Pictorial Statistics

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This article discusses Francis Galton's method of inductive inference where the data are photographs. Although Galton used photographs of all kinds of objects, such as human faces, human skulls, medallions, and animals, in particular racehorses, this discussion focuses on the portraits of people. His aim of induction was to determine the *typical* characteristics of the *natural class* to which the individuals belong. The populations he studied, among others, were Jews, criminals, and people suffering the same illness, such as consumption. The aim of this method was to make the main characteristics of the natural class in question visible by composing the relevant photographs in a specific photographic way. The idea was that this composite photograph is the portrait of the "typical" member of the natural class concerned. The method and technique of this photographic composition was Galton's own design. He called this process of induction that led to a "composite," "pictorial statistics" (Galton 1879: 162).

The advantage of pictorial statistics is that it enables the determination of the *average* of nonmetric objects. The composition is based on the exposure of the photographs of the individuals to a photographic plate, each during a same specified time interval. As such, this procedure was considered *mechanical*, leading to an *objective* representation of a class.

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Lorraine Daston and Peter Galison (2007) have shown that the rise in dominance of the epistemological virtue of mechanical objectivity can be understood as an insistent drive to reduce subjective bias. This article, however, argues that despite the fact that Galton aimed at this kind of objectivity, subjective judgments nevertheless appear to be a necessary part of this kind of inductive inference to achieve purity. At first sight, this seems very much in the line of Daston and Galison's account. They argue that in the twentieth century the awareness arose that mechanical-objective pictures still could contain errors that should be erased by *trained judgment*. Galton's case of inductive reasoning, however, departs from Daston and Galison's account by showing that the correct composites were achieved by a combination of mechanical procedures and *un*trained judgments. To find the most appropriate balance between fit to the data and purity, fit was dealt with by objective procedures but impurity reduced by *familiarization* with the data.

To support this claim, I first discuss the design and applications of the method of composite photographs by Galton and the "typical pictures" of Henry Pickering Bowditch. Then I unpack this method to see what else other than mechanical objectivity is involved, and what the specific role of familiarized judgment is.

1. Composite Portraits

In a series of publications, appearing between 1878 and 1906, Galton explained his own developed method of "composite portraits" and discussed some of his results in detail.[1] The year before the first publication on composite portraits, in a presidential address to the Anthropological Department of the British Association at Plymouth, Galton already proposed to study the external physical characteristics of a group of persons resembling one another in some "mental quality," not by anthropometric measurements but by photographs. According to Galton (1878: 97), the photographic process

> enables us to obtain with mechanical precision a generalised picture; one representing no man in particular, but portrays an imaginary figure, possessing the average features of any given group of men. These

1. These publications may be found on a website, galton.org, dedicated to Galton, and edited and maintained by Gavan Tredoux. A special section of this website, galton.org/composite.htm, contains all publications on composite portraits.

> 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 said, it is no such thing; it is the portrait of a type, and not of an individual.

Galton implicitly assumed that the outlines of each individual component are distributed according a Normal (Gaussian) distribution:

> Those of its outlines are sharpest and darkest that are common to the largest number of the components; the purely individual peculiarities leave little or no visible trace. The latter being necessarily disposed equally on both sides of the average, the outline of the composite is the average of all the components. It is a band, and not a fine line, because the outlines of components are seldom exactly superimposed. The band will be darkest in its middle whenever the component portraits have the same general type of features, and its breadth or amount of blur will measure the tendency of the components to deviate from the common type. (97)

He compared this process of photographic composition with "shot-marks" on a target, where these marks are more thickly clustered near the bull's-eye than away from it (97). This kind of metaphorical reasoning on the likes of marksmen and target practices is explored extensively in Judy Klein's (1997) *Statistical Visions in Time*, starting with a discussion of Lambert Adolphe Jacques Quetelet's comparison of his "l'homme moyen" with the bull's-eye of a target. Galton (1877a: 493) himself was clear about the source of this idea of variation: "It was to Quetelet that we were first indebted for a knowledge of the fact that the amount and frequency of deviation from the average among members of the same race, in respect to each and every characteristic, tends to conform to the mathematical law of deviation." The adequacy of this kind of metaphorical reasoning is discussed in section 2.

An important advantage of this method, according to Galton (1878: 97), is that the results are neither biased nor subjective: "The merit of the photographic composite is its mechanical precision, being subject to no errors beyond those incidental to all photographic productions," thereby in his view meeting the epistemic virtue of mechanical objectivity. This claim is questioned after I explore the details of the production of a composite photograph.

The method of composition was explained in his article on "composite portraits" (Galton 1878; see figure 1). The first step is to collect photographs of the persons belonging to a category one would like to study.

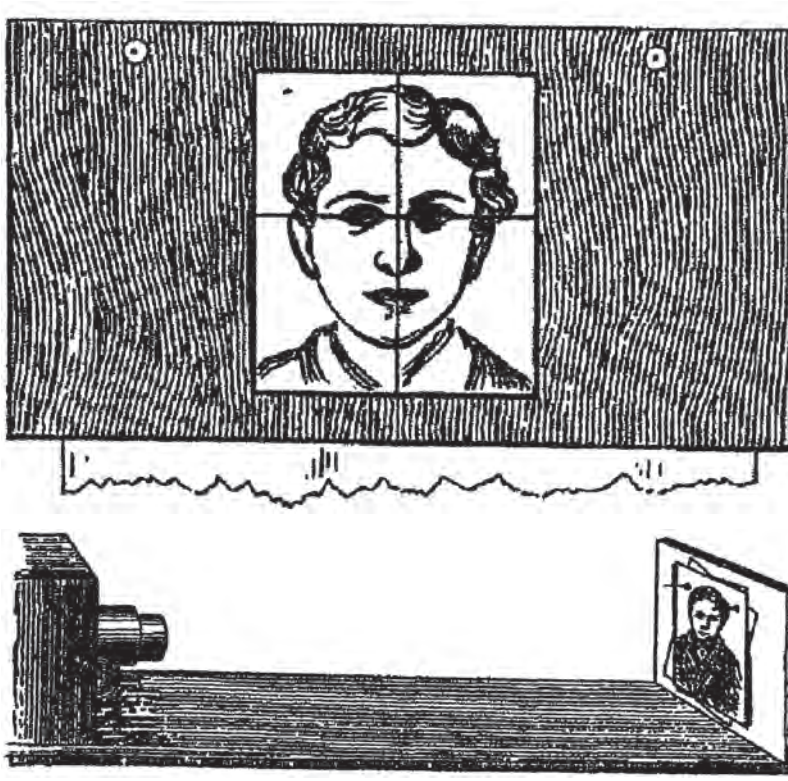


Figure 1 Setup for making a composite photograph.
Source: Galton 1878: 97.

"They must be similar in attitude and size, but no exactness is necessary in either of these respects" (97). They, then, should be hanged in such a way that the pupils of the eyes of each portrait have the exact same position when exposed to the camera. Each photograph is exposed for the same amount of seconds, for example, ten seconds, to the same part of the sensitized plate. If we are dealing with eight photographs, then the plate has a total exposure of eighty seconds. After being exposed to these photographs, the plate is developed, and the print taken from it is the resulting composite portrait. In two 1881 articles, published in *Photographic News* and *Photographic Journal*, Galton presented a technically more advanced method that was easier to manage, but the underlying principle was the same: the composite portrait is a superimposition of several photographs.

Figure 2 Composite portraits showing "features common among men convicted of crimes of violence," ca. 1885.
Source: University College London.

Galton's (1877b: 11) first composite portrait was that of the "ideal criminal" (see figure 2), which he described as follows: "His conscience is almost deficient, his instincts are vicious, and his power of self-control is very weak." The question was how these peculiarities correlated with physical characteristics and features. To approach this question, he could use a large collection ("many thousands") of photographs of criminals,

provided by Edmund Du Cane, director general of prisons in England. In the aforementioned presidential address, Galton (1877b: 12) explained how he sorted the photographs before exposing them to the camera:

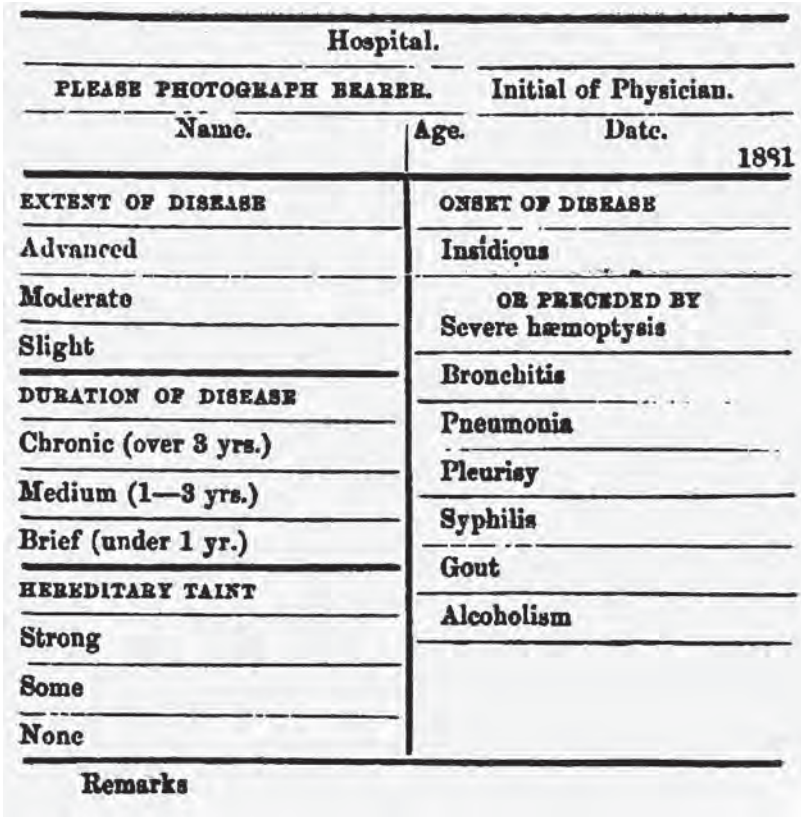
> I may as well say, that I begged that the photographs should be furnished me without any names attached to them, but simply classified in three groups according to the nature of the crime. The first group included murder, manslaughter, and burglary; the second group included felony and forgery; and the third group referred to sexual crimes. The photographs were of criminals who had been sentenced to long terms of penal servitude. By familiarizing myself with the collection, and continually sorting the photographs in tentative ways, certain natural classes began to appear, some of which are exceedingly well marked. It was also very evident that the three groups of criminals contributed in very different proportions to the different physiognomic classes.

The second major study in pictorial statistics dealt with the question of how one "might be able to ascertain whether there are any facial characteristics common to any large proportion of cases of phthisis" (Galton and Mahomed 1882: 476). This study was carried out with Frederick Akbar Mahomed.[2] For this study, there were no photographs yet available, and therefore they had to photograph the patients themselves. They started with the phthisical patients of Guy's Hospital in London, in January 1881, but because this did not accumulate enough photographs, they also included the patients of the Brompton and Victoria Park Hospitals for Diseases of the Chest in London.

"To protect ourselves from any charge of a prejudiced selection of cases or distortion of facts" (Galton and Mahomed 1882: 477), the selection of the patients to be photographed was based on cards with fixed categories on which the chief details of the cases were recorded by making a tick in the appropriate space (see figure 3).

The first selection was "all cases of well ascertained phthisis occurring in either sex within the limits of fifteen and forty years of age" (Galton and Mahomed 1882: 477–78). The limits of age were chosen to further comparability and to exclude "the more evidently acquired phthisis of

2. Mahomed (1849–1884) "must be regarded as one of the most important pioneers in the field of arterial hypertension" (O'Rourke 1992: 212) and developed the first quantitative sphygmogram (a mechanical device used to measure blood pressure). He contracted typhoid fever in 1884, probably from one of his patients at Guy's or the London Fever Hospital, where he still held a visiting appointment, and died in the same year.



Hospital.

PLEASE PHOTOGRAPH BEARER. Initial of Physician.

Name. Age. Date. 1881

EXTENT OF DISEASE
Advanced
Moderate
Slight

DURATION OF DISEASE
Chronic (over 3 yrs.)
Medium (1—3 yrs.)
Brief (under 1 yr.)

HEREDITARY TAINT
Strong
Some
None

ONSET OF DISEASE
Insidious

OR PRECEDED BY
Severe hæmoptysis
Bronchitis
Pneumonia
Pleurisy
Syphilis
Gout
Alcoholism

Remarks

Figure 3 Card on which the chief details of the cases could be recorded.
Source: Galton and Mahomed 1882: 477.

advanced age" (478). This selection process resulted in 442 portraits of patients suffering from phthisis, of whom 261 were males and 181 females.

The next step was to make composite portraits of subsets of these photographs. These "composites" were then used to make "co-composites," that is compositions of composites. And these co-composites were in turn used to make a "co-co-composite." But before Galton and Mahomed made these composites, they first viewed the individual portraits and were "struck with the absence of those characteristic faces which we expected to find among them" (481). One could even question whether there is a tubercular diathesis. It appeared that only by "much sorting and arranging into groups, and after combining the individuals, so as to test the similarity of their features" (481), the characteristics of phthisis became visible.

Galton and Mahomed emphasized, however, that the sorting should be as objective as possible. But their first attempt of sorting yielded no "characteristic type." This attempt was based on using some of the categories of the cards (see figure 3): groupings of the cases of "advanced disease," "brief duration and advanced disease," or the cases of which the "hereditary taint" is "strong."

Because the first sorting based on the categories of the card had failed, a second attempt at sorting used a different principle of unbiasedness. This time the sorting was more subjective but carried out by the nonphysician of the two, and hence "the one of us least likely to be prejudiced by preconceived notions" (481). Thus the sorting was done by Galton without any consultation with the physician Mahomed (who was away to London), in the following way:

> Fifty-six cases (among the women) were recorded by the medical officers as having a strong hereditary taint of phthisis, and it is of these alone I now speak. On first examination of the collection of portraits, I was chiefly struck by their diversity, but after familiarising myself with them and sorting them tentatively in various ways, I began to perceive what seemed to be natural groups, leaving comparatively few that I could not classify. I made composites of each of these groups; there were eleven of them, containing on an average five components each, one only had as few as three, and one only as many as nine. I then sorted the composites and found that they fell into two main divisions, not, however, separated by any abrupt line of demarcation. In the one division there were six composites of, on the whole, thirty-six portraits, and in the other there were five composites of twenty portraits in all. The first division had blunted and thickened features, the second had thin and softened features. I then made a compound composite of each of the two divisions . . . , and finally I threw both divisions into a doubly compound composite (co-co-composite, . . .) to form the general average. (482)

When Mahomed returned from London, he concluded that the first type with the blunted and thickened features coincides with what physicians described as the "strumous" and the second type with the thin and softened features as the "tubercular" (see figure 4). Galton and Mahomed then proceeded with sorting out the patients with these two types and putting these selections to the test by making composite portraits of them, with the result of obtaining "very striking and highly characteristic faces" (483).

Figure 4 Composite portraits showing two types of phthisical, 1882.
Source: galton.org/composite.htm.

Reviewing these results, Galton and Mahomed came to the following conclusions. If the composites are made without any selection of "natural classes," the "average" "presents no features or expressions characteristic of what may be called secondary types" (483). But by taking "very carefully selected faces," it is possible to form a composite portrait having certain characteristic features. This method of evaluating composite portraits of specially selected faces was considered "an excellent test of the correctness of the selections made. If the result obtained has lost the special characteristics sought for, we may be sure that the faces selected were ill assorted" (484).

The third major study with the use of photographic composites was on the "race characteristics of Jews." This had resulted in a few composites that Galton (1885: 243) considered "the best specimens of composites I have ever produced." Although not explicitly noted, the reason why he considered them the best composites is probably because he had advanced the procedures to get the individual photographs on the same scale and position, which made adjustment of the camera much easier and therefore the results more "beautiful." The description of these advanced procedures takes up the largest part of the publication (Galton 1885) in which he discusses this study. Unfortunately, however, Galton did not say much about how he selected the photographs. The only thing he wrote about it is to mention that "the individual photographs were taken with hardly any

Figure 5 Composite portraits showing the Jewish type, 1885.
Source: University College London.

selection from among Jewish boys in the Jew's Free School, Bell Lane" (243). He made eight composites, labeled A to H. A, B, E, and F were each based on five individual portraits of these Jewish boys (see figure 5). C was the co-composite of A and B, with the addition of three other individual portraits "to increase its sharpness" (243). D was a composite of five adult faces; G, a co-composite of E and F; and H, a composite of five "older faces."

2. The Determination of Types

In 1894, *McClure's Magazine* published an article by Bowditch titled "Are Composite Photographs Typical Pictures?" Influenced by Galton's composite photography, Bowditch had made eight composite portraits: one composition of twelve Boston physicians, another with the same physicians but five years later, two of twelve horse-car conductors each, two of twelve Saxon soldiers each, and two of twelve Wend soldiers each, with the aim of the determination of "types" or "typical forms."

To Bowditch, the method of composite portraits had several advantages over other methods. It gives "the typical form a truly objective character" and removes the "subjective source of error" (Bowditch 1894: 331). He admits, then, that as far as size and proportions of the body are concerned, by measuring and weighting large numbers of individuals belonging to a certain group, and from these figures thus obtained calculating the mean and variation of the dimensions selected for study, the "typical form," the "truly representative of the group," may be deduced. However, there are "certain anatomical peculiarities of too subtle a character to be expressed in figures, but producing results which reveal themselves with unerring certainty to the trained eye" (334). In particular, according to Bowditch, "for the recognition of racial peculiarities the unmeasurable seem to be more important than the measurable differences" (335). Despite the fact that we have to deal with the unmeasurable, the method of composite portraits enables a "scientific discussion" of the conception of racial physiognomy and "shows clearly the importance of devising some method by which mean and average values may be determined for those unmeasurable anatomical peculiarities" (336). His own study of the faces of the physicians, horse-car conductors, and soldiers "certainly suggests the conclusion that there must be some racial peculiarities showing themselves in the composite portraits" (340–41).

According to Bowditch, the method of composite photography enabled the objective determination of a typical form of unmeasurable features. Both Galton and Bowditch placed this method on an equal footing as statistics in which the "average" was supposed to represent the typical, hence the name "pictorial statistics" Galton gave to this method. Following Quetelet and Galton, Bowditch (1894: 333–34) also compared the "ideal forms round which individuals group themselves in accordance with the law of accidental variation, as shots group themselves round the bull's-eye of a target" (see figure 6). To reinforce this image of the target, in his eight

Figure 6 "Plate I Twelve Boston physicians and their composite portrait—the composite in the center."
Source: Bowditch 1894: 332.

plates the twelve individual portraits were arranged around the bull's-eye of the composite photograph, as noted by Klein (1997: 128).

Before we can discuss whether statistical analysis and pictorial statistics are really the same kinds of target practices, we first have to discuss what the target of pictorial statistics actually represents, the claimed typical form or something else. To Galton, in contrast to Bowditch, the composite portraits, particularly when the whole set of photographs was used, were problematic. It appeared that for the cases where no preselection has been carried out, the typical characteristics had disappeared in the average.

In the first case, the composite portrait of criminals (see figure 2), Galton (1878: 97–98) observed that

> the features of the composites are much better looking than those of the components. The special villainous irregularities in the latter have disappeared and the common humanity that underlies them has prevailed. They represent, not the criminal, but the man who is liable to fall into crime. All composites are better looking than their components, because the averaged portrait of many persons is free from irregularities that variously blemish the looks of each of them.

Contrary to what he hoped would happen, it appeared that "the special expressions of different criminals do not reinforce one another in the composite, but disappear" (Galton 1879: 162).

Also, in the case of the composite portrait of the patients suffering consumption, Galton (1881a: 144) seemed surprised by the beauty of the resulting portrait: "a very striking face, thoroughly ideal and artistic, and singularly beautiful. It is, indeed, most notable how beautiful all composites are. Individual peculiarities are all irregularities, and the composite is always regular." This case, however, was more problematic. Unlike the case of the criminals, the individual photographs did not show the characteristics of the "type," but he hoped that these characteristics would nevertheless become apparent in the process of composition:

> On looking over the individual portraits of the patients suffering from phthisis, one is first struck with the absence of those characteristic faces which we expect to find among them. With the exception of a few who were very severely ill, the faces did not seem to differ much from those of any group of ordinary patients, indeed there seemed nothing characteristic about them. (Galton and Mahomed 1882: 481)

By taking all photographs without any selection, the co-co-composite "presents no features or expressions characteristic of what may be called secondary types" (483). These secondary types were the "strumous" and the "tubercular" and could only be found when based on a preselection that resulted in these two co-composites. In this sense, the method had failed, according to Galton and Mahomed, "to obtain for us so typical a face" (484): "There is no foundation for the belief that persons possessing certain physical characteristics are especially liable to tubercular disease" (492).

And again in the case of the Jewish schoolboys, Galton (1885: 243) came to a similar observation. While driving through the Jewish quarter

near the Jew's Free school, the feature that "struck" him most was the "the cold scanning gaze of man, woman, and child, and this was no less conspicuous among the schoolboys." But these "dirty little fellows individually" appeared to be "wonderfully beautiful" in the composites.

As Elizabeth Stephens (2013) shows, Galton's composite portraiture was a failure as a scientific project for several reasons, but the reason here of most relevance is that it undermined rather than substantiated the anthropometric and physiognomic theories Galton intended to illustrate. While Galton's work in composite portraiture was motivated by eugenicists' concerns, in which some types were understood as superior to others, the composites seem to prove that all types are "beautiful." Rather than enforcing the signs of the prisoners' villainy or racial inferiority, the composite portraits erased them. Or as Gavan Tredoux (2020) phrased it aptly: "The portraits of criminals tended to blend away into normality." While to Galton, Quetelet's average was the "type of the race" (Gigerenzer et al. 1989: 58), the portrait of the average did not look like that.

3. The Familiarized Eye

The characteristics of the type in question did not became visible when the composition was based on mechanical-objective procedures alone, for example, by using the categories of the patient card (figure 3). They only became visible because a part of the procedure was a sorting of the photographs in "natural classes" based on a judgment of the eye. For Galton, it was, however, important that the eye be untrained, to avoid prejudice by preconceived notions. The sorting was done after having "familiarized" the untrained eye with the materials. And subsequently, the correctness of this selection was tested by a visual assessment of the composite photograph.

As was quoted above, in section 1, by continually sorting the prisoners' photographs, "certain natural classes began to appear" (Galton 1877b: 12). The "assurance of the truth" of the "pictorial deductions" was to be found in the "substantial agreement" of the different batches of components, "this being a perfect test of truth in all statistical conclusions" (Galton 1878: 99). To achieve an accurate portrait of the "genus" of the "criminal,"

> the objects to be portrayed must all have many points of likeness in common, and it is of especial importance that characteristics of a medium quality should be much more common among them than those that deviate widely. No statistician dreams of grouping heterogeneous

> facts in the same table; no more do I propose to group heterogeneous forms in the same picture. Statistical averages, and the like, are nonsensical productions unless they apply to objects that cluster towards a common centre; and composite pictures are equally monstrous or meaningless unless they are compounded of objects that have a common similarity to a central ideal type. (Galton 1879: 160–61)

The clustering of the components was, like in numerical statistics, seen as an indication of the truth.[3]

> It might be thought that blended portraits would form mere smudges, and so they would if only a few specimens of extremely different casts of features were combined, but in all groups that may be called generic the common points of resemblance are so numerous, and medium characteristics are so much the most frequent, that they predominate in the result. All that is common to the group remains; all that is individual disappears. (Galton 1879: 161)

A composite that showed the most common outlines and least "smudges" was seen to be "generic" for the "natural group" at hand. These natural classes were based on familiarization and subsequent sorting of the photographs available of that population. The sorting was based on looking for visual "likenesses" by an eye that is supposed to be unbiased.

Daston and Galison (2007) describe the history of objectivity as a move from the dominance of the epistemic virtue of "truth-to-nature" to the dominance of "mechanical objectivity." Galton's work on pictorial statistics can be considered a part of, or even a contributor to, this move, but

> Galton's method is a perfect instance of an image-making routine poised between our two ordinarily disjunct modes of observation: on the one side, it aimed for an ideal type that lay "behind" any single individual. On the other side, Galton's face-machine proceeded toward that ideal not with what he and others had come to see as subjective idealization (stemming from "biases," "fancies," and "judgment") but with the quasi-automated procedures of mechanical objectivity. (Daston and Galison 2007: 169)

3. Clustering is usually seen as an indication of accuracy, which is closeness to truth. This is, however, a common misconception. Clustering is actually an indication of precision, which should be distinguished from accuracy. When there is a systematic bias, the data will not cluster around the truth. For a more detailed discussion of this distinction between precision and accuracy, see Boumans 2020.

Truth-to-nature is the aim to portray the underlying type of a species, rather than any individual specimen. "It is an image of the characteristic, the essential, the universal, the typical" (Daston and Galison 2007: 20). The image of the typical was usually made by a specially gifted observer with artistic talents. At several places Galton made clear that he wished to go beyond this too-subjective portrayal of a type.

> A composite portrait represents the picture that would rise before the mind's eye of a man who had the gift of pictorial imagination in an exalted degree. But the imaginative power even of the highest artists is far from precise, and is so apt to be biased by special cases that may have struck their fancies, that no two artists agree in any of their typical forms. The merit of the photographic composite is its mechanical precision, being subject to no errors beyond those incidental to all photographic productions. (Galton 1878: 97)

Although admitting that "many poets and painters have had the visualising faculty in an extraordinary degree, while it is in the brains of poets and painters generally that we find the artistic power to reside of producing pictures that are not copies of any individual, but represent the characteristics of larger classes" (Galton 1879: 160), when the phenomena are submitted to measurement, "very many of the notions that were derived from general impression are discovered to be wrong, even absurdly so" (157), and "it is only by the strict methods of scientific inquiry, namely by measurement and number, that these fallacies can be cleared away and the truth discovered" (158). According to Chiara Ambrosio (2016: 556), photography was an "indispensable aid to the kind of ideal empiricism Galton aspired to."

> By blurring the idiosyncratic and retaining in view only the typical, composite photography not only lends visual evidence to the material content of our generalizations, it also shows that "pure" generalizations, independent of the differences and peculiarities of particular individuals arriving at those generalizations, are a desirable empirical aspiration in the first place. (556)

Daston and Galison (2007: 169) describe Galton's view on objectivity as follows: "The device would remove the process of abstraction from the artist's pen," which was indeed Galton's intention. But a closer look at the way Galton arrived at what he considered pure generalizations shows that the aim at complete mechanical objectivity was not reached. In a sense, Galton's approach, which was partly based on the epistemic virtue of

mechanical objectivity and partly on a visual judgment to sort the photos, fits Daston and Galison's account that in the history of objectivity one can observe a subsequent move from mechanical objectivity to what they call *trained judgment*: the acknowledgment that the images produced by mechanical-objective procedures contain instrumental artifacts. These should be removed by trained judgment. The removal of these artifacts requires expertise, not only theoretical but also of the instruments. But the case of the image of the phthisical patient shows that Galton did not want to have the *trained* eye correct for the inaccuracies of a purely mechanical approach. His nonphysician's eye was preferred to do the sorting above the trained judgment of Mahomed. It was the untrained eye that should be part of this process of inference. Untrained here means that the analyst is not educated in the medical or psychological studies of the population in question. The eye was supposed to be "trained" in another sense, namely, that it had familiarized itself with the materials.

This part of statistical inference, the necessary familiarization with the data, here photos, appears not to be particular for Galton's pictorial statistical inference but is a "normal problem of inductive science," according to John Maynard Keynes ([1921] 1973). When discussing the "nature of statistical inference" in his *Treatise on Probability*, Keynes emphasizes that in determining the accuracy of the statistical characteristics of a certain "mass of individual records," the statistician "must pay attention to a new class of considerations and must display a different kind of capacity" (360). The statistician "must take into account of whatever extraneous knowledge may be available regarding the sample of population which came under observation, and of the mode and conditions of the observations themselves. Much of this may be of a vague kind, and most of it will be necessarily incapable of exact, numerical, or statistical treatment" (360).

For Galton, to avoid arriving at "nonsensical productions," the photos needed to be sorted on likeness before a composition could be made. A meaningful inference was looking for the homogeneous facts that were supposed to be grouped in "natural classes." This homogeneity of a class, the "common similarity to a central ideal type" could be seen only by the eye that had familiarized itself with the material. Therefore Galton had to assume that natural classes he studied with the photographic techniques are real, in other words, that group of criminals, phthisical, and Jews each belong to a *natural* class and that the familiarized eye can pick them up.[4]

4. I would like to thank Chiara Ambrosia for emphasizing this point.

The fewer the smudges, then, a composite of a natural class showed, the better the sorting was done, confirmed by the fact that "the ideal faces have a surprising air of reality" (Galton 1878: 97). Thus, as a matter of fact, the photographic procedure that results in a composite is not where the inference takes place: it is the process of the sorting that is the inference. The composition functions, then, only as the test whether the inference is done accurately.

4. Conclusions

Despite Galton's hope of achieving objective generalizations through photography, composite photography did not give him what he had hoped for. Mechanical generalizations did not show the "typical," "generic" characteristics of a specific population; they showed the "beautiful" face of common humanity. The characteristics of a type became visible only after having sorted visually the photographs into "natural classes." The more "beautiful" the composites were, the less they show the characteristics of a type.

Because the concept of beauty played such a significant role in Galton's method of inference to the characteristics of a type, it must briefly be demonstrated why it could be used in this way without Galton feeling the need for further justification. A detailed historical-cultural contextualization of beauty goes beyond the main topic of this article; Mary Shelley's *Frankenstein* suffices to illustrate that at Galton's time humanity and beauty were closely linked. In this famous work, Shelley relates ugliness with the inhuman nature of Frankenstein's creature. Because of his "miserable deformity," he is considered a "monster," despite the fact that the behavior of the creature at the beginning showed all the features of Victorian virtues: gentle demeanor, inquisitiveness, and refinement. "God, in pity, made man beautiful and alluring, after his own image; but my form is a filthy type of yours, more horrid even from the very resemblance" (Shelley [1818] 2018: 127).

Galton indebted the principles of his target practice from Quetelet. The average person was considered representative of true human nature. But all the qualities of the *average man* "represent all which is grand, beautiful and excellent" (Quetelet 1842: 100); the face of *l'homme moyen* is beautiful. This face of the average therefore conflicted with Galton's aim to portrait the criminal, the sick, and the Jew; they were not supposed to look "grand beautiful and excellent," but "ugly."

Quetelet (1849: 102) suggested the introduction of "limits" to deal with the "extraordinary" cases. The limits are distances to the mean that can be used to define several nonordinary categories. In terms of the "height of man" he defined distances to the mean with which he established the following categories: "giants," "large men," "the ordinary size," "small men," "dwarfs," and "monstrosities," the latter to be found beyond the most distant limits at both sides of the mean. But this more mechanical kind of categorization based on preset limits is not applicable to the nonmetric features of a face. To arrive at categories to be found beside the "ordinary," Galton had to develop a different method. The camera was used not as a tool of inference but as a tool of testing the inference based on the familiarized eye.

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