Tracing the outlier: digital objects and algorithmic sorting in Rossella Biscotti’s Other

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ABSTRACT

The relatively new Big Data systems, which operate at different levels, such as modes of monitoring, bulk analysis or techniques for data mining, are increasingly used by corporations and agencies to make sense of massive collections of data, as they promise access to an increasingly traceable and more predictable population. Although these systems have been objects of interest in scientific, economic and socio-political research for some time, they also play a more and more noticeable role in recent aesthetic and cultural discussions. This article argues that, as decisive modes of representation of knowledge production, algorithmic sorting and categorisation are relatively underexplored but important territory for scholars in the diverse field of the philosophy of aesthetics. This article presents the concept of the digital object as a way to comprehend the different modes of functioning inherent in the logic of algorithmic sorting, as they are “translated” into visual manifestations in the artworks of Rossella Biscotti, as the point of departure for analysing the 19th century punched card technologies built into the operation of automated looms and later electromechanical tabulating machines.

Today’s relatively new Big Data systems present themselves as innovative and comprehensive tools for sorting and aligning the huge bodies of information accumulated by internet archives. Counting, sorting and deciding, algorithmic machines are increasingly used by corporations and agencies to make sense of massive collections of data, and promise access to an increasingly traceable and more predictable population (Mackenzie 2013, 392). But what are the precursors of this algorithmic way of thinking, where do these ideas and promises come from?

This article revisits the early history and development of data processing, and identifies some of its parallels to today’s data systems, as the point of departure for an analysis of the nineteenth-century punched card technologies built into the operations of automated looms, and the later electromechanical tabulating machines. The ideas of sorting, categorising and standardising information are far from new; indeed, standardisation played a key role in the nineteenth century, with the rise of large-scale bureaucracies (e.g. insurance companies, banks, railway companies and post offices), creating and operating over very large spaces (Bowker and Star 2000, 126). As corporations and governments advanced and expanded, they also changed their methods of operation, relying more heavily on processed information. This shift was made possible by punched card technology, among other things, which enabled these expanding bureaucracies to efficiently store and share large quantities of information. Although the development of punched card technology brought with it a digital logic that facilitated novel ways of standardising and analysing large amounts of information, it also gave rise to a new algorithmic way of representing, organising and thinking, paving the way for modern statistics and computer science.

Although punched card technologies have been phased out, subsequent digital apparatuses (in the broadest sense) have retained the capacity to quickly sort data into searchable fields processed through pre-defined filters and disjoint categories (Kleinman 2015, 46). Thus, this article’s central hypothesis is that the early digital processes of pre-filtering have formed the way we understand large data archives today. To this day, when bureaucracies and companies try to make sense of massive collections of data and decide on and resolve specific socio-economic matters of fact, standardisation and classification represent decisive modes of knowledge production.

This article explores the Italian artist Rossella Biscotti’s series, Other (2014–2015) (see Figure 1), composed of large, installed textiles that represent demographic data from the Brussels censuses of the
early 2000s. By investigating the concept of so-called "statistical outliers", Biscotti highlights the ways in which the normative structures of pre-filtering logic play out against the economic realities of each household investigated by the censuses. Biscotti links the patterns and colours of the surface to the modular logic of data by placing the medium of the woven fabric at the centre of her investigation. Just as threads on a loom form patterns and figures, data create interfaces and produce specific, contextual knowledge: counting, sorting and deciding specific matters of facts.

Whereas the material manifestation of the artworks in the Other series—the threads composing the specific forms and colours of the surfaces of the textiles—evoke various references to modernist architecture, art and design, the internal logic at work in their structural organisation also opens up studies of digital phenomena as such, and therefore the series offers a valuable opportunity to discuss the very reasoning or mode of operating at work in these types of data processing. Accordingly, this article argues that the artworks should not be seen only as a collection of inert, installed textile objects that express a particular minimalist aesthetic, but also as a specific system of references and categories, or a certain taxonomy of possible knowledge. This system or this inherent logic in the artworks is the focus of this analysis, and so, in this article, other possible, more materialist observations are less illuminated. The purpose of this article is twofold: first, I uncover some of the key mechanics attached to informational systems, including modes of counting, sorting and standardising, historically and with parallels to recent digital culture as they are artistically orchestrated in Biscotti’s Other series; second, I discuss these mechanics as abstract modes of operation, as decisive and strategic systems for presenting information. As part of my analysis, and as the central contribution of this article, I suggest the term digital object, in order to re-construct the algorithmic functionality inherent in the discrete materials and media, aiding the appearances of the “object” of information.

Earlier efforts to define a concept such as the foregoing include philosopher Yuk Hui’s book, On the Existence of Digital Objects (2016), in which he studies mark-up languages and Web ontologies, and the way they form what he calls digital objects, that is semi-physical objects composed of data and metadata. Whereas Hui convincingly describes the nature of concrete data and metadata, and the technical systems (digital milieux) in which his digital objects operate, I am more interested in the epistemological consequences of the increasing embedding of digital technology in everyday life, that is, in the aesthetic and cultural meanings of data and data processing. The digital object, I suggest, does not exist “out there”. Instead, it describes the formal functionality of digital information systems: the way they categorise and systematise information, and accordingly make certain kinds of knowledge possible.

Consequently, the reading of Biscotti’s series identifies some of the resources to be gained from the work of Louis Althusser, that is, from the series of papers gathered together as Philosophy and the Spontaneous Philosophy of the Scientists (Philosophie et philosophie spontanée des savants) in 1967, of which the idea of theoretical concepts (or theoretical objects, as he also calls them) is particularly relevant in this context. Whereas Althusser’s study of theoretical objects concerns the abstract form of theoretical discourse (Lewis 2018), I expand the concept to include a certain “algorithmic thinking” as a special kind of theoretical object, that is, a mathematical–theoretical manoeuvre used to understand something that could not be otherwise understood, but only observed.

With the term “theoretical object”, I try to describe the structural connection between a range of digital processes that take part in the knowledge production. In these processes, a certain “object” of knowledge emerges, an object we think with or through during theoretical endeavours, and that influences the possible patterns we see. The digital object does not encompass various artefacts “out there”, and it should not be understood as a collective or typological name for all kinds of digital artefacts. It is not my ambition to try to adequately cover or collect a range of machines or apparatuses. As a contribution, it is way more abductive in its form: a theoretical attempt to synthesise, rather than to name.
Haptic, analogue surfaces

In her art project, Other (2014–2015), which consists of large textiles works that depict patterns of demographic data from recent Brussels censuses, Rossella Biscotti interrelates three histories: the use of punched cards to programme early data-processing machines and automated looms, the modelling of demographic records through census-taking and the legacy of modern design (Ayas, Kleinman, and Saelemakers 2015). The fabrics are produced on a computer-operated Jacquard loom, employing this equipment’s specific technical potential for representing both the general, binary logic of digital systems and the particular, material surfaces on which this logic is sustained.

At first sight, Biscotti’s artworks may seem rather simply constructed: a woven textile is pinned to a metal bar suspended from the ceiling, one part hanging from a simple mounting mechanism, and the other part extended on the floor. In addition to the figures and forms on the surface of the fabric itself (the data patterns of the Brussels censuses), the installation of the textile creates a right angle, disturbed only by a few wrinkles and ripples in the soft material. Yet, the fabrics do not function as a pure picture plane, but as an element in which content is also conveyed structurally (Holzhey 2015, 13): the warp, which serves as the often concealed but essential structure of the woven fabric, is actively employed as a design element, enabling not only the representation of squares and colours on the surface, but also presenting the binary structure of the medium itself (Holzhey 2015, 17–8). Along with the grey squares in the fabric, the warp plays an important role in the piece, and the design takes advantage of the possibilities of the weaving technique itself. The aesthetics of Biscotti’s fabrics and the form of presentation selected for the project reveal almost unambiguous references to the 1920s and 1930s, to Weimar Bauhaus architectural monuments in particular, but also to many others (Holzhey 2015, 15).

A couple of similar associations come to mind, for example, the genre of abstract textile works from the 1920s, including those created by the Swiss artist Sophie Taeuber-Arp, the French artist Sonia Delaunay or the German artist Anni Albers, each working with the possibilities of textile structure, taking advantage of the binary organisation of warp and weft to advance what Markus Brüderlin has called “the birth of abstraction from the spirit of the textile” (2013, 38ff). The comparison of the structure of warp and weft, and the horizontal–vertical composition of the image surface has further been argued (Holzhey 2015, 17) as corresponding to the rectangular grids found in paintings from the first decade of the twentieth century, highlighted by Rosalind Krauss (1979, 52) in her famous 1979 essay, which mentioned pieces by artists such as Piet Mondrian and Kazimir Malevich. As such, the textile surfaces may be said to possess a certain haptic quality, sustaining an experience of a visual “touch” when viewed, blocking perspective and depth (Thomsen 2012). There are also modernist references in the venue for Biscotti’s artworks, as they were exhibited in Krefeld, in the villas created by Mies van der Rohe, which today comprise a museum space. Like the square modules that form the notation in the textiles, Mies van der Rohe also relied on a system of interlocking cubes to form the houses’ volumes (Heynen 2000, 39ff).

Several arguments suggest a modernist context for Biscotti’s artworks, and it is tempting to end the analysis on this note, and simply admire the series for its abstract expression, and elaborate obvious references to a time when mechanisation and rationalisation redefined textile production and artistic investigations of the textile medium. However, this article suggests another hypothesis. Even though Rossella Biscotti’s Other series includes unambiguous references to the modernist aesthetics of the first half of the twentieth century, my claim is that they are digital. First, they may be said to be digital because they are digitally produced, and because this very production is central to understanding them (Lopes 2010, 8–14). Second, I expand this argument to claim that they address central concerns regarding the nature of digital phenomena, and identify key questions in the field of philosophy of aesthetics.

Digital processes operating in Biscotti’s Other

When one takes a closer look at Biscotti’s artworks, one becomes aware of the systematic organisation of the patterns of grey and coloured squares at the surface of the fabric. The pieces not only account for abstract or modernist aesthetics, and make use of the specific structures of the medium or the materials at hand; they also carry a kind of representational relationship that indicates something more, or something outside the artworks themselves. If one thoroughly studies the piece, Other (Acquired Nationality) (Figure 2), a woven legend at the bottom of the textile appears to play a central role in decoding it, as it provides concrete information on its content.

A denotation is attached to each shade of grey in the textiles, the frequency with which something happens, or a differentiated number of something is distributed among a range of data points. The variously-coloured squares indicate different values that may be decoded, using the “key” in the legend. The artworks are not just image surfaces; they are graphs representing data input, carefully colour-coded and open to decoding.
The exhibition catalogue (Biscotti 2015) includes preliminary studies for her textiles. Different kinds of data processing were executed before the computer-operated Jacquard weaving process itself was started. In Other (Acquired Nationality), values are summed on the basis of two categories visualised in a table that is included in the catalogue. These numbers correspond to a frequency encoded in the different nuances of grey in the squares: one yellow and one red square are assigned statistical identification characteristics such as name, gender, age, marital status, nationality, district in which a person lives and the so-called Household Identification Numbers of anonymous citizens. The patterns are encoded representations of a diagram produced prior to the weaving process, which consists of X and Y axes that visualise anonymised demographic data taken from the 2001 Belgian census, linked to the National Register (Holzhey 2015, 17). Consequently, it becomes difficult to separate the haptic surfaces of the textiles from their graphic templates, and therefore, also from the digital processes to which the material manifestations refer.

Even though the artworks are material, sculptural objects in a museum space, tangible, soft image bodies, they are the products of a decisive digital process. However, it is important to understand this digital process not only in order to identify and categorise the series as an example of computer-made art (Lopes 2010, 8–14; Paul 2016, 2; Philipsen 2015, 71–3; Paul 2003, 67), but also to conceptualise the central reasoning or logic running through the artworks, and accordingly, through many digital processes related to census-taking in particular and national economic investigations of demographics in a broader sense. Even though Biscotti’s series is not digital in its display—in its immediate physicality and presence in the room—it is important that it is a result or a manifestation of a digital process (Hoy 2017, 8).

In his book, A Philosophy of Computer Art, Dominic McIver Lopes specifically highlights the dichotomy between digital art understood as digitally displayed art, and digital art as a digital process, as digital technē (2010, 8). In his book, he notes that many art historians and critics forget the importance of the digital process in originating and activating digital artworks. These processes are not necessarily intended to be displayed digitally (e.g. on a screen or in an interactive installation), but are nonetheless crucial for our understanding of them:

Digital art is either made by computer or made for display by computer in a common, digital code. The digital display is obvious enough when we come across it, and so is its impact, which includes new opportunities for multi-media and new venues for audiences to access art. A less obvious ‘game changer’ is the use of digital encoding to make art. (Lopes 2010, 8)

If one goes along with this argument, one might accordingly ask: what is the nature of the digital process used in Rossella Biscotti’s artworks, and could that very process be the key to understanding them? As mentioned, the data points represented in the fabric refer to national censuses undertaken in Brussels in 2001, underscoring not only the contemporary applicability of the digital process performed in the artworks, but also to the historic relationships between outdated technologies such as punched cards and the binary logic still found in the systems underpinning the politics of demographics. Therefore, an important part of the story behind these artworks includes the studies undertaken by Biscotti prior to producing them: studies of the different kinds of data processing used in census taking, previous and recent. In these studies, she has unravelled the complex history of data processing itself, from early tabulating machines and punched card technologies to more recent counting systems and the built-in errors carried along from generation to generation. In the exhibition catalogue (2015, 41), Adam Kleinman notes that this is a timely parallel, considering how today’s Big Data systems employ not only quantities of data that reach almost incomprehensible proportions, but also the logic of sorting and organising data patterns that goes back to the first systems developed in the 18th and 19th centuries.

### Recognising patterns

Through the textile medium, Biscotti studies and presents the individuals who did not attain a place on the socio-economic map. In a census, an
individual’s status is determined by his or her answers to a hierarchical flow chart of “yes” or “no” marital enquiries centred around the criteria of a conventional family unit. “Other” is the last box: a category of people that have “fallen out” of all the given possibilities, the outliers of the statistical analysis (Biscotti, Reist, and Allo 2017). By choosing the woven textile as her central medium, Biscotti not only visualises the various outliers of the demographic mapping, but also studies the very process of pattern-creation made possible by the automatic loom and the logic of punched cards. She shows how a certain kind of algorithmic thinking—running through textiles, censuses and contemporary data analyses that use pattern recognition algorithms—has a decisive aesthetic dimension, manifested in her recurring object of study, the outlier.

For algorithmic thinking—or digital logic—to operate, one needs certain systems, processes and technical advancements. Bulk analysis and pattern recognition share a common, now-obsolete precursor, which shaped their development. One of the most important components of both the first automated looms and the emerging censuses of the 19th century was the punched card, and Biscotti’s project negotiates its influence as well.

The punched card was an essential part of the Electric Tabulating System, as German–American inventor Herman Hollerith (1860–1929) called it in the 1889 patent he took out (1889). At that time, Hollerith was an assistant to Professor William Trowbridge of Colombia University, a Chief Special Agent in the Census Office, and through this work he came to know John Shaw Billing, who was in charge of planning the work for the statistical part of the 1880 US National Census (Randell 1973, 127). As Brian Randell points out in his 1973 book, The Origins of Digital Computers, there have been several different accounts of the relative roles of Billing and Hollerith in the invention of the punched card tabulating system (127). Although it is generally agreed that Billing encouraged Hollerith to develop a mechanised tabulating system, there is some disagreement about whether it was Billing’s suggestion to employ a punched card (already known from automated looms), or whether it was Hollerith’s idea to represent logical and numerical data by holes in cards after seeing a conductor punching a railway ticket to indicate the physical appearance of the ticket holder (127). Even so, the punched card was soon patented under the name of Herman Hollerith, and first used on a large scale for the 1890 US National Census, but was extended considerably in just a few years.

The electromechanical tabulating process worked on a binary scheme, allowing cards to hold information representing the responses to a census questionnaire. The cards could be tabulated individually, and afterwards, could be wired to count the number of cards processed according to which particular holes or combinations of holes had been punched. Finally, an electrical counter could be attached to such a tabulator, assisting the manual sorting of cards into a number of separate sequences. Even though the invention of perforated paper cardboard may seem insignificant by today’s standards, when bulk analysis involves wide-scale server parks, boundless numbers of graphic cards and ingenious automatic learning systems, the punched card should not be underestimated, especially not from a historical perspective.

In the last part of the nineteenth century the American population continued to grow, at a rate of more than 30 percent from the 1870s to the 1880s (Kleinman 2015, 41), and the USA continued to pass many restrictive immigration acts, seeking to curb the number of so-called “undesirables” entering the country. Desperately seeking the necessary innovations to simply count people faster, the tabulating system offered an invaluable solution, owing to its superior speed and accuracy. The system registered the answers to various enumerator questions concerning age, ethnicity, marital status and so on, and during its first use in the 1880 census, was involved in punching some 56,000,000 cards (Randell 1973, 128). Although this machine vastly increased the speed at which the census could be tallied, reducing the time spent from years to months, it also—more crucially—allowed the government to quickly tailor specific queries, as the entire data set could now be subdivided into smaller subsets by successively feeding selected cards back into the machine. Such successive filters could be programmed and reprogrammed sequentially to isolate an entire set, for example, the exact number of cards that registered women from China who were married, had one child, lived in Brooklyn and so forth. This capacity to quickly collect and filter vast data sets according to searchable criteria soon found applications well beyond census taking. It became a standard way of thinking that applied not only to census taking, but also to the general way in which populations were understood: as data points in a set that could be aggregated, processed, compared and interpreted. In 1911, Hollerith sold his company, the Tabulating Machine Company, formed in 1896, and it was soon merged with two other companies to form the Computer-Tabulating-Recording Company, which turned into the International Business Machines Corporation (Randell 1973, 128), today known as IBM.3

Data analysis and automated looms

In the early years of data analysis, the punched card was a central element—particularly when it was used
for bulk analyses of populations. Yet, it would be an exaggeration to give Hollerith and the American Census Office all the credit for systemically perforating cardboards to optimise binary processes. Over 150 years earlier, well before Hollerith’s technological breakthrough, the cards were used to speed up machines, when the first draw looms were set to replicating weaving patterns using a similar system. Like Hollerith’s pins, this early example of algorithmic processing introduced a continuous roll of paper, hand-punched in sections, each representing one lash or thread. This first system for the original handloom, or drawloom, was designed by textile worker Basile Bouchon of Lyon in 1725, modified slightly by his assistant, Jean-Baptiste Falcon, in 1728, made fully-automatic by inventor Jacques de Vaucanson in 1745, and finally assembled and promoted by Joseph Marie Jacquard (Barlow 1879, 141), whose Jacquard machine is the best-known such machine today. Operated for the first time in 1801 and patented in 1804, Jacquard’s loom matched any of the hand-operated looms known to the skilled workers of Lyon (Johansen 2016). The new looms were coupled with steam-driven line-shafts, and Jacquard’s invention soon advanced the kind of rapid manufacturing technologies that have transformed modern mass production since then (Kleinman 2015, 43). The ability to change the pattern woven into the fabric by simply changing the cards that encoded the positions of the threads was an important conceptual precursor to the development of computer programming, although it took many attempts and revisions to develop the systems we know today.

Although punched card technologies were phased out long ago, subsequent digital apparatuses (in the broadest sense) have retained the organisational capacity to quickly sort data into searchable fields processed through filters. “A hole punched on a certain row of a certain column of a card could mean whatever one wanted it to mean” (126), as Geoffrey C. Bowker and Susan Leigh Star write in their book, Sorting things out: classification and its consequences (2000), and this way of standardising information played a key role in the nineteenth century, with the rise of large-scale bureaucracies such as insurance companies, banks, railway companies, post offices and the government, creating and operating over a very large area (126). To this day, standardisation and classification are decisive modes of knowledge production, when bureaucracies and companies wish to make sense of massive collections of data.

The Other series may be seen as a unique investigation of the nature of the pre-filtering logic underpinning data processing at the beginning of, and throughout the nineteenth century, until today. Biscotti displays the various quirks grandfathered into the ways data were collected, with carefully selected excerpts from the data sets from the 2001 Brussels censuses. To highlight the ways in which this pre-filtering plays out against the economic realities of each particular household, she focused on how the census-taking sought to group each person around a nuclear family unit: that is, whether a resident was married, whether he or she had children, and so forth.

Even though this rule affords the criteria to depict the nature of certain residents, it inaccurately identifies, and often obscures residential relationships that are not based on such normative structures, such as collectives and co-housing, or households comprising extended families. In addition to persons lumped together as “others”, “minorities”, or other accumulative categories of outliers, Biscotti also looked for other questionable inaccuracies, such as how obsolete information is carried over from one census result to the next. Peculiarly, Biscotti’s examination of the data sets show that individuals who immigrated from countries that no longer exist (such as Yugoslavia), are now recorded as representing households of such nationalities in Belgium. Tracing the outliers in the data sets, that is, the family life of the individual households that appear in the tails of the distributions, Biscotti realised that the correct information could be extrapolated if a given individual later had a child born after a state was dissolved. In the example of the Yugoslavian citizen, the census noted that a given household contained a “Yugoslavian” father, a Macedonian mother and that their boy was of Serbian decent, and since heritage is determined along paternal lines, the deductively calculated conclusion must be that the father is Serbian, regardless of his census categorisation (Kleinman 2015, 47). Although examples such as this may seem harmless to a layman, statisticians and computer scientists have debated problems such as those linked to modelling and “cleaning” data sets on the one hand (Van den Broeck et al. 2005), and, on the other hand, comparative analyses of other censuses. Although the goal is to improve the quality of a data set by correcting measurement errors generated during the collection process (e.g. in the questionnaires), in order to make the final data set similar to other related ones, the ethical implications of such types of standardisation and modification have been questioned (Autry 2017).

Counting, sorting, deciding machines

Returning to Dominic McIver Lopes’ differentiation between digital art understood as digitally displayed art and digital art as a digital process, and to the claim that digital processes are sometimes overlooked and deserve attention, the question of what kind of digital process this is may be revisited. This article’s central claim is that Biscotti’s series manifest
a specific system of references and categories, that is, a specific way of knowing, or a specific taxonomy of possible knowledge. The unifying concept underlying the artworks is a mode of operation, or a way of functioning, that builds on the potential attached to the act of systematic counting. Although Biscotti’s series is not digital in its display, it is crucial to understand that it is a realisation of a digital process: first, an algorithmic process of sorting data input into different, seemingly well-ordered categories, and second, a process of deciding and using such sorted and categorised information.

Although the first of the above-mentioned processes, the algorithmic sorting, may be traced and outlined, owing to the meticulous documentation of census tables and questionnaires in Biscotti’s exhibition catalogue, the second process, the decision-making, remains elusive and recurrently problematic, its impact being “undisputable and inescapable”, to use Bowker and Star’s description of the material force of categories and classifications (Bowker and Star 2000, 3). Personal and private information interpreted by the National Register under labels such as “name”, “gender”, “age”, “marital status” (including sexuality), “nationality” and the district in which a person lives, are used by the government to determine and resolve specific socio-economic matters. Accordingly, Bowker and Star describe systems of classification as follows:

We have a moral and ethical agenda in our querying of these systems. Each standard and each category valorizes some point of view and silences another. This is not inherently a bad thing—indeed it is inescapable. But it is an ethical choice, and as such it is dangerous—not bad, but dangerous. (5–6)

The act of systematic counting realised in Biscotti’s textiles is not only regulated by normative categories based on socio-economic interests that Bowker and Star mention, it also builds on access to the digital encoding that operates on the same basic principles as Hollerith’s tabulating machine. In these kinds of data processing systems, everything that one requests to represent digitally has to be accessible to the one counting: in a demographic census, it is crucial for each data point to conform to the predetermined logic of the categories, otherwise it is lumped into contingent categories such as “others”, “minorities”, or the like. The counting system is not flexible or dynamic; it is built on rigidity, making way for unambiguous operations of sorting, and thus, of definite decisions. It only measures input already prepared for analysis, prearranged, pre-filtered and disambiguated.

The counting system’s rigidity is also a mode of operation that makes it possible to analyse and interpret large and extensive data sets altogether. In these modes of operation, individual data points are transformed into “blocks”, enabling all sorts of compositions, all sorts of syntheses and analyses. The combination of variables such as nationality and marital status is only one of many combinations possible to make. The data analyst need only tailor the query to a specific interest, select the pair of “blocks” for its composition, or the features of the function, to see the graphic image of the input. Thus, one could argue that through her series of works, Biscotti displays the analysis itself as it is made. She illustrates the digital process as a process: first, between the individual data point, the individual household ID represented by the legends at the tops of the textiles, and the frequency with which different combinations are shown in the data set; second, between the particular data point highlighted with vivid colours in the fabric, and the number of shallower data points visualised by the grey tones, and finally, between the particular conditions of the lived life of the individual and the statistically conforming and disambiguating logic of counting.

Data analysis, in this case census taking, builds on the central logic of counting, and this logic renders any other mode of operation impossible. However, in return, an effective modular system of “blocks”, enabling a wide range of correlations and syntheses, facilitates effective and determined analyses of all sorts of affairs. Data analysis needs this logic or mode of function, in order to execute its statistical operations. It produces its own object for analysis based on the very logic introduced by Hollerith with his tabulating machine. Now, what kind of “object” is this algorithmic mode of operation? What kind of taxonomy makes the data analysis possible? How are the many discrete effects, prompted by all kinds of heterogeneous causes (immigration rates, crime rates in certain neighbourhoods, female workers in specific sectors, etc.), connected in this one apparatus?

**The digital object of Biscotti’s studies**

As I have argued, not all “objects” present themselves through an immediate physicality or corporeal manifestation. As Louis Althusser ([1969] 2011) would argue, some objects are theoretical. Some objects, such as the objects working “within” or “through” the fabrics displayed at Krefeld, are not “real” in the concrete, material sense, but produced or put forward analytically, in order to better understand the issue at hand. Althusser writes:

[1] In the strong sense of the term, only particular real and concrete objects exist. At the same time, we shall say that the ultimate purpose of any theoretical discourse is ‘concrete’ knowledge (Marx) of these particular real and concrete objects. This is the sense in which abstract history or history in general does not
exist (in the strong sense of the term) but only the real, concrete history of those concrete objects that are particular concrete social formations we can observe in the accumulated experience of humanity. (46)

Althusser writes that abstract entities do not “exist” in the strong sense of the term. They are analytical entities produced as theoretical manoeuvres, in order to understand something that could not otherwise be understood, but only observed. The same holds true for the theoretical objects of Biscotti’s studies, that is, the inherent “logic” or mode of operation, and not the threads or material “bodies” of the textiles themselves. Digital objects, as I suggest calling them—provisionally described as “modes of operations” with respect to Biscotti's artworks—are quite similar to the theoretical objects described by Althusser. When one first encounters the material manifestations of a digital object, in this case, the abstract textiles that depict systems of scattered grey and coloured squares, it may be challenging to conceptualise their “operationality”, just as when one first comes across a pair of playing cards and attempts to acquire a stable understanding of the game being played by the others: without an insight into the many ways in which a pair of playing cards may be algorithmically sorted, or the many possible games one could play with said cards, it is almost impossible to use them as anything more than mere pieces of cardboard decorated with various faces, forms and numbers.

The functionality of a punched card or a series of operations attached to a system of punched cards is challenging to comprehend without an understanding of the algorithmic processes of counting and sorting. Thus, the digital object is not an object in the physical sense, but a concept—or an “object”—that indicates a theoretical manoeuvre used to understand what could not be otherwise understood, but only observed. With my use of this term, I try to re-establish the functionality of the seemingly heterogeneous ways digital phenomena are encountered, I try to (re)construct the coherence between the discreet materials and media aiding the appearances of the “object”.

Studied along the foregoing lines, Biscotti’s real, concrete artworks realise a certain material manifestation of the digital “mode of operation” (the algorithmic counting and sorting): the analytically produced “object” translates itself into different materials and media, or “travels” between them, and the textile as medium is but one of many possible media into which this theoretical object could “translate” itself. The textiles, or rather, any other possible translations of the algorithmic logic of sorting, may be understood as empirical concepts in the Althusserian sense. More than mere materials, the woven fabric of Biscotti’s series manifests the results of successive elaborations, that is, the product of a knowledge production process, itself complex. Althusser writes “Empirical concepts are not pure givens, not the pure and simple tracing, not the pure and simple immediate reading, of reality” (Althusser [1969] 2011, 48), and therefore Biscotti’s textiles may be understood as the means by which the algorithmic discourse (“object”) of the census comes into existence. They not only represent the people listed and counted in the census, but also render visible the process of enumeration itself, making the operation possible altogether. The woven textile serves an essential purpose as both the medium of the study and the central mode of operation.

In this way, the relationship between theoretical and empirical concepts, or in Lopes’ words, digital technê to digital display (2010, 8), may be seen as a mutually informed exchange, where the empirical concepts realise theoretical concepts in the concrete knowledge of the concrete objects, and thereby make possible a given theoretical discourse. The Other series and the concrete textiles displayed as its “output” are not just traces or remnants of a more important digital process, nor specific cases of a generality formulated by an algorithmic process.

Concluding remarks

Today’s Big Data systems, whether modes of monitoring, bulk analysis or data-mining techniques, open new, uncertain terrain in the field of (digital) aesthetics and culture. On the one hand, they present themselves as innovative and comprehensive tools for sorting and aligning huge bodies of information accumulated by internet archives; counting, sorting and deciding, they are used to make sense of massive collections of data, and promise access to a not only increasingly traceable, but also more predictable population. On the other hand, they are also part of a longer, not entirely unproblematic history of data processing linked to racial profiling and other material forces of categories and classifications, for example. This article presents the concept of digital objects as the point of departure for an analysis of the nineteenth-century punched card technologies built into automated Jacquard looms, and the later electromechanical tabulating machines used in census taking. It is argued that algorithmic sorting and categorisation are important, yet (still) relatively unexplored concerns in field of aesthetics. Rossella Biscotti’s artworks offer a unique opportunity to explore and discuss these concerns in relation to
early digital processes of algorithmic pre-filtering and sorting, and also to study the ways in which those processes formed today’s understanding and conceptualisation of large data archives.

Notes

1. In computational statistics, the term outlier denotes an isolated point, or a point detached from the main body of observations. In this way, Douglas M. Hawkins defines an outlier as “an observation that deviates so much from other observations as to arouse suspicion that it was generated by a different mechanism” (1980). Sometimes outliers are the results of errors, variations or changes in the distribution of the data (Stigler 1986).

2. To paraphrase Ada Augusta, Countess of Lovelace, who translated and contributed to the work of Charles Babbage, and who famously remarked, “We may say most aptly that the Analytical Engine weaves algebraic patterns just as the Jacquard loom weaves flowers and leaves,” (Menabrea 1843).

3. The troubling history of IBM and its use of tabulators—first to keep track of Asian and other so-called “undesirables” (Kleinman 2015, 41), and second, to conduct the 1933 German census, aimed at documenting Jews, gypsies and other stigmatised ethnic groups, and finally, to record the number and location of these same minority populations to aid the collection of said individuals into concentration camps—should not be left out. Edwin Black has examined this particularly dark chapter of the history of data processing in his book, IBM and the Holocaust (2001).

4. Today, Joseph Marie Jacquard is known as the inventor of the automatic loom and of the subsequent mechanisation and rationalisation of the labour of the weaver. However, this linear genealogy from the Jacquard machine through Hollerith’s tabulator to modern data processing is not entirely unproblematic. As briefly outlined, the first system was originally developed for the manual draw loom (not the power loom) by Lyon workers Bouchon and Falcon in the 1720s, and it took many attempts and additions to enable the weaving of complex patterns known from the later applications to the power looms marketed by talented entrepreneurs such as Jacquard.

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