's sign theory R package. Friedman and Smiraglia (2013) examined Peirce's visual signs in academic products and reported that line graphs, bar graphs, and histograms were the most common types of graphs used by researchers in conference presentations. Accordingly, Figures 5, 6, and 7 show the results of the current analyses of variable interconnections using a bar



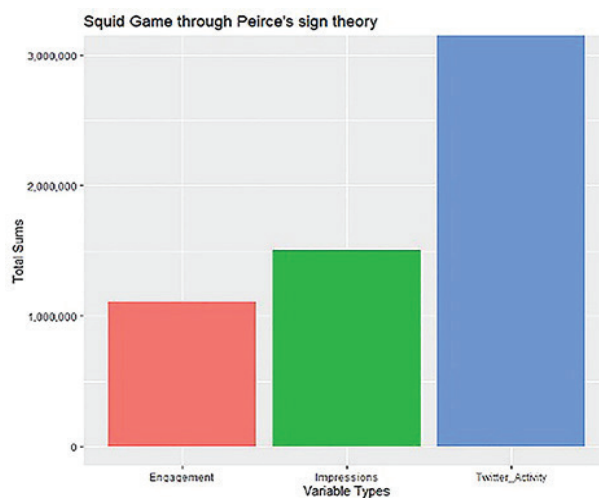
**Figure 4.** The top 16 most frequent terms found in the 2020 and 2021 Squid Game Twitter feeds.

chart, line graph, and bubble graph format, respectively. Figure 5 details the term engagement represented on the Y-axis and the number of impressions shown on the X-axis. According to Chae (2015), impressions and user engagement represent the core metrics of Twitter Analytics. However, to our knowledge, no previous study has examined the interactions between Twitter Analytic core variables.



**Figure 5.** The relationship between the number of impressions and user engagement, shown using a line graph display.

To examine interconnections among all three user analytics variables, we counted the number of activities for each variable in our data set and summarized the result as a bar graph. Figure 6 summarizes user activity ranked highest in overall value.



**Figure 6.** Summary of users' Squid Game Twitter activities shown using a bar graph.



Next, we counted the correlation analysis between the three terms and displayed the results as a correlogram. Twitter activity had a stronger correlation measurement of the strength of the relationship between the two other variables. However, extreme outliers were present in each category with a negative score observed under the impressions and engagement categories. Figure 7 summarizes the correlation found between the three categories.

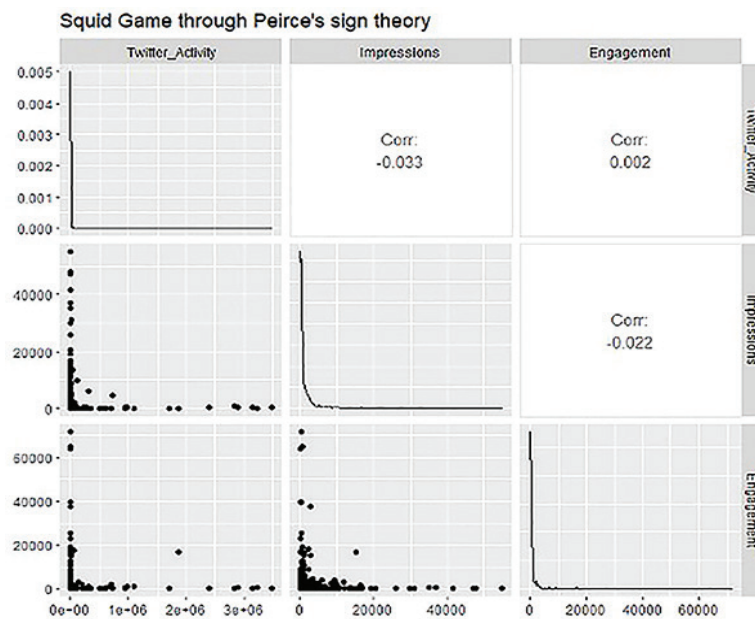


Figure 7. The correlations between the three variables in Twitter Analytics, shown as a correlogram.

The leading form of user activity on the Squid Game Twitter account was retweeting. Yang et al. (2010) reported that retweeting behavior can be captured by a statistical power-law distribution 35% of the time while other retweeting behavior does not match any statistical distributions with 31%. Our findings showed similar patterns, but we were unable to capture retweeting behavior under our data collection distribution. Approximately 69% of retweets did not refer to Squid Game, but rather to other activities.

Last, we tried to develop algorithms consistent with the criteria of Jappy (2013) and Peirtarinen (2012) for the evaluation of images according to Peirce's principles of visualization. Many open-source processes exist that allow for the analysis of image content. Those processes include techniques that allow the machine to analyze the physical attributes of the image, such as the pattern of the image and the point differential found on the image, among others. This process is based on the ability to convert images to data that are conducive to analysis. According to Pavlidis (2012), it is difficult to develop dual processes for the analysis of images that also incorporate the human interpretation of image meaning. We attempted to convert Jappy's (2013)

and Peirtarinen's (2012) criteria to algorithms to analyze the images we created. However, we found many of Peirce's principles of logic as outlined by Jappy (2013) and Peirtarinen (2012) are not easily applied to the analysis of Big Data visualizations. For example, the graphs we created were based on more than 350,000 data points, using a machine that could measure and assess the interactions between the three variables. However, according to Jappy (2013, p 167), interpretation of the graphs according to Peirce's principles would require an independent lens of psychology, ethnology, and cultural influences. We were unable to generate an independent algorithm or data set to match this demand. Likewise, one of Peirtarinen's core principles is reminiscence. This principle recommends the user to collect histological data and images to better evaluate the image. However, no historical Twitter data is currently available. These barriers prevented us from developing algorithms that faithfully captured Peirce's principles, as outlined by Jappy (2013) and Peirtarinen (2012).

Taken together, this study exhibited that the Peirce's sign theory R package can be used to analyze data from social media feeds to produce multiple types of data visualizations, together with information gleaned from Twitter Analytics. However, we were unable to develop suitable algorithms to follow Peirce's visual interpretation language due to difficulty in providing accurate interpretation of the meaning found in visuals, as understood through the lens of Peirce's theory. Indeed, according to Ezhilraman and Srinivasan (2018) the development of suitable algorithms and processes to evaluate and support the creation of visualizations presents an ongoing challenge.

## G. Discussion

This study highlighted two major gaps between Big Data visualization under Peirce's sign theory found in social media feeds. The first gap is the unmatched examination between Twitter Analytics data and Peirce's sign algorithm conducted on the open-source R platform. The subject of data authenticity found in Twitter data was discussed by many researchers who have reported that great quantities of tweets are generated by AI bots and are difficult to identify and remove from Twitter. To address this challenge, we analyzed Twitter Analytics as our first step in examining the core triangulation variables, for which no studies had been conducted. Our next step in this study employed open-source Peirce's sign theory R package and matched it to Twitter Analytics to report on interconnection and correlation between these three categories. The second gap the study found was the lack of a machine image evaluation algorithm based on Peirce's visual sign and grounded in social media data. Under this gap, we examined Jappy (2013) and Peirtarinen (2012) interpretations of Peirce's sign. However, we were unable to generate visual evaluation algorithms that matched Peirce's sign theory due to the complexity of the criteria together with the problematic nature of Twitter data authenticity.

To address those two gaps, this study employed the open-source Peirce's sign theory R package as its supporting platform for its social media data analysis and visualization. The open-source R programming language is known for its Big Data and visualization capabilities, especially with Twitter data. (e.g., Bello-Organ et al. 2016). Future studies will need to examine more advanced algorithms developed using Peirce's sign theory in terms of human perspectives to better understand observed data and data visualization models found in social media.

## H. Summary and conclusions

Social media platforms generate large amounts of data that reflect the complexity of human and machine activities. Many researchers have reported new concerns about the viability of these social media channels regarding machine-generated messages. As those data sets continue to grow in quantities, researchers have also used various theoretical and algorithmic frameworks to analyze social media feeds. Semiotics is the discipline that studies the foundation of sign associated with text and images and their meaning found in language and communication. One of the founders of semiotics is the American philosopher Charles Sanders Peirce who offered a triadic foundation for the term sign. This study raises the question: what insights do Peirce's visual sign theory contribute when we try to interpret Twitter data analysis? To address this question, first, we present the results using Twitter Analytics, and Peirce's sign theory R package to generate results visually. Second, we investigated whether we could use digital image processes and algorithms to evaluate the results considering Jappy's (2013) and Peirtarinen's (2012) discussion of Peirce's visual interpretation. The study's visual result showed common data visualization-type displays of Twitter data analysis using the sign theory of Peirce's R package technology with Twitter Analytics. Those visual results present interactions among the three Peirce visual sign categories and provide deeper insight into key concepts using Twitter Analytics terminology. We then explored the feasibility of developing algorithms for analyzing these visualizations based on criteria set out by Jappy (2013) and Peirtarinen (2012), who outlined Peirce's search for meaning found in visualizations. However, such algorithms were hard to assemble due to the complexities of those criteria and the complexity of social media data feeds: especially with human vs machine messages. As a result of our study, we established a close relationship between Peirce's semiotics framework and Twitter analytics and the generation of visualization using Peirce's theory. Future studies should investigate the transformation of Peirce's sign theory into more complex algorithms, as well as the behavior and interaction of social media users with visual content.

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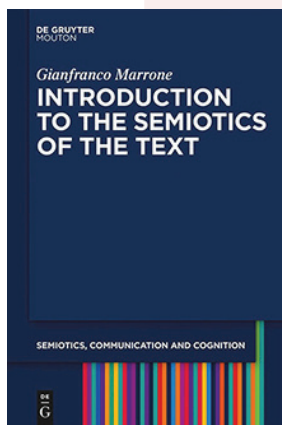
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## An introduction to semiotics?

punctum.gr

BY: Karin Boklund-Lagopoulou



Gianfranco Marrone

### Introduction to the Semiotics of the Text

Berlin: De Gruyter/Mouton, 2022. 197 pages. ISBN 978-3-11-068888-7.

Paul Copley and Kalevi Kull, editors of the series *Semiotics, Communication and Cognition* published by De Gruyter, have persuaded De Gruyter and the International Association for Semiotic Studies to collaborate in sponsoring translations of important works in semiotics that are not yet available in English. This is a major development in the field that should have all semioticians, whatever languages they speak, electrified with excitement. Anglophone and Francophone researchers naturally address primarily the reading public in their respective countries; Italian authors logically enough write for Italian readers, Hispanic writers for Spanish-speaking readers, and so on. This also affects the bookselling market: it is, for instance, extraordinarily difficult even for someone who does read French to order French books from Greece.

One result of this situation is that, with the exception of a handful of globetrotting polyglot semioticians, the field of semiotics has gradually tended to separate into different theoretical traditions, on the basis not so much of nationality as of language. This is a pity: semiotics is not so strongly established that we can afford to ignore work published outside our own linguistic field of vision. The initiative of the series editors is cause for celebration, especially when it brings us books such as this volume by Gianfranco Marrone.

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Potential readers should, however, be warned: this is not your usual kind of introduction. Though he does fill the first 12 pages with a charming and accessible presentation of the basic semiotic concepts, Marrone's ambition is in fact to cover more than half a century of complex and sophisticated theoretical development in less than 200 pages, leaving the reader rather breathless. He has a knack for saying fundamental and complicated things in a seemingly simple way, so that we do not always realize the scope and implications of the apparently straightforward page we just read.

The book, as the title indicates, is built around the concept of the text. It takes the form of an impressive account of the development of Greimasian theory, from its original form as a theory of narrative through the semiotics of passion, the focus on enunciation and the extension to the analysis of images, sensory experience and corporeality. What is noteworthy is that Marrone presents this theoretical corpus not in terms of its gradual growth from the 1960s to today, but to a very large extent as an integral, coherent whole, in which each new development is seen as an extension of concepts that are already in place. He also constantly relates it to the work of other semioticians. The result is a sense of theoretical completeness and coherence that is largely his own achievement.

Marrone in his first chapter chooses to present basic semiotic concepts through something that he calls a "fable": a little story of arriving on a Mediterranean island for a holiday and driving around looking for a beach. This is characteristic. From the beginning, his central concern is with the text not only in the sense of the many institutionalised forms that are already culturally defined as texts, but in the less easily recognized form of the flows of information that we receive and interpret constantly in the course of everyday life. His little fable allows him to introduce central theoretical concepts and issues—expression and content, sender and receiver, communication and signification, inference and cultural context, difference, value, narration, form and substance—in an apparently self-evident manner. There is no over-simplification and, remarkably, there is no attempt to attribute concepts to any particular branch of semiotic theory.

This changes in the second chapter, which is a very brief summary of the historical development of narratology. Here, Marrone pays his respects to the structuralist tradition and its assertion that "highly diverse cultural manifestations ... can be examined as texts *from a methodological perspective* even if they are not seen as such *from an empirical perspective* ... The text as understood from a semiotic perspective is no longer a thing, an empirical object, but a theoretical model used as a descriptive tool under certain specific and explicit epistemological conditions" (pp. 14-15). This, as he rightly observes, leads to the socio-semiotic possibility of examining virtually every aspect of social life as a text. It also leads to what is essentially the breakdown

of the boundary between text and context. Context becomes “that which is not pertinent to textual analysis” (p. 15), or perhaps more exactly, that which is not pertinent to the analysis of what the researcher has defined this time as the text. The text, which as he says is the specific object of study for the semiologist, is constructed each time according to the pertinence selected. It is in constant connection with other texts and discourses, open, permeable, dynamic.

Marrone then rather quickly backtracks a bit from this dizzying prospect, discussing the properties by which we recognize textuality. The text is still always a product of negotiation, but can be provisionally delineated in terms of properties such as (relative) closure and the syntagmatic and paradigmatic axes that give it formal coherence and semantic cohesion. This brings him to narrativity and the Greimasian generative trajectory as a general theoretical model for textual analysis.

There follows, in the next chapter, 35 pages on Greimasian narratology, including its later extension from narratives of action to narratives of being, i.e., to the semiotics of passions. Marrone begins with the semiotic square, its dynamics and the value systems (axiologies) that it articulates, continues with a very brief discussion of the essential elements of narrative grammar, modalities and narrative programmes, to arrive at the canonical narrative schema, which as he observes is essentially polemical in structure. This leads him to the need for a parallel theory of subjectivity, affect and the semiotics of passion, which also has its canonical schema. His presentation of the schema of passion relates it very effectively to the canonical narrative schema, showing how the moments of subjective pathemisation (constitution, sensitisation, moralisation) interact with the corresponding moments of action (manipulation, competence, performance and sanction).

The final section of the chapter returns to the canonical narrative schema in order to question the central position it gives to polemical, goal-oriented action. Marrone is certainly not the first researcher to note that this model of narrative is culturally determined, “a very precise cultural conception that tends to valorise action over passion, institution over sentiment, doing over being” (p. 58). However, it seems that his objections concern the applicability of the model to *behaviour* or forms of life: real Subjects do not always pursue very clear Objects, may have individual goals that are not socially recognized and do not fit neatly into a model designed to account basically for the stories we tell. I am not sure that I agree.

It is certainly true that forms of life are less explicit—probably less coherent—about goals and values than a Russian fairytale, but that does not imply that their values are not as fundamental and as deeply felt as those behind any romantic heroic story. We have only to consider the lengths people will go to if they feel that their way of life is threatened. The canonical model (as Marrone implies) needs to be applied with some flexibility. Rejection of dominant social values

is also an axiology; the sanction of any particular choice of action or non-action does not have to take a social form but can be purely internal, such as that of the conscientious objector or the vegetarian. The model of the canonical narrative schema is capable of any number of transformations. Marrone is well aware of this: alternative forms of life “can all probably be traced back to a *coherent deformation of standard models of civil living*”, deformations that can “enter into common use ... and become a source for negotiation in the social arena” (p. 59). But such alternative forms of life acquire their meaning of contestation or subversion precisely *by their divergence* from the standard schema—i.e., their divergence can be described and made meaningful only by comparison with the canonical form.

Marrone then turns to the next focus of textual theory, namely enunciation. This is the preferred term, in the Greimasian tradition, for the process of communication. It has its roots in the linguistics of Emile Benveniste, who pointed out that any utterance implicitly includes information on the speaker (among other things, in the use of personal pronouns, temporal and spatial indications, verb forms and so on). In other words, as soon as a language is put to use in communication, the act of communicating becomes inscribed in the utterance.

Greimasian semiotics has preferred to use the linguistic concept of enunciation rather than that of communication, because to treat communication as a process of enunciation allows us to examine how subjectivity emerges in discourse. “It is possible ... while analysing the enunciated text, not only to reconstruct the semantic structures of the message, but also the enunciative structures that have created it” (p. 67).

Such an analysis does not lead us to the actual speaker/producer of the text or to the actual reader/receiver; it leads us to their simulacra as constituted by the text, an Enunciator and an Enunciatee that can be seen as actants in a narrative of communication. The concept is familiar from literary theory: the implied author/narrator and the implied reader are textual constructs, not to be identified with any actual author or reader. But when applied to other forms of communication—especially highly mediated forms, such as mass media—it has interesting consequences. Marrone notes that between the actant positions in the text and the actors who take up these positions in actual communication, “there is almost never a one-to-one correspondence” (p. 68). Many different people and a great deal of sophisticated technology all assume the actantial role of a single Enunciator in a television news broadcast. If Enunciator and Enunciatee are seen as “differently constructed forms of subjectivity” (p. 69), they can have different degrees of modal competences (obligations, desires, knowledge, power). And their communication becomes less a transfer of information and more a negotiated relationship, an implied or explicit *contract*:

The result is an idea of communication and language that is very different from the traditional one. The criterion of an utterance's truth or falsity is not so much determined by its relationship of adequacy to the external reality ... but from the relationship between Enunciator and Enunciatee, that, on the basis of respective modal charges, can find an agreement on the truth of the communicative process ... The truth, from this perspective, is not the effect of a representation but the result of an inter-subjective relationship (p. 69).

In other words, we tend to accept a statement as true, not on the basis of external evidence, but on the basis of our trust in the source of the statement. In an era of anti-vaxxers and flat-earth conspiracy theories, that is something worth bearing in mind.

Marrone also uses the concept of enunciation to touch very briefly on other issues, such as discourse, inter-mediality, theme and figurativity, which are not necessarily best understood as aspects of enunciation. A more serious caveat, however, is something that he acknowledges from the beginning, namely that "reinterpreting communication as enunciation" (p. 62) "tends to play down the concrete communicative contexts (casual or constructed) of production and reception, together with the economic motivations (political, social, familial, emotional, etc.) that lead a given social actor to propose a particular communicative pact to a given public that accepts (or refuses) it" (pp. 62-63). His argument is that these concrete contexts are recuperated in the analysis of the process of enunciation: "Semiotics rediscovers these circumstances in the discourse, according to the basic semiotic principle by which the *communicative context of a text is inevitably present*" (p. 63).

The validity of this claim obviously hinges on the degree to which a semiotic analysis of enunciation can recuperate the full circumstances of the enunciative act *using purely semiotic methods*. Personally, I do not think that this is possible. A great deal of cultural knowledge goes into any interpretation of a text, and this is equally true for the traces of the enunciative act that can be found within it. With more or less contemporary texts from our own culture, we apply this knowledge implicitly. When we are confronted with texts from another culture, or from a more distant historical period, and not infrequently when dealing with complex technological processes of text production in our own society, we need to reconstitute such knowledge. In practice, that means that we have to rely on other disciplines (history, anthropology, technology, sociology) that use different methodologies. We still need semiotic analysis, but we cannot rely on it exclusively; semiotic methodology is simply not enough.

Much as he uses enunciation to introduce discourse and intermediality, Marrone in the next chapter uses textualisation—the passage from the plane of content to the



plane of expression—to introduce the analysis of images as texts. He very rapidly disposes of “so-called iconism, i.e. the natural or conventional nexus between images and reality”, specifying that “the image signifies thanks to perceptive cultural grids” (p. 85). As in his discussion of narrativity, the presentation moves smoothly (and very briefly) through nearly half a century of work on the semiotics of images, selecting the concepts that have proven useful (figurativity and plasticity, semi-symbolism, the plastic categories of eidetic, chromatic and topological together with light and texture) ordered into a coherent theoretical framework.

He then integrates this attention to the image with a discussion of how the visual can invoke the other senses: “Looking is a *process that involves the totality of the perceiving body*” (p. 100). This phenomenological approach leads him to a discussion of “the relationship between sensory and somatic processes that we have referred to as aesthetic” (p. 111) in its original ancient Greek meaning of *aesthesis*, sensation. Although “from the semiotic point of view ... the senses are not the starting point for the cognitive relationship between subject and object”, but are already culturally trained and formed by the “perceptive grids that, through specific cultural models, direct that very perception cognitively and pragmatically” (p. 112), he feels that it may be possible to perceive especially the plastic dimension as artists do, as a kind of “other” vision of the world, in what he calls the *aesthetic grasp*. It is an attractive idea, but I wonder whether, at this point, the notion of corporeality is not becoming dangerously metaphysical.

These 120 pages are then followed by nearly half again as many pages of an appendix on the history of the notion of text. The title is misleading. There is indeed a detailed presentation of how the concept of the text has evolved through the work of major theoreticians, from Barthes, Eco and Greimas to Lévi-Strauss and Lotman. But behind the discussion is Marrone’s own passionate argument for a socio-semiotics, for bringing the whole methodological apparatus of text theory to bear on social phenomena. This is something that informs the whole book; the appendix provides historical and bibliographical support for it.

Marrone is sympathetic to Lotman’s notion of the semiosphere, in which texts interact dynamically and what from one point of view is context can from another point of view itself become text. He also seems to approve of the perspective of Lévi-Strauss, where all versions of a myth are part of the meaning of the myth. There is one major drawback of such a perspective, namely that it becomes impossible to examine the relationship of any particular occurrence of the myth to its cultural and historical context. Different kinds of texts are constrained by different conventional rules of discourse. However, these are issues for further discussion, as is the relation of socio-semiotics to other social sciences that I remarked on earlier.

Marrone provides very full additional bibliography for further reading at the end of each chapter. The parenthetical references in the main text are kept to a minimum, which makes for much smoother reading but might perhaps be a little unfair to some other researchers. There are some minor problems caused by the translation from Italian of what was originally French terminology: the French *thymique* should probably be rendered in English as *thymic* rather than *timic*, and the French *sème* corresponds to English *seme* and not *semi*. But these are very minor details. The elegance of Marrone's integration of more than half a century of textual theory makes this book an essential part of every semiotic library and an invaluable asset to students of the Franco-Italian (i.e., European) tradition of semiotics.

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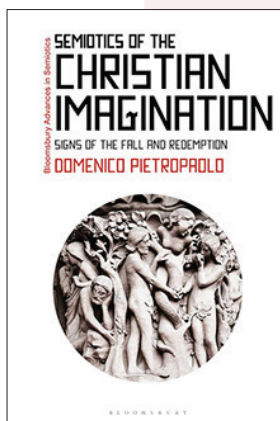




# Semiotics of imagination in religion

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BY: Thomas-Andreas Pöder



Domenico Pietropaolo

## Semiotics of the Christian Imagination. Signs of the Fall and Redemption

London *et al.*: Bloomsbury Academic. xii+244 pp., e-book,  
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“**S**emiotics of the Christian Imagination. Signs of the Fall and Redemption”, published in 2021 in the series Bloomsbury Advances in Semiotics, is a masterful and beautifully written result of decades of interdisciplinary scholarship. Its author, Dominico Pietropaolo, is professor emeritus in the Department of Italian Studies at the University of Toronto with simultaneous involvement in the Center for Theater and Performance Studies, the Center for Comparative Literature and the Center for Medieval Studies. Among Pietropaolo’s previous monographs are *Dante studies in the age of Vico* (Pietropaolo 1989) and *Semiotics and pragmatics of stage improvisation* (Pietropaolo 2016).

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## Point of departure, main issues, and the goal

The book begins with an instructive Preface (ix–x) explaining what the semiotics of the Christian imagination is. It summarizes the main investigative directions and ways of proceeding within this space, as well as makes explicit the basic presuppositions of the project. The importance of the preface as a kind of hermeneutic key offered by the author to the readers of his book is highlighted by the fact that in the book itself



Pietropaolo draws attention to the distortions in understanding caused by not taking seriously a text's prologue or dedication.

The preface starts with a straightforward definition: "The semiotics of the Christian imagination consists of [1] a repertory of signs and a logic of signification [2] through which the Christian community of faith is [3] encouraged to envision spiritual truths, [4] in accordance with conventional readings of Scripture [5] under the tutelage of the church." (ix) In my opinion the given definition is too rigorous and does not quite cover the richness and varieties of the chapters of the book. I come back to this point later. At first, I take a closer look at some of the elements of this introductory definition.

In the given definition, semiotics is presented as a function of the Christian imagination. The semiotics of the Christian imagination is therefore something that characterizes the Christian community of faith as such. Wherever there is the/a Christian community of faith, there is always Christian imagination at work, and therefore we always encounter there the semiotics of the Christian imagination as well. This means that semiotics is located here at the level of the phenomenon or phenomena to be studied. There is no Christian imagination without the semiotics of the Christian imagination. Correspondingly my first observation is that the author uses (here) the sign "semiotics" as referring to something that is implied in the Christian religion and can be made explicit via analysis. Thus, it is not introduced and explained to the reader, for example, as an academic discipline that engages in this case with the Christian imagination. To simplify: "semiotics" refers here to a sign system that is studied rather than to a somehow disciplined manner of studying it.

The Christian imagination involves, to formulate it in linguistic terms, a vocabulary and grammar. However, to Pietropaolo it is surely crucial that the constitutive elements of imagination and the logic of relating them to each other make up a structured process but are by no means only linguistic. They also belong also to other semiotic modes and dimensions of culture, like the art, music, drama etc. At the same time the focus of the author does not lie in the multimodality of Christian imagination as such, but in exploring the meaning making processes in Christian art and music, in the interpretation of the Bible and of nature (science).

The programmatic definition explains the meaning of "Christian" via reference to "the Christian community of faith." There is of course a myriad of possibilities and attempts to specify "Christian." The chosen option is solid. It is (at least at first look) a rather down to earth, descriptive, and in any case a community-oriented approach. This Christian community of faith is a community of faith because of its relation to "spiritual truths." It is telling that the Christian imagination is happening and encouraged in the context of a community of faith. What is "Christian" is specified in the first instance not via imagination of the community but via faith of the community. However, the spiritual truths believed by the community can be and are envisioned by that

community. The Christian community, so tells Pietropaolo, is encouraged to imagine, or envision the spiritual truths believed in.

The last part of the definition brings two further clarifications. It is a specifying statement about the structure of the Christian imagination, about the nomenclature of signs and the mechanism of their workings. The Christian community's envisioning of the spiritual truths is supposed to happen "in accordance with conventional readings of Scripture under the tutelage of the church." In Pietropaolo's understanding, the multimodal Christian imagination is dependent on "conventional readings of Scripture." There is a structural asymmetry: envisioning spiritual truths presupposes access to these truths via reading the Scripture. This structural asymmetry and order is valid vis-à-vis the Christian community of faith as such. It does not mean that on the level of individuals the Christian imagination is always preceded by reading the Scripture. Thus, Pietropaolo claims that the Christian imagination is something that systematically, although not always in the context of concrete biographies and life-stories of individual Christians, follows the reading of the Scripture. This is an important presupposition of Pietropaolo's view of the (semiotics of) Christian imagination.

Another presupposition is that the Christian imagination, being by definition a social or communal enterprise, is related to the conventional readings of the Christian Scripture. The importance of traditional reading is highlighted as a normative source of the Christian imagination. That means that the Christian imagination is not by necessity genuinely Christian but can correspond more or less to the community's traditional understanding of its canon. The Christian imagination can turn out be a Christian mis-imagination. The last bit of author's definition reveals the non-self-evident and rich character of author's presuppositions in approaching the Christian imagination most clearly. Namely, it is claimed that the church plays a guiding role in the process of determining the conventional reading of the Scripture in the community of faith. This way the definition describes the church as the point of orientation for the use of imagination in the Christian community of faith. The fact that in this way the church emerges as a counterpart of the community of faith signals with utmost clarity how the authors definition of "the semiotics of the Christian imagination," despite its appearance, is everything else than a universally and eternally valid statement about the Christian imagination in every place and time. It rather emerges out of a very particular space and time and is contextually bound to a particular tradition of reading and living Christianity.

The timeframe covered by the book encompasses "late medieval, Renaissance and baroque culture" (ix). Most of the material interpreted in the book comes from the 14<sup>th</sup> to 17<sup>th</sup> century, although in some chapters the author discusses examples from the 13<sup>th</sup> or the 18<sup>th</sup> century. Chapter 1 serves as a more theoretical introduction to semiotics in the sense of an explicit theorizing on sign and signification characterizes the book in

terms of its time-scope as a study of “the culture of the early modern period” (1). The preface gives no explicit hint at the geographical or cultural or confessional space. After having studied the book, it is clear the focus lies on the Italian culture. “[T]he tutelage of the church” mentioned in the definition of the Preface is implicitly at the same time a statement about the space. The semiotics of the Christian imagination is modelled in the book as the semiotics of the Roman Catholic imagination having its cultural and semiotic centre in Rome. The book is exploring (signs of) the emergence and construction of the distinct confessional consciousness, in the context of which the Council of Trent (1545–1563) and more generally the process of so-called Counter Reformation or Catholic reformation plays a crucial role. The book studies the pope- resp. Rome-centred Christian culture on the way to and in the wake of the Council of Trent. The process of differentiation and pluralization of the Christianity via the Reformation(s) builds an implicit background in the study of the semiotics of Christian Imagination in “the Catholic world” (11). The result is a highly impressive visualization and description of the workings of Catholicism culture in its “classic” shape, “of which the pontiff is the highest representative” (5).

The subtitle of the book “Signs of the Fall and Redemption” suggest the Fall and Redemption as a double focal point of the Christian imagination structuring or organizing Christianity as a world of signs. Again, the choice might at first sight appear as a way of identifying the universal basic pattern of Christianity. Although signs of the fall and redemption have played an important role in Christian imagination, these sign processes are nothing but static—as the book vividly helps to realize—and therefore only with reservation are “signs of the fall and redemption” to be generalized as the universal code of “the Christian imagination.”

I understand the goal of the book to be an illumination of the workings of the Christian imagination, thereby contributing both to the understanding of the Christian religion in culture and to the understanding of culture in the light of the Christian religion (that is, as Christian culture).

## Methodology, methods, and the first chapter on semiotic theory

To achieve his goal the author looks for “the semiotic strategies ... to focus on the ... object of contemplation”—i.e. on the aspects of the fall and redemption—“and to give that object a rhetorically and aesthetically captivating form.” Thus, he investigates “the semiotic paradigms of various fields of culture” as far as they are filtering these spiritual truths and giving them material representation (ix, 1).

The book turns out to be more a case-driven analysis than a theory-centred exploration. It is divided into 10 chapters with 20 pages on average. Although the ideas of

the fall and redemption are intrinsically interrelated, chapters 2 to 5 are more related to the fall of and chapters 6–10 to the redemption of humanity. Chapter 1 is different in character as it does not analyse individual examples of semiotization of the fall and redemption but gives an overview of the authoritative theory of signs that had been “developed ... in the later Middle Ages and Renaissance” (ix) for the sake of making sense of and encouraging the exercise of the Christian imagination. That ecclesiastically official sign theory emerging in particular out of the context of reflecting on and teaching about sacraments—i.e. in the framework of overcoming the consequences of the fall and gaining access to the reality of redemption—determined significantly various fields of culture that the author sees as different “semiotic paradigms” (ix, 1) or “modes of communication” (131).

If we understand methodology as a framework for identifying, selecting or constructing a method for a study of something, then the preface contains an explicit statement about the methodology as well. The author declares namely Giambattista’s Vicos’ (1668–1744) “philosophical principle” of “poetic logic” as informing his approach in the book (cf. viii–ix, 19–21). According to the author: contemplating on the essence of things—on their being—through theology and metaphysics “is identical” with a perceptible signification of that essence in all areas of culture by authors, playwrights, artists, composers, performers or scientists.

“The main argument of the present book is that the structure of the Christian imagination, as displayed in its contemplation of the fall and redemption of mankind, comprises both versions of semiotics as inseparable aspects of its operation, which is always simultaneously cognitive and creative.” (x) I understand the author as saying that the study of the Christian imagination demonstrates how there is no cognition (of sign) without creation (of sign). In other words: the book is presupposing a kind of creative or poetic (and therefore not-naïve) realism. Truth claims are possible because they appeal to the objectively real, to the spiritual truths. However, they are always implying creativity and subjectivity as far as the cognition of the spiritual, the sacred, or the transcendent belongs to the finite beings and is imagined in earthly forms and material.

Therefore, the author in his attempt to explicate the structure and dynamics of the Christian imagination highlights on the one hand the normative role of the church and its official metaphysical-theological teachings. In doing this, he refers to Vico’s understanding of the relationship between philosophy, theology, and poetics where they are not separated by static and clear-cut borders but come together in their analogical movement between the immanence and the transcendence. Metaphysical and theological cognition goes hand in hand with poetic imagination and creativity, with perceptible signification in the arts and sciences. All fields of culture in their functioning, all creative operations of culture, follow a poetic logic or poetic semiotics in semiotizing



perceivably and materially—in short: immanently—the spiritual (metaphysical-theological) truths or the transcendence. Earthly culture as a whole is a semiotization of the transcendence.

Chapter 1 on “[t]he centrality of signs in the Christian imagination” suggest understanding the culture of the early modern period as interaction with the Bible and theology. Sculpture, art, music, drama, literature, and science are semiotic paradigms for “explicating fundamental passages of Scripture”, for “illustrating related principles of doctrine and faith” (1). This way Pietropaolo is implicitly hinting at the structural dependence of the doctrine on the Scripture, but also introduces faith in the first place at the level of doctrine.

The early modern culture is characterized as being profoundly interested in the idea of imaginative representations. In the centre of this interest stands “the development of a semiotics of imagination by means of which to understand in a concrete manner, and to give material expression to, abstract principles of official doctrine pertaining to the ideas of the fall and redemption of mankind” (1). This semiotics of imagination is both an instrument of cognition and of expression. Imagination is related to “abstract principles of official doctrine” by being both based on it and guided by it.

Again, this structural description of the Christian imagination as concrete and doctrine as abstract and official, operates within a rather late and specific development in the understanding of the Christian teaching. It is teaching in the sense of a legally binding error-free doctrine given by the church to be believed by the people, and the corresponding concept of faith consists of willingly affirming these officially sanctioned propositions. Teaching as a proclamation of the gospel and faith as a relationship of trust in the gospel would be, for example, much closer to the New Testament witness and its use of these terms.

In outlining “the semiotic apparatus” through which the Christian imagination related “the world of immanence to the world of transcendence” Pietropaolo engages therefore in a close reading of sources that, as he highlights, have not usually been referred to in academic accounts on history of semiotics but are nevertheless significant as they represent the officially recognized mainstream thinking on the subject.

These sources were part of the preparation of the priests who again had the task of educating their congregations, so they were able to participate in the sacraments as sacred signs and relate properly to other signs of the sacred that expressed imaginatively the spiritual truths (of the fall of redemption). These texts on signs’ nature generally and more specifically on biblical and sacred signs come from Innocentius III (1198–1216), who was one of the most famous and influential late medieval popes, as well as from Cardinal Tommaso de Vio (Cajetan), an authoritative theologian of the Renaissance who is introduced in the book as “a key figure in the development of semiotic awareness in this period.” The third source is the Catechism of the Council

(Trent) that determined decisively the shape and development of Catholicism for centuries. In comparison, the next council took place not earlier than in the end of the 19<sup>th</sup> century (First Vatican Council), and its decisions continue to have a normative significance for the catholic world.

Innocentius III is an exponent of “the semiotic self-awareness of contemporary culture, of which the pontiff is the highest representative, indirectly citing only those views that he is willing to sanction with his authority” (3). Differently from Augustine the late medieval theologians, beginning with Thomas Aquinas, extended the concept of sign to cover not only sensible but nonsensible signs. Mental entities like images and ideas redirect as signs our understanding towards something other than they are—they are characterized by a signifying intentionality. In taking up this line of thought, Cajetan in reflecting on God’s mode of speaking views it as happening on the one hand through external signs and therefore through senses and on the other hand through internal signs directly addressing and guiding one’s intellect and imagination.

In order for it to be understandable to humans God assumes “a mode of speaking that is commensurate with the capacity of the human intellect” (7). God speaks like a human being. Pietropaolo calls it “a semiotic strategy of convergence” (7) or “communicational accommodation” (8). The signs of God’s revelation are simple (cf. Roman 1:20). However, despite human’s natural ability to understand and love God, recognizing and understanding God’s signs can turn out to be difficult as “a result of a deliberate decision to do something reprehensible” (8). To hear and understand God a human has to be “in the right frame of mind to receive this sign.” It presupposes “a special disposition”, namely righteousness (8). According to Pietropaolo Cajetan considers it as “a creaturely version of communicational accommodation” (8). Wilful decision to do what is wrong inhibits communication on the human side. The most objectionable deed is a wilful ignorance of God. In short: in Cajetan’s model understanding God’s communication presupposes the disposition of righteousness. To understand revelation presumes having the right will to understand it.

Cajetan’s approach to the interpretation of the biblical text is based on his understanding of signs and operates with a distinction between literal and spiritual meaning of the text. Biblical story uses signs for (words about) particular events, including speech events (spoken words), and thus the text of the Bible signifies on the first level literally. But these events themselves are signs for God’s will and aspects of God’s revelation. Thus, on the second level the biblical text signifies spiritually. The revelation—God’s speaking—occurs through language but also through events that are signified in the language of biblical stories. This implies importantly that mental visualizations and images are themselves signs that direct readers to aspects of the revelation a passage is intended to convey. Pietropaolo sees in Cajetan striking similarities with the Saussurean tradition of semiotics in understanding both the signifier and the signified

as mental entities and the relationship between them and the referent as arbitrary. In Cajetan also the social dimension of sign-use is highlighted. The comprehensibility of signs is limited to the community: “signs presuppose a community of people linked by them. Nor are all the signs available to a community exclusively verbal.” (10) in the book Pietropaolo comes repeatedly back to Cajetan and, by the way, indicates parallels for example between him and Saussueran semiotics (9), between him and Lotman (51), between him and Peirce (138).

Among sacred signs sacraments are special as far as they not only signify but realize or perform or enact sanctity. Sacred signs “account for most of the spiritual and cultural life of the Christian community” (16). All communities “presuppose the existence of a body of signs held in common by their members” and the Christian community is bound together and identified by the symbols that articulate the spiritual life of its members.” (16) That social cohesion and spiritual affirmation is a result of “the acceptance and cultivation of the semiotic code of a common spirituality” is for the Catechism a fundamental and universally valid truth (16). Through this common (sensible) symbolism of the common spirituality can members of the Christian community—the Catholic world—learn to know God’s will and can God reveal Godself to the community. Sacraments constitute the core of this symbolism because in these “semiotic rituals” coincide God’s communication of grace and humans’ reception of it. They are acts where God (God’s grace towards human) and human (faith or trust in God’s grace) meet. “The signifying process is performative in both directions, and it is in this compound performance that the sacraments enact what they signify.” (16) Sacraments signify and perform grace and faith—they present what they represent.

The Catechism visualizes what is happening in the sacraments—the sanctifying, transforming touch of God in the soul—with traces of footsteps in the sand. The sanctity enacted via sacramental signs in human being signifies God’s acting in the human (18). Thus: the sanctity (the faith) of a human signifies, testifies, perceives in the sacrament the invisible presence and action of God. In Peircian terminology the sacraments are a special case of indexical signs. The Catechism imagines sacraments on the model of signs operating as signs because they involve a relationship of causal kind: sacramental signs signify because they sanctify. Pietropaolo summarizes: “[I]ndexicality is without doubt the most prominent semiotic aspect of the sacramental imagination.” (18) In the background stands the so-called vestiges of God-tradition: elements of creation are understood as “material traces of the causality of God.” Indexical signs can materially represent a causality of which they are a result and direct our attention to it even if the cause is not sensible.

Pietropaolo’s overview about the explicit reflection on signs taking place in the normative centre of the early modern culture and the results of which were systematically and widely disseminated via catechesis and preaching constitutes a background to case studies in the chapters to follow. They are intended to direct readers, provide

background information, demonstrate the high level of semiotic consciousness, and its officially sanctioned and publicly transmitted shape. However, the following chapters and their “contemplation” of concrete examples of Christian imaginative discourse in a variety of modes can by no means be reduced to a simple application of this more theoretical or abstract material. Indeed, each chapter is readable on its own by combining minute discussions of cases with more general theoretical observations, historical background information and occasionally drawing parallels to topics from recent developments in semiotics. However, together they mediate a plurimodal and multifaceted access to the early modern imaginative mind organized and guided by the operations of the signs of the fall and redemption. This relative independence is also visible from the fact that there is no chapter summarizing the results of what has happened and what has been claimed and argued for in the chapters of the book.

## Overview of the main body of the book (chapter 2 to 10)

Chapter 2 on “Gendering the serpent” analyses three examples from the highly popular tradition in the Late Medieval and renaissance culture that pictures woman as an instrument of the fall of humanity, and thereby in fact demonizes femaleness. In the story from the Bible on the temptation and fall of Adam and Eve the devil or the serpent is interpreted visually as having woman’s face or as having an upper body of the woman. In continuity with the antiquity, visual signs were considered as superior over verbal signs in affecting the imagination and understanding of the people. The architecture, sculpture and visual arts were used by the church as semiotic tools to communicate basics of Christian teaching and of biblical narratives.

In the book that proceeds otherwise in a descriptive mode—consistently refraining from explicit and strong evaluative judgements about the content of the Christian imaginations and of the theology and teachings supported and sanctioned by the church—Pietropaolo makes here an exception. Although sexualizing the serpent does not have any basis in the narrative of the Bible, the motive became widespread in the dominant “misogynism of art and theology” of “the Counter Reformation.” “The anti-feminist” reading of the Biblical story of the fall “tacitly enjoyed the official sanction of the church” (25; cf. 166–167) and was multimodal, including the pictorial worlds of church buildings, communicated as God’s word and thought.

In the chapter visual examples are selected based on the importance of their ecclesial-institutional context that lends them “the authority of the institution” and therefore “an extraordinary illocutionary force” (26). They stem from: Bologna, where there existed the most important church in Italy outside Rome; from Paris, that was a leading intellectual-spiritual centre; and from Rome. Pietropaolo interprets sculpted panels on the portals of San Petrinio and Notre-Dame and Michelangelo’s and Raffael’s panels in Vatican.



Chapter 3 presents a very different and self-consciously non-conventional position on the issue via close reading of a commentary to the Genesis (1530) by Cajetan, a leading theological mind who already played an important role in chapter 1. Contrary to the church's tradition that had been using the Latin translation of the Bible, Cajetan takes the Hebrew text as the basis of interpretation and aims at carefully explicating its literary sense. According to his hermeneutically reflected and subtly argued reading there was physically no serpent present, and no external dialog took place between the serpent and Eve. In the passage the language is used figuratively to visualize what is happening in Eve's mind after the suggestion made internally by the devil. Serpent and dialogue are material signs of the nonmaterial mental process (48, 54, 65–66). To think there that there was a serpent, as usual by theologians and artist, is to misunderstand the literal meaning of the story. Rather, the serpent is "a metaphorical sign of evil thoughts within the soul" (64). Cajetan's hermeneutics as elaborated by Pietropaolo with its focus on the Hebrew text and on the literal sense via which "the text itself orients the reader towards its own correct interpretation" (54) bears some interesting similarities with his "antipode" Martin Luther. A significant meeting of the two had occurred in Augsburg in 1518 (Basse, Nieden 2021). Cajetan's commentary is at times extraordinary also in viewing women more positively than usual. However, as Pietropaolo notes, at times he does not let the Hebrew text of the Scripture lead his reading but his theology that reflects the social hierarchy of genders and traditional view of women's weakness making Eve a suitable candidate to fall to the temptation. Cajetan's "metaphorical serpent"—a provocation in the exegetical tradition—finds a parallel in manuscript images from the 14<sup>th</sup>–15<sup>th</sup> century depicting the scene of the narrative of the fall Adam and Eve without the serpent.

Chapter 2 and 3 deal with visual and literary depictions of the fall of Adam and Eve. But these visualizations direct a man in the presence of these depiction to see in every beautiful woman a potential seduction and an external temptation by the devil (like in chapter 2). In chapter 3 for Cajetan the temptation is internal, related to doubting about the validity of the limits, to desiring for limitless freedom. Chapter 4 about "workers of evil" deals directly with circumstances of the contemporary culture and society and analyses semiotically the phenomena of witchcraft, witch hunting and inquisition in the early modern culture.

Pietropaolo observes a hermeneutical shift in the middle of the 15th century when scholars started to read the culture of their own time back to Dante's literary text about Virgil showing soothsayers and sorcerers in *Inferno*. Literary themes in Dante became signs for and were seen in correspondence to phenomena in contemporary society. In the background lies the tropological interpretation of the Bible and the idea of types: "the expression of an idea in the text may be regarded as embodied by particular individuals or events in the present, which seem to have a similar form" (68). In the

context of rising interest in witch hunting across Europe several juridical and theological works on demonic witchcraft were published. Pietropaolo very interestingly and insightfully analyses a few passages from two pioneering authoritative and infamous works that are directly relevant for the semiotic imagination of the fall. First, a papal bull (1484) that described officially the crime of the witchcraft authorized and guided a massive investigation of suspected witches and declared all convicted ones to be the enemies of Christianity and redemption. "In the church's hideous crusade against witches, it gave the prosecution hitherto unknown support and momentum." (71) Second, *Malleus Maleficarum* [The Hammer of Witches] (1487), an "extremist" (69) handbook on witch-hunting, developed a "witchcraft semiotic in the elaborated theory" (85) and played a dominant role in the early modern demonological culture up to the 17<sup>th</sup> century.

Chapter 5 on "the fall from harmony" takes as its starting point Augustine's influential interpretation of the earthly paradise as an image or a figure for the church opening up a rich field of further possible correspondences. One interesting development in the Christian imagination was to interpret the Garden of Eden as a sign for a chapel where sacred music is performed. This illustrates well how "signs are used not only to signify and communicate existing ideas but also to produce new ones" (89). The period under concern is already the baroque era where the idea of primordial harmony was very popular. Pietropaolo explores via two cases how the Christian imagination uses signs foreign to "the semiotic domain of the musical and theological code" as destabilizing and "generating parodic inversions of meaning" (90).

Despite its title "Fall from harmony", in the chapter 5 there occurs already a shift of emphasis to the topic of redemption, to the aspects of overcoming the consequences of the fall. Chapter 6 on "Passiontide Drama", the longest one in the book, goes back in time to the transitional period between the Middle Ages and the Renaissance where "many joined religious orders, practised conspicuous penance, participated actively in sacred rituals, made pilgrimages to holy places, became self-torturing mystics, and purchased indulgences, surrounding themselves with signs of the Passion and redemption from all the arts" (105). It was time where ideas like purgatory and good works or merits were in vogue.

Pietropaolo attempts to approach this Christian culture by answering the question how it understood "the issue of spiritual catharsis before dramatic re-enactments of the supreme spectacle of Christ's suffering" for the redemption of humanity (107). In the Late Middle Ages the sufferings of Prometheus and Job were typologically seen as "proleptic signs of the Passion of Christ" and this raised the question about the possibility of Christian tragedy. Pietropaolo examines a source on the Mass as the ordinary Christian tragedy that explicitly relates the theory of Greek classical tragedy and the theology of the Eucharist (109). "The achievement of consciousness of redemption, in

the here and now of the communal experience, is the intended cathartic effect of the performance.” (109) The Mass, “the very heart of Christian worship” was commonly seen as “an allegorical ritual of the Passion in dramatic form”, but there was debate “concerning the nature of the relationship between the enacted representation and the historical event at its origin.” Although the Mass is seen as a sacred drama, its significance by far does not exhaust in tragedy but is also positive and comic (116). The rememorated suffering of Christ constitutes a condition of possibility for the salvation of the entire humanity and the dramatic form of Christianity includes Resurrection.

In addition to elaborating the mass semiotically in the paradigm of drama Pietropaolo analyses Passion plays. In their cathartic aim these have to be interpreted in relation to the function of the Mass in the redemption of the humanity. He “identif[ies] the principal signs involved in the cathartic aspect of the spectacle of suffering and [] sort[s] them out “for dramaturgical interpretation” (117). Passion plays are intended to have the following impact: “to suffer along with Jesus for the redemption of man and to triumph in the experience: *gaudeo in passionibus* [I rejoice in my sufferings, cf. Col 1:24–T.-A.P.]” (118) To understand how this double experience is semiotically achieved, Pietropaolo interprets in a novel move selected Late Medieval Passion plays and two scenes in particular from dramaturgical perspective as production scripts.

The crucial results concerning the relation between history and faith are highlighted in a concluding reflection (127–130). “The chief concern of the plays and, we may add, of the liturgy [including the sermon–T.-A.P.] in which the same events are celebrated is not with the magnitude of the suffering of Jesus as a man in history but with the here and now of the community in attendance.” (128) They are not simply informing about the past but invite the individual and the community to discover the salvific significance of the Scriptural events in the present reality of their lives.

Imaginative signs in sacred art are not only used to teach or inform about a sacred narrative or a spiritual truth as inspired “by a sacred text and validated by the church” (131) but also to evoke a transformative spiritual process in their recipient towards what they signify. They combine a referential and a conative function.

Chapter 7 on “Signs of passion and compassion” is about the challenges to imagine artistic elements that are not so explicit in the Scripture like reactions of those who witnessed the suffering of Christ (“the swoon of Mary”) or the exact mode of how he was crucified. Pietropaolo considers “the semiotic process involved in making such artistic choices, starting with Cajetan’s analysis of the proper way of representing the suffering of Mary as a witness of the Passion of her son, and following it with various depictions of the crucifixion in a manner that does not elicit a strong emotional response” (132). He offers deep insights into the development and logic of the sacred sign of Mary and of the Marian piety that became very popular in the Late Middle Age and early Renaissance culminating at the end of the 15<sup>th</sup> century.

Chapter 8 on the imitation of Christ as the model (sign) starts with a distinction between and characterization of contemplative (holistic) and meditative (analytic) approach to sacred paintings in one's spiritual edification. The result of the meditative mode used in the Jesuit pedagogy is "a blending of the painting into expository discourse", "a double-coded discourse created by the fusion of linguistic and visual elements" (153). How this exactly works evolves during the chapter via Pietropaolo's detailed semiotic analysis.

His verbal-visual sources stem from the beginning of the 17<sup>th</sup> century, from a book of sacred emblems intertwined with expository and exhortative essays on how to imitate Christ in one's own life to be(come) a true Christian. The idea that the achievement of redemption or salvation necessarily involves the imitation of Christ by means of good works is the result of an interpretation that harmonizes philosophy and the Bible. The chapter lets itself be understood as a good introduction to the principles of the Christian ethics of Renaissance humanism and as an analysis of the performance of the (true) Christian life as involving "a complex dynamic of cyclical semiosis" (164) intrinsically related to imagination. „Painting an image of Christ in one's heart or on one's soul is an exercise of the imagination rendered possible by the visual culture of the time, which encouraged reliance on structured fantasizing in the effort to get closer to God. But achieving a transformation of the self through improved conduct is a practical exercise that can result only from a rational decision to behave as Christ would behave if he were in the same situation." (160)

If I put it in a very abstract way, the last two chapters focus on aspects of imagining the world of humans as history and nature. Thus, the book comes to an end with imagining time and space, the limits of humans' situation, the end and beginning of history and its process, the cosmos as perceived from the earth, the heaven and sky.

In concrete terms, in chapter 9 the "signum magnum" in heaven (Apocalypse 12:1), identified also as the polar star, is Mary as the Queen of Heaven. In the rising Marian devotion, it "became a reference type for the semiotization of historical struggles against the forces of evil, all ultimately interpretable as echoes of Mary's role in the [history] of salvation" (166). In another typology Mary was the antitype of Eve, according to the Vulgata (mis)reading of the messianic prophecy of Genesis 3:15, "the serpent defeater ordained by God to reverse the process set in motion by the fall" (166). In the focus of the chapter are biblical tragedies "Ester" and especially "Iudit" by the great Italian baroque dramatist Frederico Della Valle, published in the third decade of the 17<sup>th</sup> century, in the context of heavy theological critique against Mariology. Both Ester and Judith have to be considered as types of Mary.

Type as the first element of a typological correlation can become complete in its meaning only when antitype as the second element arrives on the scene (168).



Pietro Paolo explains in detail the semiotic functioning of the typological interpretation. He does it by analysing first how Della Vella is leading the viewers to become aware they are entering into the world of signs—a distinction between “seeing in” and “seeing as” is here of relevance –, and how he constructs his main characters as signs having a “temporal semiotic structure” pointing our minds both forward and backward in time (170–171). “By virtue of semiotics of typology, Iudit participates in that part of the work of redemption that concerns the defeat of Lucifer. By decapitating Holofernes, she recapitulates the messianic prophecy of Genesis, and she anticipates the slaying of the dragon in the Apocalypse.” (178) For Della Vera typology makes the future, rather than the past, relevant to the present. This is so, because typology is not only a mode of interpretation or hermeneutics but also a structuring principle of history. It presupposes a metaphysical quality binding the mutually explanatory elements together teleologically (173–174). Therefore, the chapter is about imagining history (as history of redemption) through an insightful deconstruction of the construction of the sign and cult of Mary in the (Catholic) Christian imagination.

The theme of the last chapter of the book “The starry saints” is the semiotic relationship between God’s two books—the Bible and the nature (or religion and science). Pietro Paolo’s focus of discussion is a celestial atlas by Julius Schneider from the first third of the 17th century as seen in the broader context of the spiritual and semiotic culture of Counter-Reformation and Baroque aesthetics. In this work “large and detailed maps of the stars ... the constellations are reconfigured as allegories of Christian narratives”, bringing creatively together science, theology, and aesthetics (182). “Schiller’s Christian cartography was at the time an entirely logical development for both science and religion. A map of the celestial vault is the spatial counterpart of the calendar, not only in the scientific sense that the latter could not be constructed without the former but also in the practical sense of their intended function, which is to enable us to find orientation in time and space.” (191)

Pietro Paolo analyses, first, how and under which presuppositions this “trans-signification of the book of nature, or the transformation of its semiotic value” (187) functions, and second what structure and movement is implied in the imagination of transcendence it evokes. Among others Pietro Paolo takes up Peirce’s analysis of icons and especially diagrams: “the signification of diagrams is a matter of construction and reconstruction rather than direct reference” (194). Schiller’s sidereal signs are diagrammatic. The most interesting aspect of his maps is the convex direction of their curvature. He is “offering a stargazer the fiction that he can project himself into the realm of transcendence and imaginatively assume the perspective of the saints in heaven beyond the bulge, even as he retains his human vantage point as a man looking at the stars from the surface of the earth within the bulge.” (197–198)

## Concluding discussion and further perspectives

Despite possible expectations raised by the title “Semiotics of the Christian imagination” Pietropaolo’s books does not propose or presuppose something like a general semiotic perspective on religion (if not a theory of religion) as developed via focus on imagination. Nor does it want to be more specifically a semiotic theory of Christianity. It rather investigates the role of imagination in the Christianity that was determined by the early modern Catholic church. Other branches and paradigms of Christianity of the time stay invisible because they are lying outside the borders of “the Catholic world.”

Neither does the book attempt to approach the Christian imagination from the perspective of contemporary semiotics of image and imagination. No explicit contact is established with contemporary multifaceted research and discussion on imagination. The strategy of the book is not to theorize and define imagination—I rephrase it here as creativity—per se but to explore its manifestations in and vis-a-vis the Christian religion through art, music, drama, science etc. The point of orientation in the book is the auto-communication of the Early Modern Christian culture; and the attempt is made—a very telling one—to reveal the significance of its dominant signs, their creation, organization and dynamics in the framework of this particular semiosphere.

Giambattista Vico with his “New Science” (1725) and “poetic logic”, is in a very condensed form mentioned as the integrating theoretical vision behind the book. It implies a commitment to a very interesting, but also specific and controversial understanding of the relationship between philosophy, theology and poetics (cf. Milbank 1991a, 1991b). Usually the terms “theology” and “philosophy” resp. “metaphysics” are used in the book in a nonpoetical sense (together with Cajetan, cf. 138).

Pietropaolo interest lies mostly in clarifying questions like: Towards what kind of imaginative contemplations expressions of the Christian imagination direct their observer or reader? What kind of intentionality is implied in these signs? Where and how do they guide the one who perceives and is affected by them? It is not incidental that he can characterize the process of relating to a cultural period and its issues in the book as “contemplation” (xi, 2, 21). The many references of Pietropaolo to the Ancient and Medieval times or to Modern times, especially also his use of the elements of modern semiotic theory and analysis, are not necessarily every time implying or demonstrating the presence of some kind of direct causal link but are rather functioning typologically. They help readers imaginatively to understand a particular element as performed in the particular context of the Early modern culture. Thus, the primary target of drawing parallels between theology

and semiotics both backward and forward is to enable us to see imaginative universals and perceive patterns in concrete enactments of early modern culture. In short: Pietropaolo exercises cultural analysis in the spirit of poetic logic and typological hermeneutics. By directing the reader's gaze backward and forward, the early modern Catholic imagination and its functioning becomes itself visualized or modelled as a type. It becomes perceivable as an imaginative universal and opens up a possibility to perceive anew the significance of our own being and its challenges in the 21<sup>st</sup> century, whether or not we are accustomed to imagining ourselves as religious in some way or other.

As I indicated above, Pietropaolo's use of the sign "semiotics" oscillates between semiotics as semiosis and semiotics as reflexion on semiosis. He wants the period under study to become recognized as significant although overlooked in the history of semiotics. With reference to John Deely Pietropaolo suggest seeing the Renaissance "as the silver years of Latin age of understanding" (6, cf. Deely 2001). This is surely worth considering. However, by exclusively focusing on Catholic Christianity Pietropaolo's book on "Semiotics of the Christian imagination" may unintentionally support the impression as if it was only the Catholic church and culture where semiotic consciousness and reflexion on semiosis had a very important place, and therefore as if for the history of semiotics it is only the Catholicism that has (had) something to contribute. First, this picture would leave completely out of sight Orthodox Christianity. I recall here only the very important discussions on icon and iconicity (cf. Oltenau 2021). In addition, this picture would support the idea that Reformation and Protestantism have not only zero but rather a negative contribution to the semiotics of Christian imagination as far as Protestantism is reduced to a semiotically dumb literalism (cf. Yelle 2013). This picture would be a caricature. From the period treated by Pietropaolo I only refer to Martin Luther's very remarkable and, in many ways, significantly different paradigm of semiotic reflection as discussed in Gesche Linde's gigantic research on sign and certitude from the Antiquity to Peirce (Linde 2013, 331–707; cf. Schwöbel 2003, 62–65).

Pietropaolo speaks about "the centrality of semiotics in the Renaissance" (10) in the sense of "the semiotic orientation of the seventeenth century and beyond" (10), of "the semiotic culture of the Counter Reformation" (182), of (Catholic) church's "semiotic orientation" (2). This *modus loquendi* should not hinder us from recognizing that even in cultures where an explicit semiotic theorizing is not present, they can nevertheless be analyzed in terms of their semiotic orientation or semiotic ideology and its particularities. It is a commonplace from a Lotmanian perspective that every culture is semiotic. It means that the enactment of the Christian imagination is sign-mediated also in context where its metasemiosis (i.e. theology) is developed differently or weakly or is missing. It would underline the significance

of Pietropaolo's book and open it up for generating new insights if it would be complemented by the semiotics of the Christian imagination in the context of its other paradigms and periods.

Pietropaolo's book contemplates the performance of the Christian imagination. His analysis is evidently informed by developments and discussions in modern and contemporary semiotics and in other relevant disciplines, but he intentionally attempts to treat the functioning of semiosis and its elements in the framework of the insights and instruments of the time. Therefore, it is only natural that Pietropaolo intentionally abstains from raising questions about the validity of particular contents of the Christian imagination of the time or about the validity of elements of semiotic theory of the time taken up in his analysis. "The Christian", as said, is determined via reference what the doctrinal theology and the church of the time sanctions and defines as "the Christian." In that line "theology" comes to signal somewhat one-sidedly the abstract content-source and control mechanism over the Christian imagination. The fact that Pietropaolo in two related issues becomes himself very critical and refers to opposite view of the time indicates that even if it may stay well behind the scope of the work to question critically the truth-claims, it remains a necessity to make distinctions. Therefore, it would be a complete misunderstanding of the book to think that beside these two critical points we should recognize in the presented vision somehow the normative example for the content and shape of the Christian imagination and culture or that the semiotic reflexion of the time could be somehow the universal(ly valid) semiotics of Christianity.

Last but not least, if we consider Pietropaolo's book as a contribution to semiotics of religion, what kind of semiotic of religion it advances? According to a simple typology (cf. Pöder 2021a) it is definitely semiotics of religion in the sense of using instruments and elements from semiotic research with respect to material considered to be religious. Pietropaolo's case studies in 9 chapters use semiotics mostly in a more eclectic and ad hoc way as a toolbox of instruments enabling in his case to explore religious imagination across different modalities without a clear cut commitment to a particular general theory or tradition. This is the most common way to encounter semiotics in the context of studying religion. However, a brief glimpse at a Vicoan general semiotic theory of culture at the start of the book invites us to imagine the following chapters in the horizon of this broader integrating framework. It seems that the general framework entails not only historical but also theoretical significance, although it surely would fall beyond the scope of the book to present it in detail and argue for it. Therefore, Pietropaolo's book can additionally be seen as a version of a wider project of theorizing and analyzing religion in the context of a semiotic theory of culture—as a cultural semiotics of religion (for another version proposed in dialogue with Lotmanian semiotics cf. Pöder 2021b).



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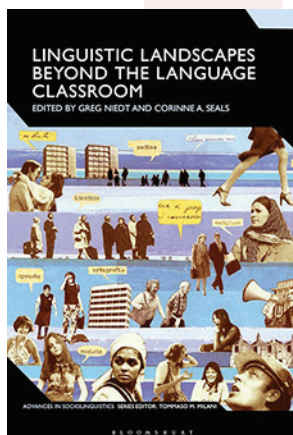
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# Alternative educational approaches and the linguistic/semiotic landscape

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punctum.gr



Greg Niedt and Corinne A. Seals

## Linguistic Landscapes Beyond the Language Classroom.

London et al.: Bloomsbury Academics, 2021, 246 pp., ISBN 978-1-035012-538-4.

This edited volume takes the reader to perceive linguistic landscapes not just well beyond the classroom, as suggested in the title, but also beyond well-trodden paths of urbanized and politically central places into a lot of diverse and often overlooked places of the world. One of the many advantages of this book, then, lays in the fact that most of the studies allow for insights into places and spaces that could be conceptualized as (semi-)peripheral as all the researchers assembled in the volume work in areas remote from central cities and capitals. This is of significance, as it allows for not just a diversified view on the research done in LLS but shows the growing interest in rural, unknown, and in many ways untypical spaces when conceptualizing given spaces and places as (part of) a linguistic and or semiotic landscape of its own kind. What is more, this book draws on a range of methods, many of them showing new approaches and ideas of how to deal with the wealth of material any research on linguistic landscapes is prone to assemble.

The following overview of the book's content will allow for a short outline of each of the eleven chapters (plus introduction) of the volume, while concentrating on the two above mentioned issues, i.e., the untypicality of the landscape discussed and the methodology used.

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The Introduction (Greg Niedt and Corinne A. Seals) provides the reader with some essential theoretical and conceptual background of LLS, *schoolscapes*, methodologies and recent discussions and achievements in the field. Another relevant matter of the introduction is the acquaintance of the reader with the book's companion webpage [www.bloomsbury.com/linguistic-landscapes-beyond-the-language-classroom](http://www.bloomsbury.com/linguistic-landscapes-beyond-the-language-classroom). The promised additional material to be found here is partial, as some of the authors only put those pictures that were already shown in the book. Yet, for those chapters where there is additional material, or where some of the discussed pictures are online only, the companion site is both useful and interesting. Altogether, the interested reader might have wished for some more pictures to be found here, as LLS is a (mostly) visual approach, and any extra picture (at least when it comes with useful captions) allows for an even better understanding of the given study's context.

Chapter 1, 'From Part of the Scenery to Curricular Resources: Authentic Signs as Portals to Cultural Practices within a Residential German Language Immersion Program' (Justin Quam and Heidi E. Hamilton), leads us to a German language learning village, *Waldsee*, in the USA, featuring both rural, urban, and educational patterns but with the interesting tweak of showing an intentionally created landscape of a German lifestyle in the middle of Northern America. The methodology used for this study shows a thoughtful combination of quantitative and qualitative aspects of pictures taken in Waldsee. Their effective application of Scollon and Scollon's *semiotic aggregate* (Scollon & Scollon 2003) adds some more substance to an already very useful introduction to LLS provided in this chapter.

Chapter 2, 'Unveiling Sign Languages in the Linguistic Landscape: Representations of Sign Languages in Nonsigning and Signing Milieux' (Jami Fisher, Donna Jo Napoli and Gene Mirus), opens up a new research focus on LLS by introducing the *sign language linguistic landscape* (SLLL). This highly relevant addition to the field is introduced through a historic outline of linguistic landscapes based on English sign languages showing its limitations based on long-standing sociopolitical and linguistic exclusions. In my view, this overview would have benefitted from a more class-sensitive approach, as the negative conceptualization of examples of an *apologetic* use of sign languages on peddler cards and the entirely positive framing of multi-million-dollar companies' and banks' usage of sign language as a sign of *deaf pride* can be disturbing. The chapter ends with an explorative case study of a coffeeshop near Gallaudet University in the US, showing a great example of how the usage of sign language can become a constitutive matter of a given linguistic landscape.

In chapter 3, 'New Caledonia: A Semiotic Analysis of the Landscape as an Opportunity for Learning' (Diane de Saint Léger and Kerry Mullan), we are shown another example of how a given linguistic landscape can be integrated into language learning activities and, what is more, also another example of how LLS can be used

to trace the landscape of a language that is not widely distributed in written form. Other than the German-speaking village in chapter 1, it is the real-life linguistic landscape which is used for educational purpose here. And other than is the case with the sign language example, the context discussed here is a post-colonial one, adding another important sociopolitical feature to the research on LLS and education beyond the classroom. Based on Jaworski and Thurlow's *semiotic landscape* (Jaworski & Thurlow 2010) concept and Pennycook's *semiotic assemblage* (Pennycook 2019), the study analyzes students' journals from two study trips to New Caledonia, providing us with an innovative methodology of looking into on-sight impressions of people visiting specific places.

Chapter 4, 'The Linguistic Landscape of Public Health Institutions in Tanzania' (Paschal Mdukula), takes us to the linguistic landscape of public health institutions in Tanzania, showing a striking example of how actual language competencies of regional languages are ignored to the favor of more prestigious languages (more specifically and very typically: English) being used in hospitals, rendering written instructions and warning on signs unreadable for hospital visitors and even for parts of the staff. While calling for a better integration of specialized institutions into LLS, the author uses a multi-layered methodological framework based on pictures of the hospitals' interior and interviews with visitors and staff of different status groups.

Another institutional context is shown in chapter 5, 'Information, Education, and Language Policy in the Linguistic Landscape of an International Airport in New Zealand' (Una Cunningham and Jeanette King). The authors take us into the semi-public realms of the linguistic landscape of an airport, while looking for educational purposes in informative signs. The chapter discusses potential traps of both touristically motivated multilingualism and the usage of minority languages in a given linguistic landscape, linking the first to the danger of racial profiling and the second to further marginalization based on exoticizing a given minority (Māori, in this case). Their methodical link of ethnographically collected photographs with interviews with the airports staff shows an interesting example of how interviews in LLS can provide much deeper understanding of the intentions of the otherwise only visually perceived linguistic landscape.

Chapter 6, 'English Learning Experience in a Textile Company in Turkey' (Yasemin Kırkgöz), shows an intentionally created linguistic landscape of English language learning posters in a workplace in Turkey. Based on the concept of *peripheral language learning* (PLL), the author discusses the educational effects of such a linguistic landscape for passerby workers. The consideration of how the environment creates a learning space is surely one to be taken into research on any linguistic landscape more seriously, and the limited institutional space and the usage of interviews for this research shown in this paper makes a good case study of how LLS and alternative approaches to education may be methodologically linked.



In chapter 7, 'The Public Discourse and Presentation of Migrant Groups within a Museum Space' (Barbara Loester), the author takes us to another highly institutionalized space, i.e., the *SeaCity Museum* in Southampton, UK. Two exhibitions focusing on migrant lives and histories in the city are examined in order to understand the educational possibilities of interaction between the linguistic/semiotic top-down agenda of the museum and the bottom-up agenda of museum visitors. As agency in the linguistic landscape is a matter of great importance and often not easy to trace outside the institutionalized space, studying the *museumscape* regarding its linguistic and semiotic features might allow LLS researchers to look for the interactions of agency in such a limited space more directly.

Chapter 8, 'Exploring Multimodal Story Houses in the Indigenous Paiwan-Rukai Post-Disaster Reconstruction' (Chun-Mei Chen), is part of a long-term ethnographic project on language documentation from the author on different indigenous languages in Taiwan. The mingling of language preservation and education studies with LLS allows for a multimodal study of the given linguistic landscape. By conceptualizing so-called *story houses* (in which both visitors and younger members are educated about the traditional way of life of the studied groups) as nexuses of practice, where not only history and language is shown but where the traditions just as much as the languages are preserved, this study shows another intriguing example of an intentional and institutionalized linguistic landscape.

Chapter 9, 'Activist Teaching through the Linguistic Landscape in Göttingen and Lviv' (Corinne A. Seals and Greg Niedt), opens the range of studied material to the elements of activist bottom-up linguistic landscape, mostly found in graffiti and stickers. With a focus on the educative features of an activist shaping of the cityscape, the authors focus on Göttingen in Germany and Lviv in Ukraine, showing both specificities and peculiarities of the two cities' activism-driven linguistic landscape. Methodologically, the authors chose a mix of qualitative approaches, based on pictures from specific parts of the city centers, to which verbally communicated results of a study group discussion were added, aiming at researcher triangulation.

In chapter 10, 'Educating the Public? Affective and Epistemic Stances as Approaches to Campaigning during Ireland's Eighth Amendment Referendum' (Louis Strange), the focus on activism in the linguistic landscape is set in Ireland's 2018 referendum on abortion rights. Introducing another overlooked analytical perspective, the author studies the matter of *stance* in a given linguistic landscape. Based on poster and leaflet material from different Irish regions as well as interviews with activists from the opposing camps, the study investigates epistemic and affective stances as educative elements during the referendum's campaign and the campaigners aim of educating the public about abortion. This chapter not only gives a good insight into theories and methods relevant for LLS, but also vividly shows what this book is about, when

starting the concluding paragraph of the chapter with the following consideration: “What does this analysis mean for theorizing education in the linguistic landscape? It suggests that the LL can potentially turn spaces—on a countrywide scale, if only for a limited period—into educational spaces” (p. 213).

The concluding chapter 11 of this volume, ‘Dynamic Walking Tour Methodology for LL Research: A Case Study in Jaffa’ (Amir Michalovich, Sarah Naaman, Moraia Trijnes, Iman Agbaria, and Elana Shohamy), allows for a detailed insight into the actual application of a dynamic walking tour and its benefits for both LLS and education about language politics in general. With its concentration on emotional responses of both walking tour participants and interlocutors, the chapter opens the range of observable aspects discussed in this volume to another central field. As the study vividly shows, emotions towards the linguistic landscape and the languages and messages displayed are diverse and crucial for both researchers and inhabitants. And only a fitting choice of methods will allow to capture these emotions and their meaning for the linguistic landscape and education, which is why this introduction of the dynamic walking tour adds another useful layer to the already rich reading of the volume.

As this overview shows, the wealth of landscapes, approaches, methods discussed in this volume makes it an interesting read and I highly recommend the book to anyone interested in LLS and alternative routes of (life-long) education.

There are only few points that show some of the limits of the volume’s general high quality: the discussion of LLS with regard to the individual chapters’ foci is, in some instances, not very clear, showing a focus on educational matters only instead. At times, one would have wished for some more insight into the relation of the material to LLS and some better conceptualization of material that has so far been received little attention in this research strand. While it is highly interesting and inspiring to read about language learning via posters or the diversification of history, a clearer delimitation of different kinds of linguistic landscapes based on the public/private divide of the given place and a careful consideration of the presence or absence of (educative) intention would be useful here. On the other side, the conceptualization of any informative, rhetoric, political material as *educational* could benefit from some better explanation about forms and venues of education in general, as differences between institutionalized and formalized education and other educative forms in a given linguistic landscape in the public space might produce totally different signs and messages. Both readers interested in the linguistic landscape and in the educational aspects discussed in this book would benefit from clearer conceptualization of how spaces are turned into linguistic/semiotic landscapes based on intention, how these intentions might be educational, and what the limitations to the landscape concept in general might be. This does not limit the fact that this book is a great contribution to the field and that all chapters show thought-provoking studies. Rather, it is a call to clarify the relation

(and its benefits for the given study) between the different disciplines in such highly interdisciplinary approaches.

All chapters of this volume show inspiring approaches to LLS with a focus on education, delving into diversified methodological frameworks. The book assembles groundbreaking case studies and each chapter allows for some deep insight into the given lands, places and institutions, providing the reader with an intriguing ethnographic account of the educational features of linguistic landscapes altogether.

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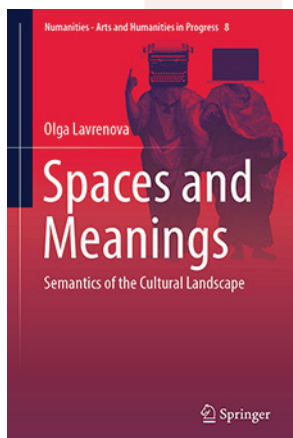
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# Spaces hiding within spaces

BY: Alexander Dobrohotov

punctum.gr



Olga Lavrenova

**Spaces and Meanings: Semantics of the Cultural landscape.**

Springer: 2019, 216 pp., ISBN 9783030151676

**I**'m ready to go—where there's more sky—but pure longing now won't set me free from the still-youthful hills of Voronezh, to those, clear, and wholly-human, of Tuscany" [Osip Mandelshtam]; "I love you, provincial haunts, off the map, the road, past the farms, the more tired and faded the book, the greater for me its charms" [Boris Pasternak]; "A sense of basic truth in every soul nests-The seed that's sacred and eternal: In flesh of time it always can embrace Space, endless, and the century's kernel" [Mikhail Lermontov]; "Paris is not all houses in this or that face, It's part of history, an idea, a tale, a rave. You know your eternity, oh great city, And your rave will never disappear!" [Valery Brusov]; "... And the scriptures of roads written in the desert" [Maksimillian Voloshin]; "Mais cette voix ne parle que dans le silence. ...Et de même que pour la ville, de même pour l'empire. Se fasse un calme extraordinaire et tu vois tes dieux" [Antuan de Saint-Exupery]; "The most important thing is to be master of metaphors. But you cannot learn it from someone else, it is the property of talent, because to verse good metaphors means to notice similarity" [Aristotle].

These are some of the epigraphs which introduce the chapters of a new book written by Olga Lavrenova, a geographer, a culturologist, and a philosopher. Poetic intonation of the preceding lines sets a drastic contract to the rigorous language

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of the monograph which is filled with specific modern terminology. Such polarity is inevitable as this book is meant primarily for the scholarly reader whose research lies within the field of natural sciences and humanities. However, an educated, curious and, most importantly, eager reader will find a truly vast amount of information on the actual extent of presence of a human mind within the physical nature; the reader will also learn about the ways culture can be studied from various point of view so that one could come a little closer to grasping this phenomenon in all its entirety.

When travelling the world or even when simply daily commuting to the office and back, we hardly pay any attention how the surrounding space of our life is filled with meanings and metaphors. This is the topic which Olga Lavrenova invites us to ponder upon in her new book where she offers the readers her thought and ideas on the semantics of the cultural landscape.

A person chooses themselves the space to live: in the space of a district in a city, a particular locality, a country, the world... Each of these hierarchical levels is surrounded by numerous invisible threads of meanings woven by the perennial cultural tradition. These threads become fabric of the universe where the cultural landscape is one of its "patches." "Fabric" and "text" are synonymic in their etymology. The scope of scientific interests of Olga Lavrenova is cultural geography and the philosophy of culture, and that is precisely why she tends to return to these two synonyms in the given work where through the metaphor she reveals the patterns of the space that has been assimilated by culture.

Noosphere, pneumatosphere, semiosphere are the terms that define different aspects of the human activity on a global scale. Reason and spirit, signs and symbols (as products of both reason and mind) penetrate all manifestations of culture and form the above-mentioned "spheres" thus changing the face of the Earth. A civilization leaves its footprint with the cavities of mines, the wrinkles of the canals, and the bald spots of anthropogenic deserts. However, it would be a mistake to think that people only deform the face of the planet since culture creates its spiritual expression by bringing the Heaven to the Earth. Through symbols and construction of public places of worship, people are capable of turning some piece of land into an icon and express transcendental categories. There are also lands of infernal character, which the humanity consigned into oblivion: illegal dumping sites, prison camps, tent camps of the homeless which from time to time appear in the city landscape but in the places that remain uncontrolled by the urban civilization, etc. Both categories are defined as "a cultural landscape" by the modern science (implying that the underbelly of culture also constitutes a part of culture), since value interpretation of the culture proposed by Roerich has not been accepted in the academic circles.

The concept of the cultural landscape has been developing at the intersection of natural sciences and humanities. In geography, cultural landscape is primarily seen



as a natural landscape which has experienced some historical and evolutionary anthropogenic influence, according to the definition given by L. Berg in 1915. This book mainly focuses on the approach accepted in the humanities where cultural landscape is interpreted as a phenomenon of culture rather than that of space.

The theory of the geographic determinism that dates back to the ancient times posited the influence of the natural environment on the mentality of culture. In the very least, the type of agriculture as well as the kind of settlement in the traditional culture is strictly defined by the natural landscape. Culture, in its turn, shapes the landscape, either intervening harmoniously or interfering in a more destructive fashion. According to the noospheric concept, cultural landscape is formed by the material and spiritual culture and cultural heritage (Vedenin 2004).

Olga Lavrenova relies on the semiotic concept of culture through the prism of the Tartu–Moscow School of Semiotics and defines the cultural landscape as "matrix system and cultural codes expressed in signs and symbols directly connected with a territory and/or manifested in some material expression; this system may be interpreted as a text in its wide cultural meaning" (Lavrenova 2019: 8).

Lavrenova considers the cultural landscape from an ontological and phenomenological point of view as a metaphor, as a system of signs and as a text, and geocultural space—as a process and as a result when a human being imbues the surrounding world with the categories of meaning and value, which is seen as a never-ending process and a result of semiosis.

In the cultural landscape, universal categories of culture find their expression, and they create "a worldview" ("a model of the world", "an image of the world"), "a grid line" characteristic of a particular culture and age. Such elusive categories as time and transcendence can be expressed through symbols and signs.

Time is considered as one of the meanings in the semiotic system of the cultural landscape, which structures and rhythms this system. It acquires spatial characteristics: it possesses clusters of loci where it concentrates; it has roads where it moves, and there are crossroads where time flows forward and also backwards. Different rhythms of times give cultural space additional fluidity and plasticity. Within the cultural landscape time exists in its geological, mythological, historical and physical facets. More than that, some places can become a representation of such categories and eternity and hard times. Within the "landscape of time", toponyms represent this or that quality of time generated by culture. Understanding space and time in their variety leads to new meanings that constantly appear in the culture, which, in its turn, pushes the boundaries of semiosphere.

Despite the fact that in the world culture the image of the world is shaped predominantly by the paradigm set in the natural sciences, its initial religious mythological worldview is looming through it. Eliade, Toporov, Gurevich, Terebinin, and

Bashlyar, etc. have been studying this aspect. “The historical angle of vision shows us the physical cosmos moving centrifugally in a four-dimensional frame of Space-Time; it shows us life on our planet moving evolutionarily in a five-dimensional frame of Life-Space-Time; and it shows us human souls raised to a sixth dimension by a gift of Spirit, moving through a fateful exercise of their spiritual freedom, either towards their Creator or away from Him” (Toynbee 1996: 504).

Cosmogony is the basis for the religious and mythological image of the world. Ontological and cosmological categories are reflected in the structure of the world, and as a result, depending on different aspects of one’s worldview, either the whole space becomes sacred, or it becomes divided into secular and sacred. Spatial loci become signs in which the signified are sacred categories and concepts. Cultural landscape brings out such mythological categories as the core and the axis of the world, cosmos and chaos, heaven and hell.

It is through the ritual of naming, blessing, building a place of worship and performing such acts when the consecration of a place happens. Sacred space can usually be interpreted in two ways—not only as a text but also as an icon. The “landscape-as-icon” has all the properties of an iconic sign, because in its structure it is likened to the structure of transcendental concepts and images.

One of the characteristics of culture, its imagery, and of its multi-layered semantics is its metaphoricity. The author of the article goes into great detail in her description of how a metaphor can give structure to geocultural space and how it can fill the mentality with some new meanings.

An image, a metaphor and a symbol appear spontaneously in the process of the artistic familiarization of the world [Arutyunova]. While meaning is particularly important for a metaphor, it is the form that is essential for a symbol. Proper geographical subjects which possess particular visual, quantitative and qualitative characteristics such as the height of mountains, the length of a river, the width of some plains play the role of symbols. For example, the river Volga, which is considered a symbol of the Russian soul, is different from other rivers of the Russian plains with its length, full-flowing character, and its unique width of its lower course. Each landscape becomes a metaphor: mountainous landscape is perceived as a metaphor of the ontological vertical, while plain steppe landscape is seen as a metaphor of limitlessness and vastness, and a river landscape would become a metaphor of life and one’s way, and so on in all their possible variations.

In the cultural landscape, one uses anthropomorphic metaphors (such as “Moscow is the heart of Russia”, “Russia is a snow-white woman, spreading in breadth”, etc.) and the transfer of meaning from one geographical object to another, for example, “Moscow, third Rome”, cosmographic metaphors in which the landscape as a whole participates conforming to space. The most common metaphors are those which liken mountains, lakes, forests to a human body or its parts. For example, J. Lakoff and M.

Johnson consider the metaphor “a mountain is a man”, which is expressed in such lexemes as “the foot of the mountain”, “shoulder of the mountain.” In mountaineering and tourist folklore, the metaphor “a mountain is a man” (Lakoff, Johnson 1980) lays the foundation for a particular neopagan cult, and defines the custom of greeting mountains before climbing, adding your stone to the stone pyramids similar to those of *ovoo*<sup>1</sup> on the passes thus paying tribute and expressing gratitude to the mountain for successful completion of a certain stage of the journey.

One way or another landscape appears to be a system of messages which can be read as a text. Toponymy allows considering texts of the cultural landscape as “rolled-up mnemonic programmes” (Lotman 2002: 83). Further, the author considers this problem mainly within the framework of the Lotmanian discourse of the semiotics of culture.

Elements of the landscape structure (centre, province, periphery, border) define the meaning of each geographic object in this matrix. And roads within the cultural landscape convey the idea of communication as well as express communication as such, which becomes evident during the trips that generates new meanings (see the classical example of “A Journey from St. Petersburg to Moscow” by Radishchev).

Text of the culture that occur at different times overlap and create unique combinations, many of which are ‘read’ differently when they appear in a new cultural and historical context, and sometimes they can acquire a completely opposite emphasis and meaning.

One can think of geocultural space as of weaving meanings. And if there are knots, then the fabric is uneven. Within the cultural landscape, there are polysemic signs and the lacunae of meanings. Natural characteristics of a place as such already have significance of its own, although it talks place in the presence of an observer. Lacunae can appear as the inner side of the meaning in a certain system of philosophical, aesthetic, and ethical coordinates.

There are always several directions, lines and “blocks” of interpretation for cultural landscape. The easiest case would be the landscape-texts of the national history. For instance, study of the semiotic structure of the geocultural space in Russia as it is expressed in the Russian poetry shows that it is perceived as a “a wave of colonization frozen in space.” Cultivated European part of Russian is separated from the structure-less toponym-space of Siberia by the border/ frontier of the Ural Mountains.

The text of the cultural landscape of Russia can be read not only from the historical point of view but also from the religious and mythological angle. This interpretation, as opposed to the historical one, is more universal and at the same time more general.

One more strategy of reading cultural landscape is through travelling. When facing it directly, the semantics of the cultural landscape requires actual experiencing rather

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<sup>1</sup> *Ovoo*—places of worship in the culture of the Mongols, Buryats, Tuvans, Khakas and other Turkic-Mongolian peoples of Central Asia.

than impassive observation. Ordinary secular space is available for observation and description but it is extremely poor in its semantic. All these spaces coexist within the same cultural landscape, and the traveller moving across the planet chooses themselves in which space their trip will take place in and how rich and polysemantic their experience will be. The book offers a classification of the trips within the context of a semiosphere: a vector on the plain for ordinary travels, circular motion for eternal wanderers or cursed mythological characters, an ascension vector for spiritual travels and pilgrimages.

Thus, geographical objects and toponyms become texts, metaphors, symbols and signs, since there are stable cultural links with specific artifacts, historical events or features of the natural landscape. Olga Lavrenova concludes by saying that “the cultural landscape is a scale of values deployed in space where geographical objects and zones act as analogues of the social and /or cultural status, or as spiritual stages” (Lavrenova 2019: 214). So the monograph “Spaces and Meanings” is a multivariate analysis of the symbolic activity of a human being on the Earth, and the scale of this activity justifies the definition of a human as a symbolic creature (*homo symbolycus*). This study brings to a new methodological and theoretical level a whole layer of disparate research in various disciplines related to geography and the humanities, such as the semiotics of space, the geography of culture, cultural and semiotic studies of geographical images.

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