Studi di estetica, anno XLVI, IV serie, 3/2018
ISSN 0585-4733, ISSN digitale 1825-8646, DOI 10.7413/18258646062

Emanuele Arielli[1]

Taste and the algorithm

Abstract

Today, a consistent part of our everyday interaction with art and aesthetic artefacts occurs through digital media, and our preferences and choices are systematically tracked and analyzed by algorithms in ways that are far from transparent. Our consumption is constantly documented, and then, we are fed back through tailored information. We are therefore witnessing the emergence of a complex interrelation between our aesthetic choices, their digital elaboration, and also the production of content and the dynamics of creative processes. All are involved in a process of mutual influences, and are partially determined by the invisible guiding hand of algorithms. With regard to this topic, this paper will introduce some key issues concerning the role of algorithms in aesthetic domains, such as taste detection and formation, cultural consumption and production, and showing how aesthetics can contribute to the ongoing debate about the impact of today's "algorithmic culture".

Keywords
Algorithm, *Taste*, *Aesthetic consumption*

1. *Aesthetics in the digital age: externalization and automation of taste*

Consumption of information and images, decision-making processes, and both social and cultural dynamics are increasingly mediated, filtered and regulated by software and algorithms, which can be concisely defined as sets of procedures consisting of instructions and inputs that are executed in order to produce a result, solve a problem, or generate an output. In recent years, the impact of digital technologies on human thinking and culture has become an increasingly debated topic: issues related to what has been called "algorithmic culture" (see Striphas 2015) include, among others, the cognitive impact of the ever closer relationship between human subjects and digital de-

[1] emanuele.arielli@gmail.com.

vices (Heersmink 2017), the influence on politics (Bucher 2018), society (Beer 2016), and culture (Finn 2015). The aesthetic dimension is a specific and less-investigated domain and will be the focus of the present paper.

As a general claim, we could synthesize two main aspects of the diffusion of algorithms: *externalization* and *automation*. The first aspect concerns the outsourcing of human thinking and cultural processes and the development of an increasingly complex and integrated "external mind", in which search and storage of information is handed over to mechanisms outside our minds. We are used to the notion of external memories, but we could also hypothesize that taste formation and creative inspiration, as well, happen more and more "out there". For instance, one could consider the process by which users might look for specific cultural content or artists in their research process. The second aspect concerns the fact that those processes follow automated mechanisms that could be responsible for both a standardization of aesthetic phenomena (for instance, through the quick and worldwide diffusion of styles, trends and aesthetic standards/innovation), and, allowing greater choice and freedom, an increasingly detailed customization of user preferences. As a consequence, handing over aesthetic and taste processes to external mechanisms and algorithms is responsible for the development of a new kind of aesthetic production and experience, where phenomena of collective exposure meet, at the same time, a higher level of individualization of aesthetic consumption.

Concerning taste, digital platforms almost appear as tools of introspection: the task of "understanding what we like" is outsourced to the system by offering information about our behavior as users. Platforms like Spotify or YouTube for music or video, or Netflix for movies, visual art archives like Google Cultural Institute or popular image social networks like Instagram, or generalist product retailers like Amazon, are able to associate our preferences with specific choice categories, recognizing what kind of aesthetic experience draws us. At the same time, those systems help us understand and refine our taste. By using Foucault's terminology, they could be seen as "technologies of the self", namely apparatuses that "permit individuals to effect […] a certain number of operations on their own […], so as to transform themselves" (Foucault 1988: 225).

However, these systems rarely mirror human preferences passively, but are based on pre-determined classification and categorization systems, as well as on suggestion mechanisms in which the viewer is directed towards content based on criteria that are not always clear, but rather, are aimed at increasing consumption and not necessarily true introspection.

The crucial point is therefore to investigate the kind of goals according to which these systems are developed. We could think that one goal is to allow the search of information to be flawlessly respondent to a user's interest and needs, known as "finding optimization". At the same time, most of the content providers' business models are based on "engagement optimization", that is the maximization of the users' decision to use the services, spend time on it and orient their attention to its products and share them with others. Even though engagement is usually a consequence of efficient satisfaction of user interest, the difference between "which content users really want" and "what makes users keep looking for content" cannot be overlooked and is a central point in the investigation of "what algorithms want" (see Finn 2015).

In fact, several concerns have been manifested toward these developments. We can summarize with the following: a) the problem of opacity, i.e. the fact that the mechanisms intervening in our decision-making and information consumption follow logics that are beyond the users' understanding; b) the problem of privatization of processes that are implemented by commercial operators having the aim of maximizing user attention; c) the issue of alienation of thought processes and therefore manipulation, and the resulting social, political and cultural repercussions.

However, it would be simplistic to see the rising of an "algorithmic culture" in purely critical terms as a scenario of loss of control in human decision-making and individual thinking through sophisticated systems of manipulation of our attention and preferences. On one side, the entanglement between individual and algorithm could be seen as a further process of integration between technical objects, subjects and their relation to reality (Simondon 1958 and 1992), and as an enhancement of our possibilities in the pursuit of knowledge and information, in the same fashion as a telescope outsourced to an external device the possibility to enhance and expand our vision.

On the other side, as we will pinpoint in the sections that follow, in the different areas of contemporary cultural consumption (images,

music, video) we can observe an evolution in which the algorithm, from simple tool to empower our choices and experiences, increasingly becomes a pervasive factor in determining those choice, experiences and preferences. Using the previous analogy, the telescope, from being an empowering prosthesis, ends up being an instrument in which the subject itself becomes the object of observation and transformation. This evolution has far reaching consequences for aesthetic experience and behavior that still needs to be investigated in full.

2. *Algorithmic customization*

On the one hand, we assume that taste should be the expression of authentic inner preferences, and we expect recommendation systems to be helpful tools in researching them. On the other hand, taste is not only a question of subjective sensitivity and inclination, but also the product of a social interrelation in which complex mediations occur between the individual, his desire to define his own identity and his status (Bourdieu 1984). Therefore, aesthetic consumption has never been the product of a solipsistic decision, but a choice in which people look at the suggestions of cultural intermediaries such as tastemakers, critics, and intellectuals. The possibility of having access to what intermediaries have suggested has been, in the past, primarily the privilege of those who had the cultural and material means to enjoy their own aesthetic consumption. Although the ability to process and enjoy cultural content always needs a specific amount of cultural and intellectual capital, today, the cost associated with accessing it has mostly been neutralized thanks to digital technologies. The reduction in access costs has been described as having a democratizing effect for the individual freedom of cultural consumption, in the same way as technical reproducibility in the past, according to the classic intuition of Walter Benjamin, reduced the role of cultural "guardians" and allowed wider access to art products. However, a situation of great "cultural abundance" (see Wright 2015) leads to the daunting problem of selection and decision-making in correctly choosing what to enjoy and experience in the face of the individual's limited temporal resources compared to the amount of actual available content. Since the problem is no longer accessing aesthetic products, but making the right "aesthetic choice" (see Melchionne 2017), this has greatly advanced the development of increasingly sophisticated systems of evaluation, suggestion,

feedback and reviews, covering anything we could have access to, from services and everyday consumer commodities to sophisticated cultural products. The major value-creating function of such systems is in helping users to discover what they are looking for, as we can see in three separate domains, such as photography, music and film culture.

2.1. *Photography as networked perception*

The twenty-first century opens with a transformation of our way of perceiving the world through the massive production, diffusion and consumption of photographic images. Platforms like social networks, research engines and visual databases are the main contributors in shaping this hyper-visual era. They represent "a function of the technologies that organize the gaze and the image world it surveys" (Macphee 2002: 7).

An automatized algorithmic process takes place right at moment in which a shot is taken, not only because we are used to the automatic regulation of a digital camera's optical parameters (focus, exposure, adjustment of lighting and contrast, blurring correction, picture stabilization, etc.), but also because of the increasingly sophisticated real time re-elaboration of the raw picture data. In contemporary digital cameras (including those incorporated into smart phones) the differences in quality is mostly determined by the advancement in processing software, aimed at creating the most satisfying final output. Even for professional photographers using digital cameras, the choice is between getting a JPG image that has been processed through an inbuilt picture style or getting a RAW file that will later need adjustments, by means of a complex image processing software, in order to create a photograph that is close to what the photographer wants to convey.

Although algorithms are developed to adapt to the user's final impression and preferences, they nevertheless end up creating a qualitative "look and feel" with which the photographer's eye becomes accustomed in assessing his own pictures.

The development of algorithms (along with the evolution of camera and sensor technology) to improve the photographic results is therefore not a neutral transition, but influences the perceptual sensibility and expectations we have toward the images to which we are exposed. This is particularly evident with regard to the aesthetic evaluation of images. In large image databases, such as Pinterest, the algorithmic

image suggestion system not only works following search terms, object categories or formal analogies (shape, color, texture) with other images, but also through an automatic selection and ranking of the pictures reputed as aesthetically superior (Liu *et al.* 2014). Selection and ranking make use of software that predicts the order of preference for images by users based on their past choices. In platforms such as Flickr and Pinterest, these processes have already been developed and implemented with success (Yeh *et al.* 2010.). Some of them use purely algorithmic techniques, others are based on a hybrid between content analysis, user recommendations and search words. The selection is made through the identification of certain features of the images that have been analyzed with large databases and appear to correlate with the general preferences of particular users. A relevant consequence of the algorithmic analysis of photographic quality is the occurrence of a feedback-loop between expressed preferences and suggested images, visual "filter bubble" and the consequent convergence of photographic styles that contain features that are considered aesthetically more pleasing by the majority of users. The efficiency of these systems is demonstrated by the increase in users' consumption of the content offered by the suggestion algorithms (Zhong *et al.* 2015).

From the perspective of photographers, predicting which image will be the one closest to the user's taste would mean targeting the categories and styles according to which an image will have a greater degree of popularity. For those uploading images with the goal of maximizing interest and appreciation by users, there will be the incentive to follow the formal styles and cues that are most likely to be selected and suggested by the system. Therefore, in a circular feedback process of learning and suggesting, the algorithm not only identifies what is aesthetically optimal, but directs those who produce images to follow those optimality criteria (Veerina 2015).

Another popular case is the image sharing platform Instagram, which is an example of a social network based on everyday visual aesthetics (Manovich 2017) in which, on the one hand, stylistic and aesthetic choices allowed by the platform offer a unique possibility of compositional personalization, but, on the other hand, favor a process of large scale diffusion and aesthetic influence where innovations (e.g., a specific filters, framing, compositional style, subject choice, pose or expression) that are successful are rapidly adopted on a global scale and contribute to the evolution of trends in the social visual culture. The individual style, gaze and compositional habits that determine how

a user generates content are empowered and influenced by a suggestion algorithm that analyzes his past preferences and behavior, as well as the network of his social connections, taking cues from the images that have been liked by himself and by the people he follows, thereby generating a numerical score assigned by the system to each image in order to prioritize which picture to show. The final result is not only to capture the user's attention, but also to cultivate his visual standard and preferences and suggest, at the same time, formal and compositional solutions in the production of new pictures.

2.2. *Music and the extractions of acoustic attributes*

In the context of the daily consumption of music we are witnessing the evolution of complex methods in which the algorithmic analysis of the audience's preferences is combined with the critical evaluation of experts and musicologists, in some cases replacing it. As a primary example, the Music Genome Project is a project developed in 1999 with the aim of capturing the essential components of musical qualities using over 450 traits (or musical "genes") attributed by trained music experts to describe songs. The project utilizes a complex algorithm to organize them. Each attribute corresponds to a musical characteristic of a song, describing its tonal quality, the key, the instruments played, the type of rhythm, the gender of the vocalist, etc. An internet radio service like Pandora, currently only available in the US, uses this system to precisely define the tastes of listeners. Through behavioral targeting, the system identifies specific listening habits based on what the person does at different times of the day (e.g. unobtrusive background music during worktime, relaxing tune in the evening, more innovative suggestions during free time, and so on). The result is a scientifically tracked series of "everyday aesthetics" of the users, through the analysis of their behavior, mood and aesthetic needs. Moreover, the profiling of personal listening habits and the correlation with the large database of musicological data allows them, according to Pandora's developers, to discover particular relationships between musical preferences, personal attitudes and social traits (Prey 2017 and Titlow 2013).

While Pandora uses a classification system of music built by expert musicologist, the Echo Nest system, in contrast, relies largely on automatic extraction of data, consisting of algorithms that analyze both the musical content (through "machine listening") and texts of websites

that mention songs, articles by critics and forum sites that discuss music (Morris 2015 and Aguiar *et al.* 2018). The system was acquired in 2015 by the music service Spotify, which offers playlists for users that are partially determined by the algorithmic tracking of individual preferences and also by the curatorship of professional DJs. A recently introduced musical playlist (Discover Weekly) is a completely computational suggestion that uses a complex algorithm based on three main methods: 1) collaborative filtering, which analyze both the user's behavior and the behaviors of other people. It uses data such as the listening counts of the tracks, whether a user saved the track to his own playlist or visited the artist's page; 2) Natural Language Processing (NLP) models, which analyze metadata, news articles, and blogs, crawling the web constantly looking for written text about musical topics and identifying the "cultural vectors" associated with specific artists and songs; and 3) audio models, which analyze the raw audio tracks themselves (by means of neural networks similar to those used in facial recognition software). Those models automatically rate the features of a song, like, for instance, its "valence", that is the emotional positivity or sadness conveyed by a track. Other acoustic attributes – like, e.g. danceability or instrumentalness – are algorithmically extracted and correlated with the user's taste profiles (Jacobson *et al.* 2016, Pichl *et al.* 2017 and Ciocca 2017). These profiles assess style and taste attributes like the "mainstreamness" of a user's taste (how widely popular is the music he tends to listen), freshness (the level of novelty he prefers), diversity (the level of openness to new sounds, the frequency of adding new music to his own playlists), discovery (how often the user listens to songs that later get popular), hotness and so on. Taste profiles measure every subject along each of these different scales and compare him to everyone else, correlating the user with algorithmically extracted musical attributes.

2.3. *Film: the calculation of movie culture*

The relationship between algorithm and film culture has been more widely discussed after the diffusion of the media platform Netflix (Finn 2015, Lawrence 2015 and McDonald *et al.* 2016). According to Finn, Netflix clearly shows the transition from a flawed and inaccurate method in which algorithms are used to analyze judgments and subjective evaluations of users (drawing on their ratings expressed by

"stars" and votes) to an algorithmic observation and profiling of all their viewing habits. Metrics like completion rate, stop and start time, time of day, search history and viewing behavior (e.g., pause, skip, fast forward, rewind, etc.) could be described as the sum of the user's "micro-cultural practices" and behavior, which are taken in account not only to perfect suggestions but to gain insights on how users engage and react to specific aspects of the movie experience. Notoriously, Netflix developed over 1.000 tag categories that classify content by genre, time period, cast, plot development, and mood, using professional "taggers" to classify movies on an extremely fine-grained level (Lawrence 2015). These categories define so-called "micro-genres" (or alt-genres), which, by 2014, had amounted to more than 76.000 (like Australian 20th Century Period Pieces, Best Actor Oscar-winning Fight-the-System Movies, Sentimental set in Europe Dramas from the 1970s etc.). This micro-classification allows the company to get a nuanced view of consumer preferences and optimize Netflix's recommendation engine (about 75%-80% of viewer activity is influenced by the recommendation algorithm). Netflix can attain a very detailed picture of the user's personal taste in a way that otherwise might not even be accessible to the user himself.

But the major development of this data-driven approach concerns decisions regarding what movie to produce. Being a "system for calculating culture" (see Finn 2015) that is able to "understand content as well as consumers", Netflix allowed producers to decide whether or not to greenlight additional runs of a series, identifying which episodes or scenes particularly resonated with audiences. The classic example is the production of the series *House of cards*. Netflix used its algorithms to determine whether an audience might exist for a combination of a David Fincher movie, the actor Kevin Spacey, the genre of political thriller, and so forth (Hallinan and Striphas 2017). After several years of data-experimenting, Netflix had enough information to create original shows from scratch that had a success rates of 80%, compared to the 30%-40% rates of traditional TV shows. In allowing the production of series like *Orange is the new black*, Netflix had already determined its higher likelihood of success using viewership data from similar shows and greatly reducing the risks of failure.

From this perspective, Netflix could be considered more of a data analytics company than a media company. Similar to what happens with digital giants such as Google and Facebook, interaction with users takes the form of a mass social experiment in which information about

people's preferences, tastes and behaviors is collected, analyzed and associated with specific stimuli and cultural contents. This allows companies to sketch an increasingly detailed map of the audience's psyche, their positioning in the cultural space and their desires concerning aesthetic consumption, making it possible to find out which are the most effective ways for introducing novel cultural products.

3. *Categorizations and the structuring of perception*

The detailed classifications of cultural and aesthetic content and its correlation with our sensitivity and taste not only has the function of satisfying our preferences in an increasingly refined manner, but also redefine how we perceive, enjoy and interpret those products. In his classic *Categories of art*, Kendall Walton (1970: 343) argues that we appreciate works of art in *categories* and that how we categorize pieces of artwork alters the features we assume those works have. How categories are built has profound implications on our evaluative standards and judgments. As we saw, the process of categorization becomes an implicit feature of the algorithmic analysis of a person's consumption and of the following feedback and filtering of information. Customization consists in a more and more detailed categorization of what we appreciate by means of data analysis, allowing for the development of a predictive personalization, based on the assumption that similar people want similar things.

Customization, on one side, can favor feedback loops that reinforce a person's choices, leading to an algorithmic self-confirming aesthetic consumption. On the other side, from a closer look, what we observe is also that pre-determined categories are imposed from above on the individual choices in a schematic description of allegedly true preferences. Categories that are offered to our individual decision architectures begin to function as an explanation for our aesthetic experience and appreciation. Recommendations, feedback and filtering of content become self-actuating – that is, they could instill in the user just those preferences that they presume he should have.

The idea that algorithms increasingly determine how our aesthetic experience is structured in its consumption raises the issue of the control of the cultural categorization processes, recalling the traditional warning by Adorno and Horkheimer, according to which mass culture

creates a system of schemes and filters that eventually become the foundation of our collective perception of reality: "The whole world is made to pass through the filter of the culture industry" (1944, 2002: 99, see also Berry 2014).

Patterns and categories are fundamental in structuring our knowledge and experience: as far as cultural content is concerned, this process of categorization is progressively automated and outsourced. As previously shown, Spotify recognizes the musical genres we are mostly drawn to and use this knowledge to produce suggestions that increase our satisfaction and at the same move us towards new music that could expand the horizon of our preferences. Similarly, Netflix identifies extremely sophisticated narrative categories that are then used to target users' consumption, satisfying their preferences but at the same time building their taste and influencing their viewing behavior.

In summary, algorithmic suggestion systems "perfect" the tastes of individuals through aesthetic and perceptive categories that are elaborated to catch our attention and keep us interested. It would be naïve to think that the goal of a successful platform would be to simply mirror our actual preferences: individual taste needs to be cultivated, curated and expanded to *maximize our engagement*. Algorithms are therefore "cultural machines" (see Finn 2017) oriented to fulfill our consumption desire in the most effective way. They are also able to modulate what is culturally relevant and meaningful for us in ways that escape our direct understanding. The user's taste is satisfied, but at the same time he is led into new paths. In this sense, the algorithm constitutes a *technological unconscious* (Thrift 2005) that operates at an unseen level and permeates the dynamics of our preferences, consumption and aesthetic experience.

4. *From suggestion to profiling: the subject as a bundle of traits*

A further aspect of behavioral tracking in digital platforms is the development of increasingly sophisticated profiling mechanisms that classify not only cultural content but also individuals themselves. The refinement of classification and profiling leads us to believe that those systems would eventually know us better than we know ourselves. The

algorithmic personalization is based on the view that the user is a bundle of different preferences and potential consumption traits: each type of aesthetic consumption corresponds to a trait related to a specific taste, personality trait and a variety of socio-economic characteristics.

By identifying specific human traits and functions, technology has always allowed us to support and enhance individual components of our abilities: for example, empowering physical skills with tools or vehicles, amplifying perceptive abilities with sensorial extensions such as microscopes and telescopes, integrating cognitive skills, like memory, through writing systems, memory storage devices and so on. In this sense, algorithms can be seen as instruments of further empowerment, outsourcing the ability for the subject to search, elaborate and choose within a set of almost unlimited content, maximizing his quest for information, but also for optimal aesthetic experience.

In profiling users according to specific needs, suggestion systems analyze and disassemble the unique behavior of the individual into specific and targetable traits. For some commentators (see Raunig 2016), this conforms to the view of the subject as "dividuum", in particular along the definition offered by Deleuze and Guattari (1980), where the singular self is not a whole but a calculable aggregate of traits that merge and integrate with technology. A person's affective and cognitive elements are connected and integrated into economic, technological, biological and social complexes. Therefore, the individual is not a monolithic given that relates with all these factors, but the product of a process of individuation through the dynamic intertwining with them. Similarly, every person is interconnected to others not as a whole personality, but through its algorithmically determined traits through social connections. This is a coupling that tends to work without repression or ideological manipulation, since it only requires techniques of modulation and modeling to guarantee the functional interpenetration between humans and machines. Deleuze's main inspiration for the idea that not the individual, but the process of individuation is central, is to be found in the work of Gilbert Simondon (1958 and 1992). According to Simondon, we should not assume the a priori existence of individuals as a cause of their behaviors and preferences. We are rather an effect of an always open process of individuation through our everyday acts and interaction with systems (including the

environment, technology and human artifacts) that continuously define our identity, preferences and choices (Shaviro 2006 and Prey 2016 and 2017).

If the relation to external systems is essential to the process of individuation, then it would be simplistic to see algorithms as mere tools mirroring preferences and traits of already-given individuals. If algorithmic analysis is not only intended to better describe the subject, but to target and change his behavior, then the ideal of an algorithmic culture as an ultimate achievement of democratic public culture based on a transparent description of our preferences and choices would be a naïve illusion (Gillespie 2010 and Striphas 2015). Nobody knows, in detail, the mechanisms underlying the main digital information systems such as Facebook, Amazon and Google, which are therefore far from being democratic and transparent; rather, they are private tools aimed at maximizing profit through increased user engagement. This suggests that algorithms cease to be just a "telescope" that enhances decision-making skills. They evolve "not merely to enact our decisions, but to control the decision pathways, the space of agency" (Finn 2015: 97). Referring to Netflix, Finn states that we are witnessing "an atomized viewing audience, interacting directly with the algorithm […] watching the show in our own private temporal stream, while Netflix watches us" (Finn 2015: 102-3).

As Christian Sandvig put it (see Sandvig 2014), algorithmic targeting and profiling could lead to a "corrupt personalization", that is the process by which your attention is drawn to interests that are not your own. According to this view, personalization always follows a model of humans as *experience maximizer*: each trait that constitutes the (in)-dividual manifests unexhausted consumption potentialities. Therefore, suggestions will never back a person's behavior who, for instance, would prefer to consume less, to set limits to his search of novelty and reach a point in which his interests are satiated. Profiling is never simply descriptive, but is transformative, and supports a pattern of behavior in which individuals are preference maximizers, transparent in their cultural consumption, and inclined to share their data with the system and the community of other users.

5. *The internalization of algorithmic taste: influence on creativity*

Technology shapes and forms its content and its users, as we know at least since Walter Benjamin. Every media's innovation has always brought with it a change and evolution in cultural production, and there is always a relationship between technological advancement and formal innovation in the creative domain. Following this point, we could say that algorithms not only track and describe human production, but human creative choices begin to adapt to the output and the categories generated by the algorithm. For example, we have already mentioned how algorithmic visual curation impacted the production of photographic images through a modification of preferences and habits.

In the case of the music industry, technological restrictions (or lack thereof) always determined creative constraints (or freedom from them), as shown by the effect that the numerous changes in the recording technologies and support media had on musical production (Katz 2004). For example, an LP album in the years 1980-90 could only be about 45 minutes long, given the memory limitations of vinyl records and optical CDs. Today, not only it is possible to have pop music productions of two or more hours, thanks to the absence of limitations in digital media storage, but there is an incentive to offer a greater number of singles per album to increase the probability of its success, since success is measured by how many times a single gets listened to through a streaming service: "Online streaming platforms create a highly saturated ecosystem that encourages a high level of competition for the listener's attention" (Gauvin 2018: 302). With streaming, moreover, music producers have access to an immense amount of data: they can know which songs are skipped after a few seconds, which are most listened to in a playlist, and which musical styles or rhythms are able to attract more attention. This also led to a modification of the melodic structure of musical pieces: since, in a streaming, a user usually listens only to the first seconds of a song before making the decision to keep listening or to skip it, the musicians are oriented to capture the attention of the listening in these initial moments. For instance, this can result in the immediate introduction of the main song refrain or in the decrease of the time before the initial entry of the singing voice. Additionally, musicians may attempt to produce certain styles or sounds because they are more likely to be picked up by algorithms. Further changes have been observed, such as a decrease

in the number of words in song titles, a decrease in the time before the title of a song is heard, and a general increase in the average tempo (Gauvin 2018).

Algorithms, as seen in the case of Netflix, can be explicitly used to model the creative process. In the case of the series *Orange is the new black*, Netflix has even exerted an influence on the casting process according to what its algorithms suggested would be the most effective choices for actors in terms of attracting viewers (Hallinan and Striphas 2017). The analysis of data can lead to precisely define the format and length of a television production, its genre and narrative structure, rhythm and plot-twists, and the appropriate use of the emotional palette in the story with the aim of maximizing public success.

It could be argued that this kind of analysis in the creation of any popular production is not a novelty: market research, feedback from focus-groups and observation of the public's taste have always been the tools of producers of mass consumption products. But the introduction of extensive data analysis has led to a more pervasive, broad and precise level of observation of public reaction and a more effective intervention on their preferences.

Moreover, it could be argued that independent productions, including "high" and sophisticated cultural products (such as contemporary art, highbrow music and non-mainstream literature), are, per definition, free from explicit algorithmic profiling and analysis. But this does not mean that they are free from the influence of algorithmically curated circulation of information. For instance, museums already have redefined the ways they organize and present their collections under the influence of the digital visibility of artworks (Pulh *et al.* 2015 and Wilson-Barrano 2017). As renowned art critic Boris Groys recently suggested (2016), contemporary art practices are also influenced by the dynamics of the information flux to which we are exposed. All subjects of the "artworld" (artists, critics, researchers, theorists) are heavily dependent on the very same digital flows. According to Groys, the traditional creative process was characterized by a phase of isolation and seclusion, but with the Internet every user is exposed to the other and the reciprocal influence of art-creators and viewers, even those belonging to the restricted circle of the "artworld", gets blurred in a constant circle where documentation, inspiration and production influence each other. When we search for an artist, his artwork, or for a specific trend, the Web provides us with a set of sites, critical texts, images of the artist's works, and links to galleries, as well as videos and

news articles. This not only creates a change in the way we view, access and experience art (both on or offline), but also in the way that the artworld itself (artists, researchers, curators, critics) thinks about the process of art-making. Every young artist or designer is constantly in search of new inspirations, is checking the state-of-the art of his field or medium, and is trying to get a grasp of the trending *zeitgeist* in which she (consciously or unconsciously) tries to position herself.

Creativity has always been the product of a "networked" inspiration and of the influx of what other peers are offering to the public attention. But with the rising use of digital media and the role of platforms selecting and filtering what is culturally relevant for our eyes and sensibility the contribution of algorithms has become a presence that any cultural investigation into the dynamic of contemporary aesthetic cannot ignore. In all this, quoting Manovich, "software is the invisible glue that ties it all together" (2013: 8). That is to say, the algorithmic filter mechanisms that select and organize the information we are exposed to plays a considerable role in the shaping of our visual and artistic sensibility.

6. *Conclusion: "Know thy algorithm"*

Algorithms shape us. They have a crucial role in the formation of our taste and in the directions we take in our aesthetic experiences. They adapt to our aesthetic choices, and choices are partly the result of how the algorithm teaches us, expands our self-knowledge, but also manipulates us in subtle ways: aesthetic autonomy is a complex dialectic based on different degrees of externalized control. In investigating this dialectic, aesthetics as a discipline occupies a central role in trying to answer questions concerning how our choices and experiences are "cultivated" through a complex and not always transparent process of filtering and directing attention. Algorithms are opaque things – proprietary black boxes whose primary goals do not necessarily align with those of their users. Taste and aesthetic experience have always been the result of the meeting of personal inclinations and preferences with complex and unpredictable factors such as education, cultural context, casual exposure to new stimuli, and external influences. All these factors are "imponderable levers" that contribute to serendipitous dis-

coveries and to the evolution of personal taste and aesthetic preferences. But with the rise of the algorithmic analysis of our aesthetic behavior, less and less is left to chance, and those imponderable levers become computable factors that are used to optimize the cultural products to which we are exposed.

Moreover, the anthropological model underlying algorithmic culture is the idea that a person's aesthetic attitudes and tastes are defined only in terms of manifest choices and consumption, based on the assumption that engagement, along with maximization of interest and attention, is the direct expression of autonomy and authenticity in the exercise of one's own preferences. The assumption, here, is that we are consumption maximizers; the possibility that an individual would choose not to engage in an aesthetic experience or not to constantly look out for new cultural products is generally excluded by the very mechanism of algorithmic profiling and suggestion.

A further question that should be investigated is if our preferences and tastes are undergoing a process of global homogenization, through the convergence of consumption habits and content, led by algorithms with the goal of engagement maximization, or if instead we witness an increase of plurality (or fragmentation) of styles, trends and aesthetic preferences by users that are atomistically closed in their bubble of personalized cultural choices. Alternatively, it could be the case that hyperconnectivity combines homogenization and atomistic personalization as a consequence of the individual profiling based on sub-personal components: every person is the particular combination of globally tracked and cultivated traits (the deleuzian *dividuum*). Specifically, if algorithms track and suggest pieces of content that are pertinent to specific social attributes and cultural capital (using Bourdieu's terminology), this would not weaken, but would even further reinforce the mechanisms that shape culturally closed habits of taste and aesthetic consumption.

Since viewing time, search queries, comments and "likes", video or audio rewind, and past behavior feed into a process of intermediation that curates what we view, hear and read next, "we may find that we […] cannot escape the data" (Morris 2015: 460). This omnipresence of trackable data points has often favored the dystopian idea of the digital realm as a surveillance device conducted by means of desire satisfaction. Recalling Jonathan Crary's observation about the double-edged role of "screens" as today's window of access to information and cultural consumption: "the screen is both the object of attention

and yet capable of monitoring, recording, and cross-referencing attentive behavior for purposes of productivity […]. Attentive behavior in front of all kinds of screens is increasingly part of a continuous process of feedback and adjustment within what Foucault calls a 'network of permanent observation'" (Crary 1999: 76).

A dystopian view of algorithmic culture, however, presupposes the clear distinction between the autonomy of an already-given subject with respect to his tools, including technological devices. However, it would be more realistic to see technology as a component of human evolution, where subjectivity, that is the sum of human cognitive processes, needs, and attitudes are the product of the dynamic interaction with innovations. Following the aforementioned intuitions of Simondon about the relationships between technology and subjects, we could say that algorithms are technical objects connected to each other, connected to persons and connecting persons with the world. It would thus be naïve to describe them as an instrument of alienation, rather they are "hyper-artifacts" that network us and the world with all sorts of subtle relations, feedbacks and mutual dependencies. As far as aesthetics are concerned, algorithms should be seen both as tools that allow for experimentation with new ways of experience, taste formation and self-cultivation, and as agents of soft power, guiding the individual by curating his desires and constantly transforming him: for all these reasons, knowing the working principles of algorithms should be an essential part of our self-knowledge. Transparency in their functioning and the ability to evaluate them is a social, political and scientific issue.

Bibliography

Adorno, Th.W., Horkheimer, M., *Dialectic of Enlightenment*. *Philosophical fragments* (*Dialektik der Aufklärung,* 1944, 1947), Standord, Stanford University Press, 2002.

Aguiar, L., Waldfogel, J., *Platforms, promotion, and product discovery. Evidence from Spotify playlists*, "NBER Working Paper", n. 24713 (2018), available at: http://www.nber.org/papers/w24713.

Beer, D., *The social power of algorithms*, "Information, Communication & Society", n. 20/1 (2017), pp. 1-13.

Berry, D., *Critical theory and the digital*, London, Bloomsbury, 2014.

Bourdieu, P., *Distinction. A social critique of the judgment of taste*, Cambridge, Harvard University Press, 1984.

Bucher, T., *If... then. Algorithmic power and politics*, Oxford, Oxford University Press, 2018.

Che-Hua, Y., Ho, Y., Barsky, N., Ouhyoung, M., *Personalized photograph ranking and selection system*, "ACM Multimedia 2010" (2010), pp. 211-20.

Ciocca, S., *How does Spotify know you so well?*, "Medium" (2017), available at: https://medium.com/s/story/spotifys-discover-weekly-how-machine-learning-finds-your-new-music-19a41ab76efe.

Crary, J., *Suspension of perception*, Cambridge, MIT Press, 1999.

Deleuze, G., Guattari, F., *A thousand plateaus. Capitalism and schizophrenia* (1980), Minneapolis, University of Minnesota Press, 1987.

Finn, E., *What algorithms want. Imagination in the age of computing*, Cambridge, MIT Press, 2017.

Foucault, M., *Technologies of the self. A seminar with Michel Foucault*, Amherst, University of Massachusetts Press, 1998.

Gauvin, H.L*., Drawing listener attention in popular music. Testing five musical features arising from the theory of attention economy*, "Musicae Scientiae", n. 22/3 (2018), pp. 291-304.

Gillespie, T., *The politics of "platforms"*, "New Media & Society", n. 12/3, pp. 347-64.

Gillespie, T., *The relevance of algorithms*, in T. Gillespie, P. Boczkowski, K. Foot (eds.), *Media technologies. Essays on communication, materiality, and society*, Cambridge, MIT Press, 2014, pp. 167-94.

Groys, B., *In the flow*, New York, Verso, 2016.

Hallinan, B., Striphas, T., *Recommended for you. The Netflix prize and the production of algorithmic culture*, "New Media & Society", n. 18 (2016), pp. 117-37.

Heersmink, R., *Extended mind and cognitive enhancement. Moral aspects of cognitive artifacts*, "Phenomenology and Cognive Science", n. 16 (2017), pp. 17-32.

Jacobson, K., Murali, V., Newett, E., Whitman, B., Yon, R., *Music personalization at Spotify*, Boston, Proceedings of the 10th ACM conference on recommender systems, 2016.

Katz, M., *Capturing sound. How technology has changed music*, Berkeley-Los Angeles, University of California Press, 2004.

Lawrence, E., *Everything is a recommendation. Netflix, Altgenres and the construction of taste*, "Knowledge Organization", n. 42/5 (2015), pp. 358-64.

Liu, D., Lu, C., Mohan, K., *Pinterest analysis and recommendations*, available at: http://snap.stanford.edu/class/cs224w-2014/projects2014/cs224w-28-final.pdf.

Macphee, G., *The architecture of the visible. Technology and urban visual culture*, London, Athlone Press, 2002.

Manovich, L., *Software takes command*, London, Bloomsbury, 2013.

Manovich, L., *Instagram and contemporary image*, 2017, available at: http://manovich.net/content/04-projects/148-instagram-and-contemporary-image/instagram_book_manovich.pdf.

McDonald, K., Smith-Rowsey, D., *The Netflix effect. Technology and entertainment in the 21st century*, New York, Bloomsbury, 2016.

Melchionne, K., *Aesthetic choice,* "British Journal of Aesthetics", n. 57/3 (2017), pp. 283-98.

Morris, J., *Curation by code. Infomediaries and the data mining of taste*, "European Journal of Cultural Studies", n. 18/4-5 (2015), pp. 446-63.

Pichl, M., Zangerle, E., Specht, G., *Understanding user-curated playlists on Spotify. A machine learning approach*, "International Journal of Multimedia Data Engineering and Management", n. 8/4 (2017), pp. 44-60.

Prey, R., *Musica analytica. The datafication of listening*, in R. Nowak, A. Whelan (eds.), *Networked music cultures*, London, Palgrave Macmillan, 2016, pp. 31-48.

Prey, R., *Nothing personal. Algorithmic individuation on music streaming platforms*, "Media, Culture & Society" (2017), pp. 1-15.

Pulh, M., Mencarelli, R., *Web 2.0. Is the museum-visitor relationship being redefined?*, "International Journal of Arts Management", n. 18/1 (2015), pp. 43-51.

Raunig, G., *Dividuum. Machinic capitalism and molecular revolution*, Cambridge, MIT Press, 2016.

Sandvig, C., *Corrupt personalization*, "Social Media Collective" (2014), available at: https://socialmediacollective.org/2014/06/26/corrupt-personalization/.

Shaviro, A., *Simondon on individuation. The Pinocchio theory*, available at: http://www.shaviro.com/Blog/?p=471.

Simondon, G., *The genesis of the individual*, "Incorporations", n. 6 (1992), pp. 296-319.

Simondon, G., *Du mode d'existence des objets techniques*, Paris, Aubier, 1958.

Striphas, T., *Algorithmic culture*, "European Journal of Cultural Studies", n. 18 (2015), pp. 395-412.

Thrift, N., *Knowing capitalism*, London, Sage, 2005.

Titlow, J.P., *At Pandora, every listener is a test subject*, "Fast Company" (2013), available at: https://www.fastcompany.com/3015729/in-pandoras-big-data-experiments-youre-just-another-lab-rat.

Tryon, C., *On-demand culture. Digital delivery and the future of movies*, New Brunswick, Rutgers University Press, 2013.

Vaidhyanathan, S., *The googlization of everything (and why we should worry)*, Berkeley, University of California Press, 2011.

Vanderbilt, T., *You may also like. Taste in an age of endless choice*, New York, Knopf, 2016.

Veerina, P., *Learning good taste. Classifying aesthetic images*, Technical report, Stanford University, 2015, available at: http://cs231n.stanford.edu/reports/2015/pdfs/pveerina_final.pdf.

Walton, K.L., *Categories of art*, "The Philosophical Review", n. 79 (1970), pp. 334-67.

Wilson-Barnao, C., *How algorithmic cultural recommendation influence the marketing of cultural collections*, "Consumption Markets & Culture", n. 20/6 (2017), pp. 559-74.

Wright, D., *Understanding cultural taste. Sensation, skill and sensibility*, London, Palgrave Macmillan, 2015.

Zhong, C., Karamshuk, D., Sastry, N.R., *Predicting Pinterest. Automating a distributed human computation*, Proceedings of the 24th international conference on World Wide Web, 2015, pp. 1417-26.

© 2018 The Author. Open Access published under the terms of the CC-BY-4.0.