



Volti artificiali Artificial Faces

L'enigma dei volti artificiali è che non esistono volti completamente naturali, eppure non esiste volto che non sia anche naturale. I simulacri di volti, indipendentemente da come vengano creati — disegno, pittura, scultura, fino alle creazioni algoritmiche delle reti neurali — in fondo devono sempre basarsi su volti biologici preesistenti in qualche tempo, in qualche spazio e in qualche modo. Al contempo, ognuna di queste facce biologiche presenta un fenotipo che è influenzato dal linguaggio, dalla cultura e dalla moda, a inclusione della stessa moda dei simulacri facciali. I nostri ritratti rimandano a volti naturali, ma questi si atteggiavano spesso prendendo quelli a modello. Lo studio semiotico del volto non può però limitarsi a proclamare questo enigma. Deve anche sviscerarlo. Deve, per ogni categoria e caso di volto significante, delineare la soglia tra natura e cultura, trasmissione genetica e linguaggio.

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Massimo Leone

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Prefazione / Preface^I

MASSIMO LEONE^{*}

1. A cultural semiotics of facial technologies

The conundrum of artificial faces is that there are no natural faces, yet there is no face that is not also natural. Simulacra of faces, no matter how they are created — drawing, painting, sculpting, up to the algorithmic creations of neural networks — deep down must always rely on biological faces existing somewhere, somewhen, and somehow. At the same time, each one of these biological faces presents a phenotype that is inflected by language, culture, and fashion, including the fashion of facial simulacra. Our portraits point back to natural faces, yet the latter point forward to the former. Face scholarship cannot be bound, however, to proclaim this conundrum. It must also dissect it. It must, for each case and category of facial items, outline the threshold between nature and culture, genetic transmission and language. This operation is indispensable to the semiotic approach, for which, it should not be forgotten, “reality” and “artificiality”, “naturalness” and “simulacrum” are not absolute values but, on the

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contrary, contrastive results: photoreal portraits of non-existing biological faces generated by neural networks look as extremely realistic to the early 2020^s viewer, but will they still do so ten or twenty years from now? The answer depends on the history of facial communication, which includes the history of facial technology, that is, the series of devices and technics through which faces are ‘made’, from genetic engineering to make up, from plastic surgery to digital filters.

On the one hand, obsolete ‘facial technologies’ can be superseded by new devices, whose outputs somehow convey an accrued feeling of realism. That usually entails a de-naturalization of the former and a naturalization of the latter. Up to the end of modernity, Renaissance portraits probably were the highest human achievement in terms of visual realism in facial representation, yet they were downgraded to mere ‘art’ by the invention of photography. The point of semiotics is that it looks at the meaning-making conditions that give rise to this difference. Photography eliminates the painter’s semiotic mediation, it automatizes it, and enshrines it into a mechanic process. A increase in indexicality results from it. Reality looks closer in a photograph than in a painting, although mediation has not actually disappeared in the former but has been displaced to the machine and its inventors. At the same time, as Walter Benjamin first pointed out in philosophical terms, that bestows new artistic value to the previous technology: since painting can be no longer valued for its ‘objective realism’, it is praised more and more for its ‘subjective idealism’. Benjamin’s followers often neglect this truth: photography diminished the aura of paintings but increased that of painting. Indeed, if a new facial technology promises more indexicality than the previous one, that usually retroacts, emphasizing the symbolic value of the latter: after photography, in painting we do not praise technique anymore but style, and inventive capriciousness. This can give rise to the paradoxical effect that, after the invention of photography, a painted portrait can be judged as closer to the ‘truth of the face’ than a photograph of it, since the latter is the product of a mechanic process, whereas the former entails a subjective capacity for introspection.

That is to say that, if the naturalness or the artificiality of a face is a semiotic effect, linked to the history of facial technology, this history is neither linear nor evolutionary, but characterized by intricate paradoxes. The way in which a culture constructs the nature of a face, as well as the way in which nature underpins the cultures of the face, must be investigated with

sophisticated tools, attentive to the communicative predicament of the visage. Indeed, if the first truth about the face is that it is always together both natural and cultural, the second truth is that it is intrinsically invisible to the subject, exactly at the same time as it is offered to intersubjectivity. Nobody sees one's face ever. The invention and perfection of the mirror introduced the possibility of reflection, yet our face in the mirror is not our face; it is inverted, it is flattened, it is given a glassy appearance; not to speak of the quality of the mirror itself, opaquing, distorting, slanting the reflected image. The invisibility of the face is a consequence of its natural anatomy: natural evolution has situated the organs of vision, the eyes, exactly in the middle of the face, together with the organs of smell and taste; the ears, enabling our hearing, are not far, at the left and right side of the face. A lot of what we can perceive of the world comes from this small area of our body, from the plexus of eyes, nose, and mouth with adjacent ears, yet that is also what determines its imperceptibility, especially as concerns the vision: we can taste our own lips, and smell our own nose, yet we cannot see our own eyes, although we can close them and observe the optical spectacle of our interior darkness. The face, therefore, is the invisible place from which the world surrounding us acquires its visibility. That turns it into the source of subjectivity per excellence, the inscrutable point from which we see the reality around. That is why, in many cultures and languages, the face is not only a sur-face but also and above all an inter-face, a surface that we offer to the world and through which we receive it visually. It is a visage, etymologically connected to the idea of seeing and being seen, being visually present to the world and receiving its visual presence.

The face, hence, emerges from a double dialectics: not only that between nature and culture, but also that between giving and taking, presenting and beholding, offering and receiving. The face that we have, the face that we are, is always a mixture of biology and language, but it is also a mixture of us and the others, of how we intend to present ourselves and how we are actually interpreted. The whole ethnomethodology of the face, from Erving Goffman on, stems from this assumption. Our face is, indeed, not only a surface, and not only an interface, but also a text. It is a proposition of meaning. Such textual nature is evident in simulacra: a portrait will be perceived, read, and valued as the result of a very complex interaction between the painter's intention, the materiality of the painting, and the disposition of its viewers. Yet the face too, and not only the repre-

sented one but also the presented one, is a text, for like a text we arrange it for the world, through a mixture of intentions and spontaneity; like a text, our face is material, presenting itself as bodily surface but also as support for dentistry, cosmetics, hairdressing, piercing, tattoos, etc.; like a text, finally, this face is written (by nature, by ourselves, by society) as well as it is read, and misread in certain circumstances: whence the ancient and still extant dream of developing infallible techniques for the reading and decoding of faces, from physiognomy on.

If the face is a text at the threshold of nature and culture, subjectivity and intersubjectivity, we and the others, then the supposed ‘naturalness’ or ‘artificiality’ of it must not be gauged in absolute terms, but as resulting from an encounter of conditions and strategies, signification and communication. Faces always signify, meaning that their sense does never purely stem from intentionality, yet they also frequently communicate, and are actually the most common support for human interpersonal interaction. Hence, a semiotic study of ‘artificial visages’, which is also inextricably a study of ‘natural faces’, must essentially give rise to a reasoned typology of “modes of facial production”, parallel to that typology of “modes of sign production” included by Umberto Eco as final section of its monumental “treatise of semiotics” (*Trattato di semiotica generale*, 1975).

Given this conceptual framework, the ‘artificiality’ of a face is, therefore, not a characteristic but a relational condition, the product of a conjunction of variables and their values. The first variable is the ‘biological dependance’ of a face. A face that appears as connected to a living head, and a living body, will certainly emanate a compelling sense of ‘naturalness’. Yet that does not rule out that such a face might be also judged as ‘artificial’, for instance if it appears as transformed by thick layers of conspicuous make-up, or if it is distorted in the grimaces of an actor. And that does not rule out either that an intense reality effect might emanate from faces that are independent from living heads and bodies, as it is the case in photoreal portraits produced by neural networks. In such case, though, the disquietude induced by the facial representation will exactly result from this contrast: it does not certainly live, yet it looks alive (“uncanny valley”). The feeling of uncanny is even more intense when not only the face but also its representation is disconnected from human life: a face appears in the visual field, yet it is not related to a living body, and it is not made by a human hand either. That is the case of all those facial im-

ages that seem to emerge independently from any intentionality: “*achei-ropeita*” icons of deities or saints, but also pareidolic visages in trunks and clouds and, more recently, selfies accidentally taken by non-human animals. These faces emerging in clouds, in trunks, in paintings, as well as from electronic devices left in nature, amuse because they challenge the basic idea that a face must be attached to a body, and that a facial representation must be connected to an intentionality. The amusement is, however, accompanied by puzzlement: who actually ‘created’ such faces? Chance? Transcendence? Transcendence through chance? Or algorithms that turn chance into the principle of their functioning and, as a consequence, seem to acquire a sort of transcendent ‘aura’?

Now we know that, in many cases, it is the mind that ‘sees’ faces where they are not; it is the brain that is compelled by its natural evolution to recognize faces in the environment. Yet this recent neurophysiological explanation does not eliminate the sense of wonder that artificial faces produce. It is the awe surrounding the parallel between, on the one hand, what nature creates — biological faces of individuals through the genetic reproduction of the species — and what is apparently created by nature beyond such reproduction, or by humans through the devising of simulacra. Nature seems to have emphasized the value of singularity in the biological production of human faces, with the only disquieting exception of identical twins, yet how much of that singularity can be insufflated in the facial representations that other agencies produce? How individual can artificial faces be in comparison to the apparent singularity of ‘natural’ faces? And what is the cultural impact of more and more rapid advances in facial recognition technology, which seems to increasingly turn the singularity of faces into a matter for measurability, computability, and classification? Even more relevantly, as artificial intelligence is progressing in the simulation of facial singularity, will ‘natural’ faces too, like artworks after the invention of photography, lose their aura? Shall we be living in the uncertain epoch of a ‘mechanical reproduction’ of the face?

In a sense, we already are. Deep fakes and other trolling facial technologies muddy the water of facial recognition, increasingly blurring the difference between a ‘natural’ visage and an ‘artificial’ one, between the face and its simulacra. It is an uncertainty that gives rise, then, to a whole series of interesting phenomena of de- and re-naturalization. In many traditional societies and cultures, the mask was the epitome of the artificial

face, since it would be superposed to the ‘real’ visage and, therefore, ipso facto ‘naturalize’ it by its sheer existence: a mask covers a face, yet it always somehow discovers it too. It points at the visibility of what is hidden, somehow through concealing the fact that, as it was stressed earlier, nobody can see one’s face and one’s face must always be seen through an alien gaze, as the mask that we both intentionally and unintentionally present to it. The mass production of digital masks is adding extra intensity to ancestral human worries: what is my ‘real’ face? And what is the ‘real’ face of the others? Can I trust what I see on other peoples’ faces? And will they trust mine? Is there any truth in facial simulacra, or are they always unreliable shadows of an essence that cannot be grasped? Is the face still central in human mutual understanding, or is it, and perhaps it has always been, a splendid trick of nature, the illusion that we can see the others, distinguish them, recognize them, and, most importantly, penetrate through their visible faces into their invisible minds?

2. Varieties of artificial faces

Although, as it was pointed out in the previous section, the meaning of a face is always to a certain extent unintentional (for the communicative effect of a biological face cannot be completely controlled; for the representation of a face always depends on a certain ‘facial technology’), reflection on the naturality / artificiality of the face is particularly interesting in those cases in which not only the meaning of the face but also the face itself with its somatic and visual features seems to take shape without a human intentionality and beyond the domain of natural genetic reproduction. In these cases too, as it shall be seen, a pure artificiality is to be excluded, for an indexical footprint always somehow relates the face to nature, or the face to human intentionality. Yet, the human imagination of a ‘pure artificial face’ is a central case study, since it leads to important insights about the essence of the face in human interactions and cultures.

The idea of facial images² brought about by a non-human agency³ and

2. By “facial images” here is meant, in general, all visual configurations able to evoke, in a beholder’s perception, the idea of a face.

3. In this case, the definition of an agency as such, and its qualification as “non-human”, is

unrelated to mere procreation is old⁴. On the one hand, as regards the visual reception (or, rather, the “invention”) of such faces, human beings seem to be neurophysiologically inclined to pareidolia, that is, the tendency to recognize facelike structures in visual patterns that actually do not intentionally represent faces, like natural visual configurations (the cortex of tree-trunks or the water vapor of clouds)⁵. Such biological inclination is also linked to some cultural traces and trends: ancient sources in several cultural traditions narrate of images of faces prodigiously appearing in stones, gems, landscapes, etc⁶. They also underline the role of chance, or analogous agents, in the artistic creation of facial images. That has been emphasized even more in modern art.⁷ In religions too, deities are often thought to manifest themselves through miraculous facial images, called “*acheiropoieta*”⁸, without the intervention of any human agency.

not unproblematic. The determination whether human beings are free or compelled to give rise to images is a philosophical conundrum, as it is the singling out of a specifically human agency as opposed to a non-human one. For instance, in pareidolic recognitions of facial images, it is not uncomplicated to distribute the agency that creates them between, on the one hand, the material configuration that results in the visual pattern of pareidolia and, on the other hand, the human interpretation of these arranged visual stimuli in the form of a face.

4. Literature on the topic denominates them as “chance” or “natural images”, depending on whether they are thought as created by accidents involving at least to a certain extent the agency of human beings or by natural processes unaffected by human action. Both denominations are, however, far from being immune from philosophical questioning, involving the thorny issue of the definition of “chance” and the equally complex question of defining “nature”. The series of problems listed in these first footnotes prove, however, the philosophical relevance of facial images that are not brought about by human agency. Perhaps, the most neutral way of calling them is “unintentional facial images”, that is, images of faces that do not result from an explicit human project of representing a face. Nevertheless, as it shall be seen in the volume, this denomination too is complicated by the fact that purely intentional facial images do not probably exist, given that also natural face images, that is, the human perception of biological faces, often leads to the attribution of unintentional meaning to them. Essential literature on “chance” and “natural” images, including the facial ones, includes Ladendorf (1960), Janson (1973), Guthrie (1993), and Elkins (1999); see also Brilliant (2000) and (2007).

5. Abundant literature on the topic include Iaria *et al.* (2010); Takahashi and Watanabe (2013); Liu *et al.* (2014); Kato and Mugitani (2015); and, more recently, Palmer and Clifford (2020).

6. For a summary of the literature on the topic and further semiotic considerations on it, see Leone (2016); see also Zagoury (2019) on the Renaissance concept of “fantasia” as mental capacity for forming images from abstract visual patterns.

7. See Malone (2009) (on chance aesthetics); Eversen (2010); Molderings (2010) (on Duchamps); and Lejeune (2012); on chance in photography, see Kelsey (2015); in algorithmic art, with a semiotic perspective, see Poltronieri (2018); on the relation between chance in art and chance in biology, see Adelman (2020).

8. Medieval Greek: “ἀχειροποίητα”, “made without hand”; singular “acheiropoieton”; lit-

The present volume surveys this multifarious field and extends its research to current trends in the creation of ‘artificial visages’: in technology, through generative adversarial networks and in robotics; in medicine, through aesthetic surgery and face transplantation; in the arts, with special attention to the provocative creation of masks as ‘artificial faces’ (and vice versa) by contemporary digital artists like Leonardo Selvaggio and others. Neurophysiology and cognitive psychology, visual history and digital art, artificial intelligence and plastic surgery constitute the daring cross-disciplinary perimeter of the present volume, which results from the first year of work in a major research agenda, awarded an ERC Consolidator Grant in 2018 (FACETS: Face Aesthetics in Contemporary E-Technological Societies, 1 June 2019 – 1 December 2024). Within this perimeter, a specific issue is investigated: the relation between agency and facial images.

As a vast literature indicates, the face is the most versatile interface of human interaction: most known societies simply could not function without faces. Through them, human beings manifest and perceive cognitions, emotions, and actions, being able, thus, to coordinate with each other. The centrality of the face is such that it is often attributed to non-human entities too, like animals, plants, objects, or even food⁹, landscapes, and, in certain circumstances, countries and cultural heritage. Symmetrically, defacing people literally means denying their faces, debasing their humanity. Such centrality of the face is the outcome of biological evolution, as well as the product of cultural post-speciation and social contextualization. On the one hand, as Darwin already showed in a seminal essay, the facial expression of some emotions, like shame, cannot be faked; on the other hand, countless cultural devices can alter faces, from makeup to tattoo, from hairdressing to aesthetic surgery.

The social centrality of the face manifests itself also in the omnipresence of its representations. The human brain is hardwired to detect face-shaped visual patterns in the environment, as the phenomenon of pareidolia or the syndrome of Charles Bonnet indicate; at the same time, most human cultures have extensively represented the human face in multifarious contexts, with several materials, and through different tech-

erature on the relation between (face) visual recognition and (transcendent) agency attribution includes Guthrie (1993) and Kelemen (1999, 2004); see also Slingerland (2008: 395).

9. See Leone (Forthcoming) *On the Face*, and Stano (2020) in the present volume.

niques, from the funerary masks of ancient Egypt until the hyper-realistic portraits of present-day digital art. Depicting the face, moreover, plays a primary role in religions, with Christianity setting the long-term influential tradition of a deity that shows itself through a human face whereas other traditions, like Judaism or Islam, strictly regulate the representation of the human countenance so as to avoid blasphemy.

Within this complex trans-historical and trans-cultural framework, the abovementioned project (FACETS, Year 01) has essentially revolved around a straightforward hypothesis: since the face is so central in human behavior, facial images that are considered as produced by a non-human agency receive a special aura throughout history and cultures, as if they were endowed with extraordinary powers. Furthermore, since in many societies the face is read as the most important manifestation of interiority, ‘non man-made’ images of faces are attributed a status of authenticity and earnestness, as if they were the sincerest expression of some otherwise invisible agencies. So as to test this hypothesis, the project has cross-fertilized several methodologies.

First, it has focused on the phenomenon of face cognition known as “pareidolia”: the cognitive capacity to detect faces in a confused visual environment has been selected as adaptive by natural evolution (individuals endowed with such ability could, for instance, perceive faces or muzzles of predators hiding behind a bush); hence, such capacity is now part of the visual cognition of all human beings and is activated in particular psychological and contextual circumstances: seeing faces in trunks or in clouds is a common phenomenon, which precisely derives from such evolution. Further neurophysiological evidence, then, such as that provided by patients suffering from the so-called “Bonnet syndrome”, points at the existence of a specific brain module for the detection of faces in the environment: individuals that are visually deprived (because of senile blindness, for instance), start to spontaneously create visual stimuli within their minds, often in the shape of abnormal faces. The project has sought to relate such neurophysiological evidence with the socio-cultural issue of ‘non man-made’ facial images: since human beings seem to be inclined to ‘see faces in nature’, what is the status that they attribute to such ‘spontaneous facial images’? Do they consider them as stemming from a sort of intentionality?

A second facet of the project has related this question to the cross-cultural tradition of ‘natural images’. In many visual traditions, ancient sourc-

es report episodes of facial images that prodigiously appear in nature, and not only in trunks and clouds, like in pareidolia, but also in stones and gems. Pliny the Elder relates several such episodes in his *Natural History*, thus initiating a reflection that will then involve, in the following centuries, several scholars, mostly theologians and philosophers, but also artists and literati: is nature, or a mysterious force called “chance”, able to create images, and specifically artistic images of faces? In this domain too, what was at stake was to understand in what way spontaneity in the creation of facial images is associated to a specific aura, to an authenticity that man-made facial images lack.

The epitome of this anthropological trend is represented by the tradition of “acheiropoietai” images, as Christianity denominates those images of the face of Jesus that are considered as miraculous qua created not by artists but by a transcendent agency. The third facet of the project has enquired about them. Some, such as the Veil of Veronica or the Shroud of Turin, are thought of as facial prints of the real face of Jesus and, therefore, worshipped as relics; others, like the mandylion of Edessa, stem from a legend that attributes to Jesus himself the initiative of creating his own miraculous self-portrait, for example by simply wiping his visage with a towel. Similar episodes are present in other religious traditions (e.g., in Shia Islam, referring to the bleeding face of Husain, or in Buddhism): they all witness to a cultural trend that bestows a particular aura, and special powers, to facial images that emanate directly from transcendence: on the one hand, the mandylion is believed across the centuries to exert a magical power (detering enemies, for instance); on the other hand, non-man-made facial images emerge as portraits of human beings as well, so as to mark their divine or semi-divine nature (as in the narratives of the miraculously made portraits of some Christian saints, such as Ignatius of Loyola).

The most daring aspect of the project has revolved around the hypothesis that this anthropological connection between the communicative centrality of the face and the special status of non-man-made facial images does not cease with the advent of modern science and secularization but is somehow transferred to other domains. In present-day societies too, indeed, self-emerging facial images also exist, in several contexts. They continue to play an important role in sacred pareidolia, with the proliferation of stories (especially in social networks) of people who claim to

have seen the face of Jesus (or, alternatively, that of Satan), prodigiously emerging in a cloud, or from a rock, or even on top of a burned toast.

The connection between non-human agency and facial representation, however, unexpectedly surfaces also in non-strictly religious domains. One of them is quite bizarre but deserves farther investigation mainly because of its implications in terms of social psychology: the web is peppered with ‘selfies’ that were supposedly taken by non-human animals; although in most circumstances these images are circulated out of merriment, and imputed to fortuitous circumstances, they are often received as if they were really the product of a non-human intentionality attributed to such or such animal species.

A fourth facet, then, has allowed the project to prolong the traditional philosophical reflection on both the supposed figurative agency of nature and the relation between animals and machines. Indeed, nowadays the spontaneous creation of images is attributed not only to animals, as in the case of ‘casual selfies’, but also to devices. Whereas the ability to cognitively deal with images is often used as shibboleth to distinguish between humans and algorithms (for instance, in the “captcha test”), this distinction is more and more challenged by advancements in artificial intelligence. Since 2018, generative adversarial networks have been given the task of creating from scratch facial images that do not correspond to any ontologically present faces. The realism of these ‘artificial faces’ is quite impressive, and often induces human observers to adopt a rhetoric of awe: machines too are attributed the uncanny ability to create images of faces, with such a level of realism that seems to match that of nature itself. Recent experiments with the animation of these ‘artificial portraits’ add a further level of complexity to the issue of their social reception.

Digital technology, however, is not the only one to aim at the creation of ‘artificial faces’. In the domain of plastic surgery too, the face has been the object of constant inquiry about the possibility to recreate (reconstructive surgery) or create (aesthetic surgery) parts of it that are damaged or undesired, up to the first experiments with face transplantation. In the extremely controversial domain of genetic engineering, moreover, the ‘face’ of animals has already been artificially reproduced, and there is at least the theoretical possibility (thus far unexplored for ethical and legal reasons) to genetically ‘copy’ the human face.

That is exactly what some present-day artists seek to achieve, although

with the completely opposite purpose of criticizing trends in the current bio-politics of the face. Italian artist Leonardo Selvaggio, for instance, creates masks reproducing his own countenance, which can be worn so as to throw off attempts at automatically ‘read’ someone’s face. It has to be underlined, indeed, that the long-term tradition that imagines facial images non made by human hand is paralleled by a symmetric tradition seeking to bring about an equally non-mediated interpretation of the human face. This tradition, that starts with Aristotle’s physiognomy, passes through Lombroso’s criminal face typology, and continues nowadays with reductionist approaches to the face as well as with the large-scale introduction of face recognition software, does not dream of a face that spontaneously emerges from nature but rather of a face that spontaneously returns to nature, giving up its meaning without any hermeneutic philter or ambiguity.

3. The present volume.

The present volume contains articles that stem, first, from research of FACETS team members; second, from the kick-off meeting of the ERC project at the Polish Institute of Advanced Studies, Warsaw, on January 28, 2020, with the participation of members of FACETS’ Advisory Board; and third, from articles received by the journal in response to an open call for papers. All articles included in the collection have been selected and edited through a rigorous process of double-blind peer reviewing.

The volume comprises eight sections. The first one, entitled “The Institution of the Face”, interrogates the general philosophical issues concerning the genesis of the face as crucial plexus of human existence and identity. Nathalie Roelens (*Animal Faces: The Question of the Gaze*) tackles this fundamental question from the point of view of the multiple relations between head, face, eyes, and gaze, as well as within the thorny dialectic between the human face and the animal ‘non-face’; Marco Viola (*Le espressioni facciali e i confini della semiotica*) takes as a point of departure the state of the art of the cognitive science of the facial expressions of emotions but enters a fruitful dialogue with semiotics and Eco’s determination of its ‘inferior frontier’ with biology, the threshold of biosemiotics; Alfonso Di Prospero (*Senso, strutture e contesto: L’espressione del volto e il punto di vista in prima persona*) combines the approach of Gestalt theory to facial ex-

pressions of emotions with the philosophical insights offered by Levinas' *Totalité et infini* ("Totality and Infinity"); Alessandro De Cesaris and Gabriele Vissio (*Rappresentazione ed espressione: Note storico-critiche sull'estetica del volto digitale*) cast a historical and critical gaze on the passage of the face from being an object of aesthetic canonization in the arts to being a target of statistic normativity in the new digital technologies of the face.

The second section, entitled "Masks", investigates from different angles the device that, in many human cultures, is considered as the artificial face per antonomasia, that is, the mask, the facial image that covers and simultaneously discovers the image of the face underneath. Remo Gramigna (*Le forme della maschera: Aspetti semiotici della manipolazione del volto e della plasticità dell'apparenza*) offers a general introduction to the semiotics of the mask in relation to crucial themes in the study of signification, such as the dialectic between appearance and lie, simulation and dissimulation; Federico Biggio and Victoria Dos Santos (*Elusive Masks: A Semiotic Approach of Contemporary Acts of Masking*) focus on how this ancestral device is acquiring new meaning and functions in the controversial confrontation with the possibility of a digital, automatic, and often repressive reading of the face; Marilia Jardim (*On Niqabs and Surgical Masks: A Trajectory of Covered Faces*) concentrates on the semiotic issue of the masking of the face through a thought-provoking and timely comparison between two controversial devices of 'facial technology', the Niqab as garment of the dressing code of an ethno-religious minority in the west and the medical face mask as increasingly debated item of the COVID-19 new 'normality'; Mattia Thibault and Oğuz "Oz" Buruk (*Transhuman Faces in the Transurban City: Facial Recognition, Identity, Resistance*) adopt a hybrid approach, between semiotics and design, to observe how the contradictory status of the masked face develops through new paths in the paradoxical structure of the contemporary city; Gabriele Marino (*Il ghigno di Aphex e altre maschere: Volti del transumano in musica*) delves into the multimodal and multisensorial transformations of the mask, with particular emphasis on its aesthetic and semiotic status in the visual, acoustic, and synesthetic experiments of present-day music.

The third section, entitled with a pun "Artifaces", explores the transition from the mask to the arts, through the attribution of a specific aesthetic value to facial constructions; Inna Merkoulova (*Le visage transhumain en littérature d'un point de vue sémiotique*) adopts a semiotic frame of

reading to study the emergence of transhuman faces in literary texts of the world literature; Gianluca Cuzzo (*Il volto come “palinsesto alla rovescia” da Annibale Carracci a Sherlock Holmes*) dissects the complex historical and philosophical nexus of the face conceived as palimpsest, as surface to be decoded so as to grasp, through the theories of physiognomy or the techniques of painting, its inner mystery; Silvia Barbotto (*Artificial Face and Transhumanism in Contemporary Art*) meanders through the multifarious paths of contemporary art, where the ancient myth of the autopoietic face emerges with new energy and through novel techniques; Cristina Voto (*Opacizzare il volto artificiale attraverso le arti digitali: Errori, deformità, materia, intersoggettività*) reflects on the normativity of facial representations in the new problematic context of digital representation and art, where the technical error and the idea of deviance acquire a new status and intertwine in unprecedented ways.

The fourth section, entitled “Simulacra” covers the thematic areas of facial technologies at play in the area of ambiguity between presentation and representation, face and mask, nudity and identity; Enzo D’Armenio (*La gestione digitale del sé: Immagini e prestazioni identitarie sui social network*) semiotically studies some of the most crucial simulacra of the face of the present time, those used to build up digital identities in social networks; Elsa Soro (*Tinder is Facebook: Unravelling Facial (Dia)Logic Seduction Strategies in Online Dating Sites*) disentangles the semiotics of simulacra in their seductive predicament, within those fundamental digital arenas of the contemporary face that are the apps and networks of dating; Eleonora Chiaia (*Make Up, Make Sense: Appunti sul trucco tra ieri e oggi*) investigates make-up both as a central semiotic concept in the history of ‘face-making’, and as a practice that, stretching back to antiquity, is currently revolutionized by the increasing digitalization of the face.

The fifth section, “Avatars”, comprises articles in which artificial faces do not only cover or hide the supposedly biological visage, and not simply represent it with a reality effect, but aim at replacing it in specific communicative contexts; in the section, Bruno Surace (*Semiotica dell’Uncanny Valley*) dissects — from a semiotic point of view and through a multitude of examples from present-day visual culture — the key notion of “uncanny valley”; Gianmarco Giuliana (*Il volto nei giochi digitali: Funzioni e valori*) investigates the new meanings of the face in the avatars of digital gaming, a central semiotic arena of contemporary face-making; Lorena Rojas Par-

ma and Humberto Valdivieso (*Poética del avatar: Realidad e ilusión en la cultura digital*) widen the horizon of the reflection on the subject, imagining a poetics of the avatar in the digital culture.

The sixth section, “Computational Faces”, contains articles that focus on the new status that facial images are acquiring in the world of digital big data, where faces are composed and decomposed through binary digits in enormous bundles of information; in the section, Maria Giulia Dondero (*Composition and Decomposition in Artistic Portraits, Scientific Photography, and Deep Fake Videos*) carries out an ambitious semiotic comparison of various (pre- and post-digital) genres of face representation, reaching important conclusions about the formal language of present-day digital face-making; Ana Peraica (*Stolen Faces: Remarks on Agency and Personal Identity in Computation Photography*) explores the worries of face digitalization through the lenses of horror dystopias imagining a ‘theft of the face’; Everardo Reyes (*Face Value: Analyzing and Visualizing Facial Data*) provides a rigorous semiotic introduction to devices and techniques for the computational study of the face.

The seventh section, “Iconic Faces”, is centered on trends that, in society, lead to the construction of facial value, often through the attribution of it to objects, characters, or even landscapes that are therefore bestowed a specific aura, emerging from the visual context and imposing themselves as key items of social attention; Simona Stano (*Facing Food: Pareidolia, Iconism, and Meaning*) explores the ways in which the neurophysiological and cognitive phenomenon of pareidolia plays a role in the construction of ‘iconic faces’ out of apparently insignificant visual settings (the famous “face of Jesus on a toast”); Antonio Santangelo (*Volti simbolici: Per una teoria sociosemiotica del volto*) takes as a point of departure the semiotic analysis of some particularly charismatic faces in present-day cinema so as to propose a general socio-semiotic theory of face valorization; Dario Dellino (*Il viso e la sua ambivalenza segnica: Tra idolo e icona*) proposes to investigate the balance between indexical and iconic functioning of the face through the dialectics between idol and icon, traditionally crucial in contexts of religious face-making and valorization; Gabriella Rava (*Il volto della memoria e la memoria del volto: Il caso Bobby Sands*) deals with iconic faces in the field of conflict, trauma, and construction of memory through the monumental display of faces in the urban landscape.

The eighth section, “Theophanies”, concludes the volume with two

contributions on the mechanisms of face determination in the religious sphere, where many of the most crucial anthropological mechanisms of face construction and deconstruction, composition and decomposition, representation and effacement have been experimented long before the digital age; two extremes are explored; on the one hand, Ugo Volli (*Invisibile, espressivo e necessario: Metafore del volto divino nella Bibbia ebraica*) deals with the lexicon, the semantics, and the metaphor of the face in the Hebrew Bible; on the other hand, José Enrique Finol and Massimo Leone (*La Corposfera divina: La Trinidad trifacial y tricorporal. Contribución a una TeoSemiótica*) dwell on the paradoxical multiplication and merging of faces in pictorial representations of the Christian Trinity.

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Composition and Decomposition in Artistic Portraits, Scientific Photography, and Deep Fake Videos¹

MARIA GIULIA DONDERO^{*}

TITOLO IN ITALIANO: *Composizione e decomposizione nei ritratti artistici, nella fotografia scientifica, e nei video Deep Fakes.*

ABSTRACT: The paper aims to describe the specificity of the representational devices which, over the centuries, have given prominence to the face. It concentrates on three of them: the classical painted portrait, the composite photography pioneered by Francis Galton at the end of the 19th century, and the representation of the face in contemporary deepfake videos using computational methods on big data. The article takes into account the different framing strategies and uses of the face employed by artistic painting, scientific photography, and deepfake videos in order to identify the representational rules as well as the models of individuality/generalities that have evolved throughout time. The main questions are: How to represent a specific identity? How, on the other hand, to represent an average or typical identity or behavior of a specific people? And finally: How to construct, through multiple images, a typical identity of oneself, in order to possibly make it substitutable by someone else's identity?

KEYWORDS: Portrait; Composite Photograph; Identity; Face; Big Data

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1. This paper is a revised and augmented version of a lecture I gave at the PIAS - Polish Institute of Advanced Studies in Warsaw on January 28, 2020. I would like to thank Massimo Leone very much for his invitation in Warsaw and more generally for the tremendous energy he employs in collective research projects, projects that we all enjoy and from which we all benefit.

1. Introduction

This article aims to describe the specificity of the representational devices which, over the centuries, have given prominence to the face. Firstly, I will consider the painted portrait, which shaped the ideal type of portraiture — and which also remains an obligatory reference for the photographic portrait which diverts it — and then I will contrast it with the representation of the face in contemporary deepfake videos. To link these two universes, that is, the ideal type of portraits in both painting and in contemporary videos which depend on the availability of large collections of images (big data) and on deep learning techniques, I will draw upon the experience of composite photography, pioneered by Francis Galton at the end of the 19th century. I will take account of the different framing strategies and uses of the face employed by the three genres which are artistic painting, scientific photography, and videos produced using computational methods, in order to try to identify the rules of representation as well as the models of individuality/generalities that have succeeded one another.

The main questions addressed will be: How to represent a specific identity? How, on the other hand, to represent an average or typical identity or behavior of a specific people? And finally: How to construct, through multiple images, a typical identity of oneself, in order to possibly make it substitutable for someone else's identity?

2. Portrait compactness

In the first part of my paper, I shall address the rules of portrait composition, that is to say, the rules that cause, in the tradition of art history, a portrait to be recognized as a portrait. In the tradition of art history, we may say that what characterizes a good portrait is *its compactness*.

Indeed, portraits appear as being highly *compact*, not very *articulated*, and excessively *immutable*, especially if compared with the other great genres of the painterly and photographic traditions. It seems that portraits put forth only a simple contrast, that is, a binary figure/ground articulation which hinders the apprehension of any narrative deployment of the image. The essential characteristic of a portrait lies in the fact that the figure must be positioned in the center, which ensures a certain *compactness*

or density, and produces a “cohesive totality” against the void formed by the background. In the painterly tradition, the compactness of the figure is considered to be a necessary feature of all portraits, especially for distinguishing it from landscapes containing a human figure or an event scene.

The density and compactness of the figure on the plane of expression must be capable of signifying, on the plane of content, the *sum* of the life experiences of the subject represented, *as a totality*. This is why portraiture accentuates the unity of the face and not gestures or actions. Among all parts of the body, it is the eyes which are the most marked by past experiences and which condense a life story to be displayed before a viewer².

The subject is therefore usually displayed showing only that part deemed to be the most “noble”, this being the area surrounding the eyes and the head. A view upon the body would already carry the value of a proto-action, or of a movement exceeding the simple act of gazing, thereby breaking away from the highest level of presence achievable, the object of portraiture being *the attainment of the highest level of presence combined with the absence of action*.

As portrait theorist Jean-Marie Pontévia stated, “in portraiture, the model is busy only with a single task: *Looking like him or herself*” (Pontévia 2000, p. 16). Each portrait is meant to *condense* the life of the subject represented. Perfection in portraiture is achieved when the subject succeeds in *coalescing* his or her own past experience and destiny in *the here and the now* of the present presence.

It is therefore unsurprising that the use of blurring has been excluded from portraits, as it would hinder the recognition and valuing of the subject, who by definition forms a well-determined and circumscribed totality. In portraiture, blurring would impede the subject’s identity stabilization and would suspend any exchange with the observer; what would result from blurring would instead be a floating identity (Dondero 2020).

The question which arises now is the following: Does the face constitute the portrait’s real object of investigation, or is its object something else? A classic answer would be to say that portraits represent the act of

2. While the eyes and the gaze are what count the most in a traditional portrait, given that they are the mark of the authenticity and uniqueness of identity, we will see that it’s the blinking of the eyes and the power of the gaze that reveal the nature of deepfake videos. Indeed, blinking rates in deepfakes are much lower than in normal videos. This means that in both cases, it is the eyes, as well as the quality of the gaze, that express the authenticity of the person’s uniqueness.

looking—and that would not be wrong at all. At the same time, I think that in traditional portraits, what is represented is a system by which a balance is struck between the figure and the background, that is, a delicate structure where the background must leave room for the figure to emerge—but not too much room because then the figure wouldn't be supported by anything solid. And not too little room either, because then the strength of the figure would disappear, since it would be engulfed by the background.

3. The liberation of the face and the portrait of types (on Galton and Peirce)

I think that what may be called the *liberation of the face* happens when the portrait is unraveled, when the balance between figure and ground is undone, together with its cohesiveness and compactness. Prior to the deep learning techniques that enabled the development of decomposition and recomposition in deepfake video production, several aesthetic and scientific experiments began to diverge from the essential characteristic of compactness in portraiture. Two examples of the liberation of the face from the traditional structure of portraits come from the fine arts and from the sciences. In the domain of fine art, an example of this can be found in Francis Bacon's blurred faces. Bacon's portraits are constructed on the basis of shifting parts and, more generally, on tensions of conflicting forces of restriction and expansion, of contraction and diffusion, and of closure and explosion (Deleuze 2003). The impossibility for the observer to identify a threshold between the face and the background within the portrait signifies the uncertainty, instability, and the dispersion of the identity depicted.

Another example can be found in Francis Galton's scientific experiments in which he generated portraits of *types* (Fig. 1).

It is important to remember that Francis Galton was a prominent figure in British anthropology and statistics. He was also a geographer, meteorologist, writer, proto-engineer, and psychometrician, and he is considered to be the founder of differential or comparative psychology. He died in 1911, only a few years before Ch. S. Peirce, who died in 1914. As I'll explain later, Galton had inspired much of Peirce's theoretical thinking regarding the notion of *composite photography* (Peirce 1895; Basso and Dondero 2011).

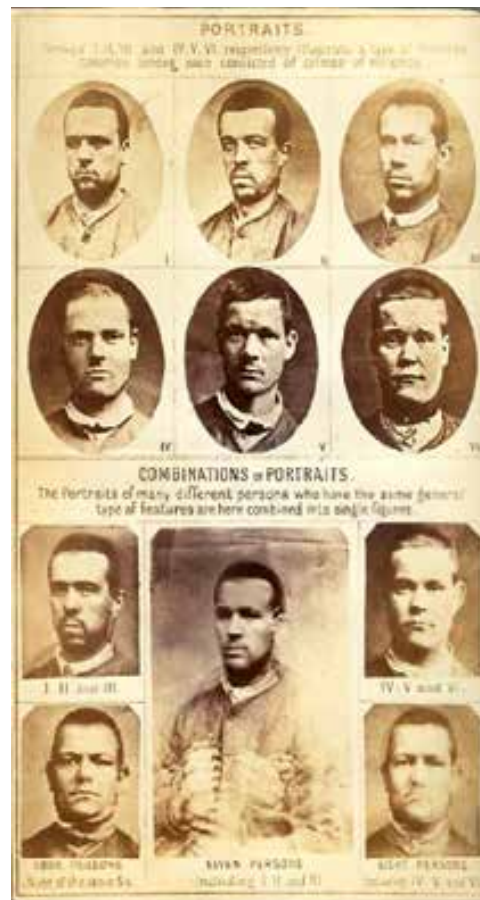


Figure 1. Francis Galton (1877) *Composite Portraits of Criminal Types*, The Galton Archive, University College London Special Collections, London.

Galton’s composite portraits were produced by the successive recording and exposure of images onto a single plate (superimposition). The scientific nature of his composite photographs proceeds from the fact that each face was captured using the same parameters, the same perspective, the same focal distance, and the same position with respect to a background grid. These fixed parameters were established in order to ensure *commensurability* among the faces³.

3. “Galton suggests that exposure times should be worked out fractionally: the exposure time of a single portrait in the sample should be the inverse of the total number of portraits in the sample itself. Thus, for a total exposure time of eighty seconds and a sample of eight portraits, each individual in the sample should be exposed for ten seconds. Of course, part of the success of the process depended on the preliminary preparation of the portraits themselves, which should all be of the same size and which should all be aligned “in such a way that the eyes of all the portraits shall be as nearly as possible superimposed” (Ambrosio 2016, p. 6).

It must be said that Galton is known for his portraiture of criminal types but, as Allan Sekula remarks in a paper published in 1986, “The Body and the Archive” (Sekula 1986, p. 18), his work was only tangentially related to criminology *per se*⁴. His work was instead part of a broader enterprise ultimately aimed at using statistics for the purpose of the “betterment” of the British race. Thus, the composite process was used not just for individuating “criminal types,” but also for investigating family traits, proclivity to illness, breeding in general and, later, to isolate typical racial features.

In his paper entitled “Composite Portraits Made by Combining Those of Many Different Persons Into a Single Figure”, published in 1878, Galton states:

[T]he photographic process...enables us to obtain with mechanical precision a *generalised* picture; one that represents no man in particular, but portrays an *imaginary figure* possessing the average *features of any given group of men*. These ideal faces have a surprising air of reality. Nobody who glanced at one of them for the first time would doubt its being the likeness of a living person. Yet, as I have said, it is no such thing; it is the *portrait of a type* and not of an individual.

(Galton 1878, p. 13)

Galton’s composites were thought to constitute true statistic averages, representing human types—a criminal, a prostitute, an Englishman, a Jew, and others. Galton wrote about his composite pictures that they are “much more than averages; [...] They are real generalizations, because they include the whole of the material under consideration. The blur of their outlines, which is never great in truly generic composites, except in unimportant details, *measures the tendency of individuals to deviate from the central type*” (Galton 1879, p. 166, our emphasis).

The blur of the outlines Galton speaks of is very important in my demonstration. Indeed, if blurring was traditionally forbidden in any kind of portrait, with Galton and his portraits of types, we are faced with the surprising fact that *individuality emerges from blurs*, because the blur of the outlines allows us to see what stands out from the generality of the type⁵.

4. For a well-documented interpretation of the use of Bertillon’s and Galton’s photographic forensic methods and of the use of fingerprints in the history of criminology, see Leone (2020).

5. As did Peirce, Manovich also became aware of Galton’s work. What is interesting in Gal-

Chiara Ambrosio, in an article entitled “Composite Photographs and the Quest for Generality” (2016), states that various aspects of Galton’s photographic method attracted Peirce’s attention from very early on and left a long-standing mark on his own subsequent work. Indeed, in his “Short Logic” (1895), Peirce already transformed Galton’s method into a conceptual metaphor, aiming at devising an exploratory tool for understanding the nature of ideas. What had fascinated Peirce, according to Ambrosio, was undoubtedly the fact that Galton not only claimed that “the ideal faces obtained by the method of composite portraiture appear to have a great deal in common with [...] so-called abstract ideas” but in fact he proposed to rename abstract ideas *cumulative ideas* (Galton, *Inquiries Into Human Faculty and Its Development* (London, 1883, p. 183).

As Ambrosio states in her paper, composite photographs were not useful because of an empiricist comparison between the mind and the camera, but because the metaphor of the composition could signify the “*kind of control* (performed by the faculty of judgment) the mind has over the process of generalisation” (Ambrosio 2016, p. 14). Peirce shifted Galton’s generalisation process of individual faces back to the faculty of judgment.

Ambrosio finely states the differences between the productions of the two scholars:

Galton’s composite photographs are static: they are presentations of *ideal types*, whose generality is validated by the reliability of the mechanical process that served for their generation. Peirce’s composites, on the other hand, are inherently *dynamic*: they have an experiential basis (some of the yellow shades to which we compare the color of our chair may have been seen), but they also have some kind of *predictive power* (the composite photograph will allow us *to recognize other shades of yellow as “yellow”*, and apply them to other percepts).

(Ambrosio 2016, p. 15, our emphasis)

ton’s work for Manovich’s purpose (1995), is that with his photographs, Galton not only proposed that *universals may be represented through images*; he actually *objectified and materialized them*. For Manovich, this phenomenon can be called *externalization of the mind*: the objectification of internal, private mental processes, through external visual forms that one can manipulate enables the sharing of what was hidden in an individual’s mind. Manovich uses the work of Galton as an example to explain the birth of modern mass society’s demand for standardization. He remarks that the subjects have to be standardized, and the means by which they are standardized need to be standardized as well.

This idea of *shades* is interesting because, according to Peirce, it is the shades that make it possible to understand the limits of categories and classifications, as well as to apply a category to new percepts—and one could even say, more generally, *to make the category elastic, plastic*. To put it another way,

For Galton the centre of the image is the essential part of the photograph, as it is in the centre that “typical features” congregate. For Peirce, on the contrary, the interesting process happens *in the periphery of the images*, the areas in which *shading suggests further*, possibly new ways of applying the composite “template” to a new context and deriving novel relations through its application”

(Ambrosio 2016, p. 16, our emphasis)

Here, we see Peirce’s famous logic of vagueness at work.⁶ Vagueness brings us to his conception of discovery and of knowledge acquisition. All of the expressions such as “predictive power,” “suggest further,” or “new context” used by Peirce and Ambrosio show, as Pierluigi Basso states, that the iconic component of composite photography “opens up a memorability delivered to future experience” (Basso Fossali and Dondero 2011, p. 252). Indeed, composite photography constitutes an *open class of photographs, a family of transformations whose new elements motivate an adjustment of the defining features* of an idea or a percept, always keeping the semiosis in movement.

It is clear that Peirce’s interest in composite photography goes far beyond its technique and the topicality of the scientific debate surrounding it at the end of the 19th century; indeed, for Peirce, each “instantaneous” photograph results from a compacting or rather from a coalescing of the intervals of exposure onto a single plate, leaving imperceptible the stratification of the different apprehensions of becoming: “Even what is called an ‘instantaneous photograph,’ taken with a camera, is a composite of the effects of intervals of exposure more numerous by far than the sands of the sea” (Peirce, CP 2.441). Basso likens this coalescing of the intervals of exposure to the functioning of perception, which can never be reduced to a photograph of the state of affairs, but which is always more similar to a composite photograph which proceeds, guided by the schematization

6. For an excellent contribution regarding the concept of vagueness in Peirce’s work, see Chauviré (1995).

accomplished by the imagination, to the situational and indexical adjustments that locally associate the percepts: “[For the pragmatist] everything in the substance of his beliefs can be represented in the *schemata of his imagination*; that is to say, in what may be compared to *composite photographs of continuous series of modifications of images*; these composites being accompanied by conditional resolutions as to conduct” (Peirce, CP 5.517).

In a way, we could say that even Galton’s conception of photography was oriented towards the future, because the type of man formed by the superimposition of individual faces was to allow the identification of future criminals, of sick people, etc. In a certain way, therefore, the generalisation achieved by the type could be transformed into a schematization, that is, into a device which is both sufficiently general and repeatable, in addition to being sufficiently singular and unique to rule on new occurrences of faces. But in Peirce’s work, the composite photograph becomes the metaphor of a close fit with the space of experience combined with the succession of “shots of reality,” which are continually linked to reactions of our behavior (“as to conduct”).

After all, Peirce’s thoughts on the variability of the world and the instability of the schematization accomplished by our perception is a good introduction to the changeability of faces in contemporary times, where the face is relevant in particular for its flexibility and its gestures.

4. Big data and deep learning: The type of the self and the undetermined individuality

Even more recently, deep learning achieved the idea of the standardization of the individual (Manovich 1995), since it allowed the development of fine analyses of very large databases, including databases of facial images. And deep learning has also led to many forms of malicious use of these databases such as identity theft in deepfake videos.

Indeed, as explained in a recent paper by Nguyen et al. (2019) entitled “Deep Learning for Deepfakes Creation and Detection”, *Deepfake* (from “deep learning” and “fake”) is a technique that can superimpose face images of a target person (Donald Trump) to a video of a source person (Nicolas Cage) to create a video of the target person (Trump) doing or saying things the source person does (Cage).

Deepfake algorithms normally require a large amount of image and video data to train models to create photo-realistic images and videos. Deep learning models such as autoencoders and generative adversarial networks have been recently used by deepfake algorithms in order to examine a person's facial expressions and movements and then to *synthesize* facial images depicting another person making analogous expressions and movements.

It's easy to see that we are dealing again with superimposing and synthesizing different face images, this time of a same person, in order to facilitate the transposition of one person's superimposed and synthesized facial expressions onto another person's gestures and facial movements. Unlike with Galton's portraits of types, the relevant process here is that of accumulating images of the same person so as to make him or her into *the type of him or herself*, so to speak. And then make the type applicable onto another person. In other words, the type of a person may then be superimposed onto the body of someone else, which is a matter of translating *the type obtained from the multiple occurrences of a single individual's face towards another singularity* that performs a particular action.

Although, in this case, over the course of production, there is a trajectory from the combination of the multiple photos of an individual to the construction of a single image that represents the individual's essence—that is to say, an image-type which is the average of all the different expressions of the individual—there are yet an increasing number of techniques that make it possible to shift from one individual to another using only a single photo of the source person or a series of freeze-frames of his or her face captured over the duration of a video. We'll get to this when addressing some more technical issues related to the production and to the automatic detection of such fakes.

The schematic figure (Fig. 2) below shows a deepfake creation model using two *encoder-decoder pairs*. In the upper part of the figure, two paths may be seen (Original Face A and Original Face B) that use *the same encoder but different decoders* for the training process. At the bottom, we can see the image of face A that is encoded using a *common* encoder (A and B) and decoded with the decoder of the face of the other person, decoder B. This substitution of decoder A with decoder B creates a deepfake, that is, the reconstruction of face B from face A.

In the case of videos, the strategies used in deepfake detection are mul-

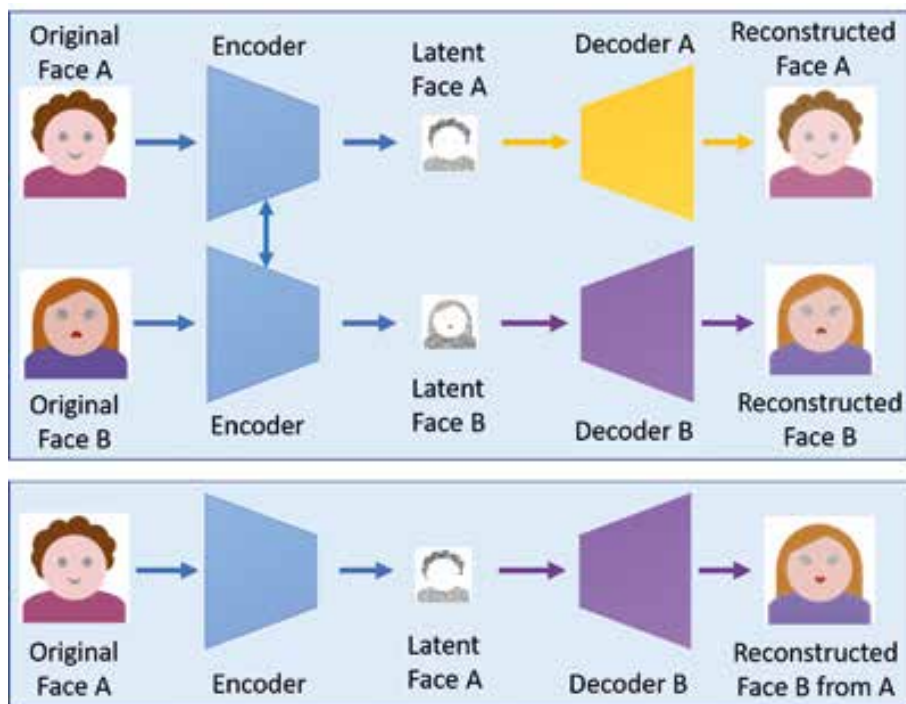


Figure 2. Nguyen *et al.* 2019, p. 3.

tiple; some of them rely on the rhythm of eye blinking, while others use spatio-temporal features, infra-frames, and temporal inconsistencies. The strategies that rely on temporal features across video frames use a *binary classification method*, where classifiers are used to distinguish between authentic videos and the tampered ones. This kind of method obviously requires a large database of real and fake videos to train classification models.

Two groups of methods are generally employed, which are *visual artifacts within* video frame-based methods and *temporal features across* frame-based methods. The first group explores visual artifacts within frames, whereas the second one employs temporal features across frames. The one that seems the most interesting to me is undoubtedly the second one, since it doesn't work on feature descriptors, but rather on *sequence descriptors*, and therefore has to check the continuity of the movement over the *duration* of the facial expressions.

Based on the observation that temporal coherence is not enforced effectively in the synthesis process of deepfakes, Sabir *et al.* (2019) leveraged the use of spatio-temporal features of video streams to detect them. Video manipulation is carried out on a frame-by-frame basis so that low level

artifacts or visual glitches produced by face manipulations are believed to further manifest themselves as temporal artifacts with *inconsistencies across frames*.

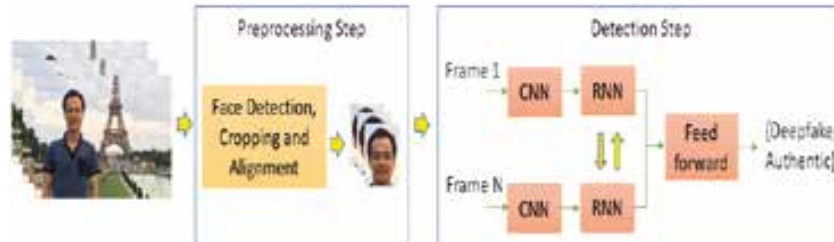


Figure 3. Nguyen *et al.* 2019, p. 5.

In this image (Fig. 3), you can see a two-step process for face manipulation detection. The preprocessing step aims to detect, crop, and align faces on a sequence of frames, while the second step distinguishes between manipulated and authentic facial images by combining convolutional neural network (CNN) and *recurrent* neural network (RNN) methods.

The face cropping and alignment are techniques used by deepfake video detectors that were already known and employed by Francis Galton: The photographed faces of the different individuals had to be totally aligned and superimposable on the same plate. In deepfake detection, scholars use the alignment of the different positions assumed by the face of a unique individual during the recording of the video.

While Galton sought to reduce the difference between multiple individuals to a single type represented by a composite photograph, with a deepfake, one tries on the other hand to build the type of a face from its movements and from expressions which transform over the duration of the video. As for the detection method, it is *at the interstices* between one frame and another that it becomes possible to detect the inauthenticity of a video and the rhythm of eye blinking, which is one of the most important signs of manipulation also revealed over duration.

While the differences in rhythm between one sequence and another and between one eye blinking and another is undoubtedly the main sign allowing us to recognize a fake, it must also be said that what surprises us when we look at deepfake videos is the fact that some blurring persists (sometimes in the eyes, sometimes in the chin) and that the light that falls

on the cheeks is not really natural: There are parts that are too bright and shiny and others that are completely opaque. The distribution of light intensity is surely one of the plastic characteristics on which it is necessary to rely for detection.

The problem of blurring brings me to the next figure, a schematic figure that presents images showing more or less successful experiments in face swapping (Fig. 4).

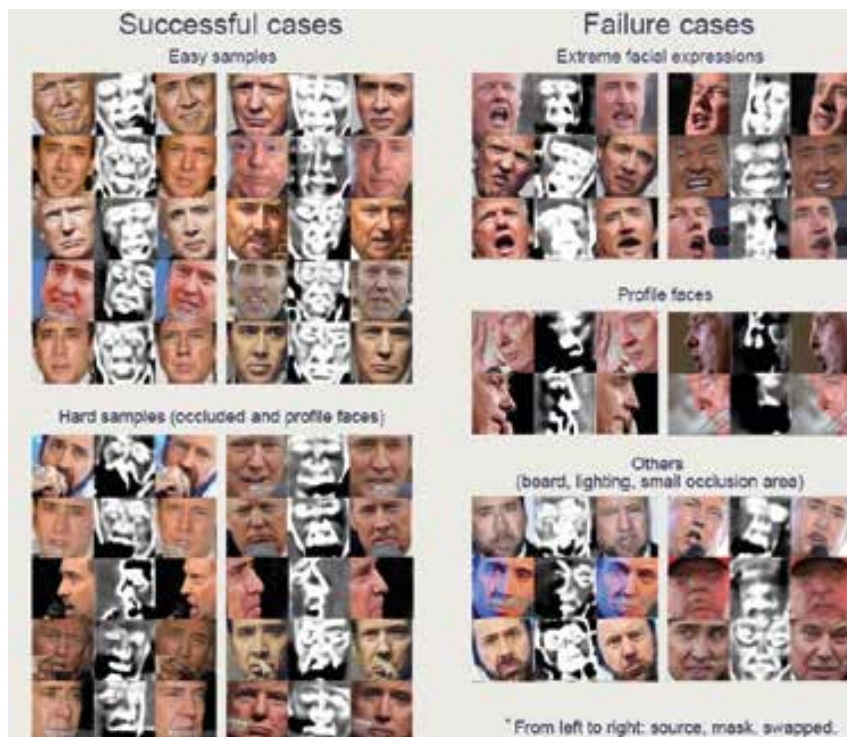


Figure 4. <https://github.com/shaoanlu/faceswap-GAN/blob/master/README.md>.

It should be noted that some of these experiments are successful because the face is well exposed and quite straight, while others are less successful because the face is obstructed or the facial expressions are not very symmetrical.

These series of images show that between one facial image and the other there is an intermediary figure called “mask” which is blurred because it combines the characteristics of both faces, source and target. The inner part of the “intermediate face” (mask) is especially blurred. This is because the outlines of the mask are well marked, as are the contours of

the eyes, nose, and mouth. It is on these contour shapes that the transformation from one individual to another operates, leaving more freedom to what does not form part of these contours.

The images seem to tell us that the skin and everything which, in a face, is more readily described as a surface, as are the cheeks, can be treated differently than the outlines of our organs of vision, smell, speech, and our general facial contour. The latter represent features that characterize the specificity of each face, while the cheeks are parts of the face that may be considered more “common” and hence, in a certain way, more easily interchangeable.

Whereas in the tradition of portraiture, blurring was forbidden so as to not compromise the stability of the identity of the individual represented, in Galton’s case, blurring meant the emancipation of individuality from the generalization into a type. In the deepfake experiments, on the other hand, blurring is what allows the passage between one identity and another.

5. Conclusions

In conclusion, I would like to recapitulate the trajectory I covered in this paper. In the tradition of portraiture, the compactness and sharpness of the figure was intended to signify the intense presence of individuality, and blurring was forbidden also for another reason, this time related more to the plane of expression: The face was part of a system of balance constituted by the relationship between the figure and its background. When the system of portraiture is unraveled, the face regains more freedom, as in Bacon’s paintings. Things change with Galton’s composite photography where sharpness represents the type. Sharpness, here, is also certainly a signifier of stability, but this stability *belongs to the type*, to the multitude, not to the individual. It is a sharpness in which *the individual fades away*. It is only in the blur that individuality emerges, in the margins of the picture.

In deepfakes, it is therefore the *type of individuality* which is produced. Furthermore and paradoxically, it is via big data, that is, through a diagrammatization of a large collection of an individual’s different facial expressions that individuality, in its essence, is produced. If Galton aimed at attaining the generalization of a type of man (the criminal, the Jew, etc.) by superimposing multiple photographs of different individual men, the big

data technique used in deepfake videos, on the contrary, aims at accounting for all the expressions of a single individual by producing a diagrammatization of these expressions, i.e. an *elastic identity* that can be transferred to the body of another person acting in a variety of situations.

Galton's superimposition, which we could call "identity synthesis," was built on the immobility of the models; in the cases of the production and detection of deepfake videos, the machine seeks to dispose of the widest range of photos of an individual's movements and facial expressions to arrive at a schematization that is sufficiently elastic and plastic to be tunable to the variability of movements and facial expressions of the person upon whom the identity will be "implanted." In this sense, the "process of the mask" undergone during the production of deepfake videos functions as a diagram⁷ where potential virtualities are at work and which, diagrams being manipulable devices, is able to *cover the possible gestures that someone else's face can assume*. We thus shift from a multitude of facial expressions of an individual to the diagrammatic synthesis that will make the identity of the individual sufficiently available to the gestures of another body and to the facial expressions of another face shape.

Here, the blurring function of the mask process is a means of passage, of mediation, of search for commensurability between a model of an individual and another individual and it is thanks to the blurring displayed by the mask that we can clearly see the transition from the *type of one self* to the *individual instance of another self*.

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7. As it is not possible to explain Peirce's notion of schematism and diagram in this paper, I refer to Chauviré (2008) for a general approach to the relationship between generality and singularity, and to Dondero and Fontanille (2014) for the relationship between Peirce's theory and Goodman's theory of diagram used in the context of scientific images discourse.

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