

Are the four Baconian idols still alive in demography?

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Abstract

In this paper, we examine the four Idols – errors of thinking and judgement – which according to Francis Bacon’s *Novum Organum* (1620) beset human minds. These are Idols of the Tribe – *false assertions that the sense of man is the measure of things*; Idols of the Cave – *idols of the individual man*; Idols of the Market Place – *formed by the intercourse and association of men with each other*, and Idols of the Theatre – *stemming from dogmas of philosophies and ... wrong laws of demonstration*. We want to see if these Idols are still alive in contemporary population sciences, and look at several examples from the fringes of demography – behaviour genetics, postmodern theory, hereditarianism, and modern hermeneutics. The analysis of these examples strongly suggests that demography needs to remain faithful to the scientific method whilst looking for new insights and inspirations.

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Introduction

Bacon wrote the *Novum Organum* (1620) in order to elaborate an inductive method in opposition to the *Organon*, the name given by Aristotle’s disciples to the set of his six works on logic. He contrasted his new approach to the standard one at the time, saying:

There are and can be only two ways of searching into and discovering truth. The one flies from the senses and particulars to the most general axioms, and from these principles, the truth of which it takes for settled and immovable, proceeds to judgement and to the discovery of middle axioms. And this way is now in fashion. The other derives from the senses and particulars, rising by a gradual and unbroken ascent, so that it arrives at the most general axioms last of all. This is the true way, but as yet untried.

He opened this new way mainly for the natural sciences, and was followed forty years later by Graunt (1662) with his *Bills on Mortality* for population sciences and demography.

Now, over 350 years after Graunt’s seminal work, we are interested to see if the first way is always followed by some researchers in demography. It was more precisely characterized by Bacon as four Idols – errors of thinking about a true scientific approach - which he called: *Idols of the Tribe*; *Idols of the Cave*; *Idols of the Market Place*; and *Idols of the Theatre*. His book gave many examples of these four kinds of Idols, so that their understanding may be duly cautioned.

Here we will examine each of them and try to see if they are still alive in the context of demography, and if so, what form they may take nowadays.

1. Idols of the Tribe (*Idola tribus*)

Let us see how Bacon characterized these first Idols. He proposed that *it is a false assertion that the sense of man is the measure of things*:

The human understanding is of its own nature prone to suppose the existence of more order and regularity in the world that it finds. And though there may be many things in nature which are singular and unmatched, yet he devises for them parallels and conjugates and relatives which do not exist.

He gave for natural sciences the example of the fiction that all celestial bodies move in perfect circles and for social sciences the example of astrology, which is always followed by many men but no longer considered a scientific matter.

For social sciences these idols are more precisely what the perceptions of our mind permit us to think. Every person knows what a birth is, or a death or a move in space -- but it is more difficult to understand what lay behind these concepts of fertility, mortality and migration, which form the basis of population sciences. However, these *individual* events, which are universally human, may prevent any scientific thinking about them. When they appear nowadays in the press, the media, etc., they are mainly being considered as personal, and not as occurring to a *statistical individual*. Such events, often selected for their uniqueness and for how strongly they impact on the minds of the readers or viewers, are not representative of the processes that underlie them.

We therefore pose the question: how much is the confusion still alive among demographers between the *quantities* of individual births, deaths and moves occurring in some population at some moment, and the *concepts* of fertility, mortality and migration? These last concepts do not only refer to some *quantities* of individual events; rather, they refer to the actual *structure* of some population, i.e. the proportion - or *ratio* - between births, deaths, and moves in this population. They refer also to the processes which generate this structure.

We will give now another recent example, the one of behavioural genetics (or: *behaviour genetics*), used by a number of researchers who publish papers on this topic in major demographic journals (Morgan and King, 2001; Rodgers et al., 2001a, Miller et al., 2010). It is also used in a great number of social sciences: educational science, medicine, physiology, psychiatry, psychology, sociology, etc. (Plomin et al., 2012). These researchers use this method to study not only demographic traits, such as fertility, mating success, longevity, juvenile survival, divorce, etc, but also every kind of human trait, such as intelligence, personality, smoking, homosexuality, femininity, obesity, aggression, etc. The two central points of these studies are (1) the claim that there is a genetic component in behavioural traits, and (2) that the contribution of this component to the variance of the traits in the population can be measured (see Vetta and Courgeau, 2003, for a detailed discussions).

The answer to the first point is evidently 'yes', as it would be for any human characteristic. This question can be said to be pointless. To answer the second point, we have to see if it is possible to split up an observed behaviour into a genetic component and an environmental one. We will show here how such an approach, which goes back to what was called 'biometry' in the work of Galton (1865), is devising parallels, conjugates and relatives which in fact do not exist. Let us see in more detail on what hypotheses it is based.

First, it is based on assumptions made a long time ago by Fisher (1918). They can be given, under more contemporary terms, as follows: there exist polygenes, that (i) act positively, (ii) segregate independently and (iii) whose number may be considered as infinite;

next, (iv) the environment is independent of genes and random, and (v) the population is in Hardy-Weinberg equilibrium, e.g. there are no changes in gene or genotype frequencies from one generation to the next. With these assumptions he was able to give an additive decomposition of the variance of a given trait into different genetic effects (for more details, see Visscher et al. 2008).

Also, it is based on the concept of heritability, due to Lush (1936), who devised it in the context of plant breeding experiments. Formally, the heritability of a trait within a population is *defined as a ratio of variances, specifically as the proportion of total variance in a population for a particular measurement, taken at a particular time or age that is attributable to variation in additive genetic or total genetic values* (Visscher et al. 2008). The heritability in the broad sense (H^2) is the proportion accounted by all forms of genetic variance, and the heritability in the narrow sense (h^2) is the proportion accounted for by additive genetic variance.

At this time these concepts were used by animal and plant breeders, and behaviour genetics began to be used to study human behavioural traits, particularly twin studies at the beginning of the seventies, with the work of Jinks and Fulker (1970). They used Fisher's assumptions to show that, even if there is a dependence and interaction between phenotypic and environment variances, it is always possible to consider separately the effect of genes and the effect of environment in an additive model.

However, these assumptions (axioms) were not obtained through a systematic observation of certain properties of genes, as at this time there was no possibility to verify their truth, but they were mainly counterfactual ones, too quickly drawn from some existing statistics and afterwards considered settled truths.

Later, we see that with the discovery of the molecular structure of DNA by Watson and Crick in 1953 and the analysis of the human genome with only 20,774 protein-coding genes (the evaluation for 2013 is provided in http://www.ensembl.org/Homo_sapiens/Info/StatsTable), the hypothesis of a very great number of polygenes for a given trait may no longer be tenable: given there are at least 1 million proteins in the human body, the sequence of DNA cannot constitute anything like a "text" for specifying their structure. Also, the hypothesis that genes segregate independently is not correct because all genes on a chromosome segregate together and the additivity of effects is destroyed.

We can also show that the hypothesis on the additivity of gene and environment has no scientific content, and that Hardy-Weinberg equilibrium for humans has no reason to be verified, as it means that there are no migrations, no assortative mating, no mutation nor selection of any type. Finally, Vetta (1976) showed that Fisher's (1918) kinship correlation formulae under assortative mating are wrong and that some formulae of Jinks and Fulker (1970) are also wrong, making their method useless. For a more detailed demonstration of all these incorrect assumptions you can see for social sciences: Sarkar (1998), Capron and Vetta (2001), Gottlieb (2001), etc. and for demography more particularly: Vetta and Courgeau (2003), Courgeau and Vetta (2006), etc. As Gottlieb (2001) said:

It is now known that both genes and environment are involved in all traits and that it is not possible to specify their respective weighting or quantitative influence on any trait. ... this has been a hard-won scientific insight that had not yet percolated to the mass of humanity.

We can also conclude that the use of the concept of heritability linked to Fisher's assumptions leads to a dead end (Jacquard, 1983).

However the behavioural geneticists remained silent about these criticisms and continue their same errors – even the entrance into the genomic era did not reduce their audience. Rodgers et al. (2001b) wrote about human fertility:

In the future, the important theoretical questions in this arena may well emerge from the human genome project.

Again many studies were published during the last years using classical twin studies¹ and genomic methods simultaneously (Van Dongen et al., 2012).

For example, genome-wide association studies (GWASs), that define genomic regions associated with some traits or complex diseases, have during the past 7 years identified around 2,000 robust associations with more than 300 complex diseases and traits (Manolio, 2013). These studies were designed to show the links existing between DNA and human traits and behaviours. However, initial euphoria has dimmed somewhat with the recognition that GWAS-defined loci explain only a very small proportion of different traits' heritability, so that they met considerable skepticism regarding their clinical applicability. Thus, we believe that this skepticism may be explained by the blind alley of heritability.

More recently, a software tool called genome-wide complex trait analysis (GCTA) was developed to address the “missing heritability” problem (Yang et al., 2011). However it is more like a twin study than like gene-finding. GCTA permits us to define pair wise genomic similarity among “unrelated” individuals, and then this similarity is compared to phenotypic similarity. It is then evident that GCTA will recover heritability detected via behavioural genetics methods, but where else would it have been?

The final nail in behavioural genetics' coffin is given by Charney (2012). He clearly shows that:

the cumulative evidence of recent discoveries in genetics and epigenetics calls into question the validity of two classes of methodologies that are central to the discipline [behaviour genetics]: twin, family, and adoption studies, which are used to derive heritability estimates, and gene association studies, which include both genome-wide and candidate-gene association studies.

This paper is followed by a very large number of peer commentaries from different social sciences and the author response. Even if it shows an increasing agreement against the use of behavioural genetics, a number of commentators remain convinced of the usefulness of behavioural genetic methods.

We hope that we have shown clearly that behavioural genetics suppose the existence of more order and regularity in human heredity that it finds: additivity of effects, independence between environment and genes, randomness of the environment, etc. All these regularities are fallacious and a real scientific approach to this question may only be found while using the scientific results of molecular and genomic sciences.

The problem of false positives in demography – incorrectly detecting patterns where there are none – is not exclusively linked to behavioural genetics, however. Fisher's legacy in statistics is partly to blame, too. Not only does it entirely ignore the *Type II* errors associated with false negatives (missing the true patterns), but also has indirectly led to allowing, by mere convention, relatively high probability of *Type I* errors associated with false positives (e.g. 0.05). In this context, Gigerenzer (2008) painted a picture of a “null ritual”, whereby hypotheses are specified *ex post*, after the statistical analysis has been conducted, and the

¹ Twin models may be extended with data from other relatives, such as their parents, siblings, spouses or offspring.

reporting of p-values usually is limited to whether they are smaller than some threshold level (such as 0.1, 0.05 or 0.01). As noted by Courgeau (2012), Fisherian inference (or, more generally, objectivist, as opposed to the logicist or subjectivist – Bayesian ones), *makes it possible to test the probability of obtaining the observed sample – if the tested hypothesis is true – but not the probability of the hypothesis itself, which is either true or false.* Unfortunately, through wide adoption of the “null ritual” to analysing survey-based data, demography may be exposed to the problem of false positives.

We will see later, in the part concerned with the Idols of the Theater, that this attitude may be linked also to more political motivations with the notions of eugenics and hereditarianism.

2. Idols of the Cave (Idola Specus)

Let us now see how Bacon characterized this second kind of Idol. He proposed that the individual may construct an entire system, with reference to a few observations and ideas. He gave the example of chemists which *out of few experiments of the furnace, have built up a fantastic philosophy, framed with reference to a few things.* More generally he presents those using these idols as follow:

There are found some minds given to an extreme admiration of antiquity, other to an extreme love and appetite for novelty; but few so duly tempered that they can hold the mean, neither carping at what had been well laid down by the ancient, nor despising what is well introduced by the moderns.

Such an appetite for novelty with reference to few things can be found nowadays in the *postmodern theory*, which tries to reject any real scientific or objective approach, putting on an equal foot art, science and religion. Simultaneously many perspectives from the past have re-emerged with new relevance, so that such an approach cumulates the appetite for novelty with the admiration of antiquity, such as Gnosticism and the major esoteric traditions. Postmodernism rejects all reference to a long tradition of scientific thinking which stays between the antique and more recent ideas and considers everything as a social construction.

Before looking more precisely at its application to demography, let us first see its more general applications trying to link the three aspects of human condition, as in the paper written by Latour: *How to be iconophilic in art, science and religion* (1996).

As long as postmodernism remained on an artistic basis (architecture, literature, music) or on a religious one, it is out of our field. However, recently Derrida, Jameson, Lacan, Lyotard, etc., introduced scientific terms in their arguments and even rejected a true scientific thinking like the second way proposed by Bacon. Such an attitude makes them directly enter in the field of this paper. For example, Latour (1996) said:

When science was obsessed by what happened in the Mind or what was the case in the World, the distance with arts, especially the visual arts, was at its maximum. But when science began to be seen as a mediating visual activity, then the visual arts offered a fabulous resource; they had always thought of themselves in terms of mediation and nether bothered enormously about the representing Mind nor the represented World, which they took as useful but not substantial vanishing points.

This view of scientific research introduces a construction of the mind that will necessarily be fallible and relative in art as well as religion, but also in science, with only local beliefs being put in evidence.

This approach inspired the notorious Sokal hoax, an article (1996) collecting a number of the silliest quotations from postmodernist authors, about mathematics and physics, in an apparently serious paper. Sokal and Bricmont (1997) repudiate the idea that science amounts to social construction:

We show that famous intellectuals such as Lacan, Kristeva, Irigary, Baudrillard, and Deleuze have repeatedly abused scientific concepts and terminology: either using scientific ideas totally out of context, without giving the slightest justification – note that we are not against extrapolating concepts made from one field to another, but only against extrapolations made without argument – or throwing around scientific jargon in front of their non-scientist readers without any regard for its relevance of even its meaning.

Even if such an attack raised important reactions of academics and the press, it did not stop the extension of postmodern theory in demographic literature.

One of the first attempts to introduce this theory in demography is in van de Kaa's paper (2001): *Postmodern fertility preferences: from changing value orientation to new behavior*. He recognizes that, in demography, the term postmodern has not become part of the scientific discourse before 2001. He thinks that the main reason for this rejection may be seen in the elusive character of this concept. In view of a more serious use of it, he conceptualizes it as a world view (*Weltanschauung*) which he ascertains by looking at attitudes regarding a fairly wide range of issues. He developed 11 scales of what he called "bourgeois" postmodernity, which cover such issues as *religiosity, requirements for a successful marriage, gender roles and socialization*. The group of people meeting the criteria of a "true" postmodernist is small but is higher for younger generations than for older, as expected.

Then, he tries to explore the relationship between the levels of "bourgeois" postmodernity in the industrial countries, measured by World Value Surveys, and the marital and fertility scores in the second demographic transition². The regression of postmodernity against the fertility scores shows that the correlation is low ($R = 0.202$) while the one against the marital scores is higher ($R = 0.472$). More detailed analysis, in particular using the near concept of postmaterialism³, most largely used in social sciences but less extensive than the concept of postmodernism, lead him to say:

One could postulate here that, as the process of postmodernization continues, postmaterialists might find it easier to combine childbearing with other activities and might then be able to match or exceed the numbers of children born to materialists. However, as yet support for that pervasive thesis is not strong.

Finally, he thinks that, even if such an analysis did not lead for the moment to very clear results, a *clever way of anticipating developments probably is to envisage the options of the postmodern **avant-garde** will dream up and select.*

In her comments to this paper, Bacharach (2001) wonders whether the need of a precise conceptualization for the concept of postmodernism is compatible with the essence of postmodern ideas and thoughts:

² As van de Kaa (2001) put it, the *measure of the stage of marital transition is based on three standard demographic variables and one, somewhat less frequently available, more specific variable. The fertility transition measure is based on four standard demographic indexes*. For more detail on these variables, see van de Kaa (2001).

³ Such a concept characterise the shift from *materialist values (economic and physical security) to ... postmaterialist values (individual self-expression and quality of life)* (idem).

However, his [van de Kaa's] attempt to operationalize even these limited meanings using extant survey data proves fraught with difficulty, and arguably transforms the idea of postmodernism into variables that would not be recognized or accepted by postmodernists.

She thinks also that, as was shown in more detailed studies of attitudes towards family issues (Moors and Palomba, 1995), family values cannot be compared with postmodern values. This leads to more complex tensions between the two sets of values that a postmodernist approach alone would not be able to answer.

A more complete presentation of *Demography in the age of the postmodern* was published a little later (2003) by Riley and McCarty. This volume takes a very short-sighted view of the history of demography distinguishing only two main periods: a modernist approach and a postmodernist one. Even its authors think that postmodernism has rarely been used in the past and that demography was mainly remaining in the modern era.

First, they appear to be unaware of 250 years of demographic thinking from Graunt (1662) to the early twentieth century with major thinkers in the domain such as Huygens, Euler, Laplace, etc. For them demography is mainly a modern science born at the beginning of the XXth century and remaining in great demand by a wide variety of clients, mainly political ones:

Because funding has been secure and because it has a ready market for the use of its findings, demography has had less reason to question the very nature and premises of the field itself.

Again, they seem to be unaware of the important changes in paradigm that occurred from the end of World War II: from a cross-sectional, to a cohort, to an event-history and to a multilevel paradigm (Courgeau, 2007). They mainly consider, this time with reason, the shortcomings of the demographic transition theory.

They do not clearly say that demography is now entering in the era of postmodernism but only *suggest that postmodern perspectives have already entered the field of demography, even if they are not named as such*. However their book is a defense for its larger use in demography and they present a number of examples of studies that they think particularly well in highlighting the usefulness of a postmodern approach.

One of their points is *a move away from universal perspectives and a focus on the local*. It seems to us that an important movement towards detailed and local surveys is present in demography for more than forty years. See for example the survey on local networks in a French commune (Courgeau, 1972) or the detailed survey interviewing around 3600 individuals about their demographic, professional and migratory experiences (Courgeau, 1985). This interest, which gives *attention to inequalities and their influences*, does not simultaneously put aside *a focus on better or exact measurement*. For example we tried to see how a part of such retrospective information from surveys may be confronted with more exhaustive measurement of population registers (Courgeau, 1992). Finally, the definition from Lyotard (1979, 1984) describes *postmodernism as incredulity about metanarratives*, which has been already criticized by Sokal (1996) from the point of view of physics, seems to us similarly open to criticism from social sciences. It is sufficient in our opinion to oppose this incredulity to the progress of social sciences and demography in recent years.

We will conclude this part by saying that the *Idols of the cave*, always running against demography, did not give rise to an important postmodern movement in these sciences, but only some wavelets which did not attain its core.

3. Idols of the Market Place (*Idola fori*)

For Bacon, these idols are *formed by the intercourse and association of men with each other*. He said about them:

But the Idols of the Market Place are the most troublesome of all – idols which have crept into the understanding through the alliance of words and names. For men believe that their reason governs the world; but it is also true that words react on the understanding; and this it is that has rendered philosophy and the sciences sophistical and inactive.

He gave different examples of such idols as they were at his time, but did not include in them political scientific debates which nowadays become more and more important. In Bacon's time political power was in the hands of absolute monarchs, with a divine right of kings in European countries or living gods in Asian countries. The first republican commonwealth of England was from 1649 to 1660 and the French revolution did not occur until 1789. The debates of the present day also use *names of things which do not exist, or ... exist, but yet confused and ill defined, and hastily and irregularly derived from realities*. The political motivation is their main purpose, *formed by the intercourse and association of men*, and it is sustained by false claims of scientific validity.

The example we will treat here is eugenics, now referred to as hereditarianism, which is often associated with behavioural genetics, but is mainly a political tool. As for postmodernism, we will first develop its main general aims, before looking in more detail its approach to the demographic field.

Even if it was already present in the work of Galton from his book on *Hereditary genius* (1869), this concept was fully introduced by him in 1883 under the denomination of eugenics, a name that was rejected later by the end of World War II, having become associated with Nazi-Germany, and was replaced by hereditarianism, a more neutral term. It has been clearly defined by Galton in 1904 as:

Eugenics is the science which deals with all influences that improve the inborn qualities of a race; also with those that develop them to the utmost advantage.

From this definition, Galton considers eugenics as a science. Such a science however introduces another concept, improving the qualities of the race, which refers to movements and social policies very influential during the early 20th century.

Even if Darwin, Galton's half-cousin sharing the same grandfather, Erasmus Darwin, agreed in principle that intellectual activity can be inherited, he was not entirely in agreement with Galton's ideas on eugenics. He wrote to him in January 1873 (Desmond and Moore, 1992) about the eugenic register he was promoting:

...the greatest difficulty I think would be in deciding who deserved to be on the register. How few are above mediocrity in health, strength, morals and intellect; and how difficult to judge on these latter heads.

Still, Galton did indeed *draw up a tentative scale of how to estimate the "worth" of persons, corresponding to the virtues and values of Victorian England* (Galton and Galton 1998), based mainly on the predominant political views of the time. The scale was largely based on the combination of social class and "merit", with the highest rank given to *Ministers of State, Heads of Departments, Bishops, Judges, Commanders and Admirals in Chief, Governors of Colonies and other appointments* (idem).

As noted by Galton and Galton (1998), these ideas were followed up in various countries: already by 1931, sterilization laws had been adopted in 27 states in the US. During the Nazi period in Germany, between 1933 and 1945, German biologists, anthropologists and geneticists actively invoked eugenic principles to justify the racial policies in Germany (idem). Even if the term eugenics had been largely abandoned by the end of World War II, many of the ideas behind it are always used under the new term hereditarianism.

We will show now how these principles were applied in a great number of so-called demographic studies.

It is very interesting to note that Galton (1873) undertook the first systematic demographic study of differential fertility, using extracts from census returns concerning 1,000 families of factory hands at Coventry and 1,000 families of agricultural labourers in rural parishes of Warwickshire. His purpose was to show that:

... those whose breed is the most valuable to our nation are attracted from the country to our towns. If, then, residence in towns seriously interferes with the maintenance of their race, we should expect the breed of Englishmen, so far as that influence is concerned, to steadily deteriorate.

He found that *the rate of supply in towns to the next adult generation is only 77 percent, or, say three quarters of that in the country*, showing that his fear is verified. However, if his study shows a lower fertility of artisan townfolk compared with labouring people who live in healthy country districts, this does not mean that the English race deteriorates, as Galton said.

A detailed study from Soloway (1990) during the beginning of the XXth century shows clearly the link between fertility and the question of “race quality”:

Correlation between fertility and social status focused public attention upon the highly emotional question of “race quality” and provoked alarming predictions that Britain would be swamped by the socially and, if eugenicists were correct, generally “unfit”.

This prospect of “race suicide” was also true for all European and North American countries and a number of demographic studies were very often linked to eugenics.

Ramsden (2003) shows also the links existing between the *International Union for the Scientific Investigation of Population Problems* (IUSIPP), founded in 1928, renamed in 1947 as the *International Union for the Scientific Study of Population* (IUSSP), and the eugenic groups. Their influence was great at the time of its foundation. The Union’s first president, the American biologist Pearl, even if he emphasized on science over policy, tended to promote his own approach:

Pearl was determined to establish a biometric approach to population study and eugenics – an approach that had been lacking in the United States, given American eugenicists’ predilections for a simplistic interpretation of Mendelian theory (Ramsden, 2003).

As Ramsden (2003) noted, this approach was also followed by Gini, president of Italy’s Central Statistical Institute and vice-president of the IUSIPP, who was supportive of Mussolini’s Fascist regime. Gini was scheduled to succeed Pearl as president following the first IUSIPP conference in Rome in 1931. As noted by Hodgson (2001), *Mussolini’s rise to power and hints that the meeting would be used to promulgate his racial theories, led [Anglo-Americans] to establish an alternative conference in London*. However the next IUSIPP conference was held in Berlin in 1935, and was even more controversial, as *German biologists promoted extreme theories and programs of racial hygiene* (Ramsden, 2003).

The following conference which was held at Paris in 1937 promoted a more social demography over the biological:

... all papers that included elements of Nazi radical doctrine were placed in a section with a paper by Franz Boas [1938], who argued that the “naïve classification” of racial types was based not on scientific principles but on “subjective attitudes”.

However, a new form of eugenics was promoted during this conference as *social eugenics*, term already used by Lorimer and Osborn (1934), and presented here by Osborn (1938). He agreed with Boas that differences in intelligence were in part determined by environment but as Ramsden (2003) says:

Yet the measurement of intelligence was still relevant to the quality of individuals within the same groups, given the similarity of environmental influences on such individuals.

We will see later how such an attitude replaced the “propagandist eugenics” of the Thirties, during the after war period.

Knowledge of the enormity of the holocaust, at the end of World War II, led to the eugenics movement quickly dissipating. John Caldwell (1996) has clearly described how demographers in the postwar era:

... fought shy of the grander theory, and usually kept out of such battlegrounds as were offered by sociobiology, denying the element of eugenics in their past, and demanding ideas that promised the possibility of quantitative justification.

However, as previously said, *social eugenics* was now promoted by former American eugenicists. They no longer cited eugenics openly but they achieved their objectives through other organizations.

For example Osborn, the well-known promoter of eugenics in the previous pre-war period, co-founded the Population Council with Rockefeller in 1953, and was its president during the period 1957–1959:

Osborn ensured that the Council supported limited research and training programs in the problems of “population quality,” first in medical genetics in the 1950s and then in population genetics in the 60s. (Ramsden, 2003)

As noted by Connelly (2006), 1952 marked the foundation of the *International Planned Parenthood Federation (IPPF)*. Margaret Sanger – its first president – found common cause with proponents of eugenics, believing that they both sought to assist society towards the elimination of the unfit. Later, Blacker, who became administrative chairman of the IPPF:

... worked with Osborn and won broad support for the goal of introducing ‘family planning’ to ‘those who need it most’. This formulation elided the question whether the need was felt by the individuals themselves or by those who knew better – that is, the critical question of who would actually do the planning in ‘family planning’. (Connelly, 2006)

Later, Salas, who was appointed the director of the UNFPA at Rockefeller’s recommendation, acted without presenting its principles and procedures to the *Economic and Social Council*⁴, consulting only countries favouring population control. As Osborn already wrote in 1968; *Eugenic goals are most likely to be attained under a name other than eugenics.* This

⁴ It is interesting to see how Sauvy (1969) pointed out that UNFPA *would act in the name of the United Nations without having to answer to them, free to dispense money to pharmaceutical companies and family planning associations* (Connelly, 2006).

movement seems to have accomplished its goal without having to answer to anyone in particular.

The movement also, to reach its political goals, used the methodology already presented in part 1 of this paper: heritability analysis, in particular for research on IQ.

For example, when Jensen (1969) wanted to argue against the money allocated to the Head Start Programme for black children in the USA, he produced estimates of 0.6 for h^2 and 0.8 for H^2 of IQ. This permitted him to claim that as IQ has a high genetic component and is highly correlated with educational achievement, the programme would not result in higher achievement by black children and money was being wasted. Later after the publication of Herrnstein and Murray book *The Bell Curve* (1994), which argued that given assortative mating and these high heritabilities a cognitive elite would emerge, Devlin et al. (1997) produced lower estimates for h^2 and H^2 of IQ at 0.36 and 0.48. McGue (1997) triumphantly informed us that:

Devlin and colleagues' findings will lead to a reconsideration of the dire conclusions from the Bell Curve.

He was wrong, as actually if IQ were a genetic trait, the lower estimate would only delay the “dire” event⁵.

With the advent of molecular genetics very powerful eugenic techniques have been made available with the use of genetic markers for identifying individuals at risk. For example, there is a large literature of candidate gene studies showing association between IQ and many single-nucleotide polymorphisms (SNPs) and IQ (Payton, 2009). However, more recent genome-wide association studies (Chabris et al., 2012) shows that *most of the reported genetic associations with general intelligence are probably false positives*. Once again, the legacy of Fisherian statistical inference and the “null ritual”, which as mentioned before ignores false negatives and, by convention, allows relatively high probability associated with false positives (e.g. 0.05), does not help. Chabris et al., (2012) conclude their study by saying:

Our results add IQ to the list of phenotypes that must be approached with great caution when evaluating published molecular genetic associations. In our view, excitement over the value of behavioral and molecular genetic studies in the social sciences should be tempered – as it had been in the medical sciences – by an appreciation that for complex phenotypes, individual common genetic variants of the sort assayed by SNP microarrays are likely to have very small effects.

The hope to find a clear signification to the heritability of IQ, with associated genes, which would permit to ensure population policies, may again be explained by the blind alley of heritability.

The use of GCTA⁶ will no more solve the problem. As Turkheimer said in his blog in 2013:

If we were start a program tomorrow to take SNPs from newborns and predict their intelligence, we would do so at a level much worse than predicting from the parent's income, for example, never mind from their IQ.

⁵ This argument is taken from Vetta and Courgeau (2003).

⁶ A software tool called ‘Genome-wide Complex Trait Analysis’ which was recently developed in order to address the ‘missing heritability’ problem.

As there are a very great number of other characteristics from the parents and from education given to the children that have great influence on their adult's IQ, the use of heritability or GCTA methods is not scientifically valid.

Eugenics and hereditarianism are always deeply anchored in present political thought, and to reject them with scientific arguments seems very difficult and even ineffective. Still, we argue that contemporary demography needs to make this effort – and be more aware of the false positives, which go undetected by the most commonly used statistical tools – in order to steer clear from potentially very dangerous ideas that lack any scientific foundations.

4. Idols of the theater (*Idola Theatri*)

The last kind of Bacon's idols has *immigrated into men's minds from the various dogmas of philosophies and also from wrong laws of demonstration*. He characterizes them more precisely:

*But the **Idols of the Theater** are not innate, nor do they steal into the understanding secretly, but are plainly impressed and received into the mind from the playbooks of philosophical systems and the perverted rules of demonstration.*

He gave many examples of such idols coming from philosophy, religion and theology: they correspond mainly to *traditional hermeneutics*, which is the study of the interpretation of written texts, especially in the areas of religion, theology, architecture and literature.

More recently a new form of hermeneutics was developed corresponding to *modern hermeneutics*. This form is what we will present and criticize here, first in its general application to social sciences and then in its application to demography⁷.

The modern hermeneutic approach was first introduced by Dilthey (1883), who made a distinction between comprehension (*Verstehen*) and explanation (*Erklären*). He recognizes that natural sciences may be only explicative, while the social sciences need a more comprehensive approach. However, he never said that social sciences may be without explanation (Franck, 1994).

As argued by Kleining and Witt (2001), *the second impact of hermeneutics upon the social sciences occurred during the last third of the twentieth century*, with philosophers like Gadamer, Habermas, Heidegger and Ricœur and social scientists like the historian Skinner or the sociologist Giddens. Even if these authors may have some different points of view on hermeneutics, they all agree that:

The next move a number of analytical philosophers have thus been prompted to make is to appeal directly to the tradition of hermeneutics, as revived by Gadamer, Ricœur, and especially Habermas, and to argue for more interpretative model of the natural, as well as the human sciences. (Skinner, 1975)

Here Skinner thinks that there are no universal truths in the sphere of natural and social sciences. Every situation is unique and should be viewed in its specific context to be properly understood. Similarly Gadamer (1960) suggests that the Baconian idols⁸ are not distorting influences on our judgement, but are features of our experience that are irreducible to their

⁷ We want to stress here that we do not reject *qualitative* evidence in general: on the contrary, we think it has its valid place in scientific enquiry through providing context, information about underlying causal mechanisms, relationships between variables, knowledge *a priori*, etc. We argue, however, that this information should be – as any other – subjected to the rigours of the scientific method in order to lead to valid conclusions.

⁸ In fact he presented the idols of the cave, the tribe and the market place, but did not discuss the idols of the theatre, perhaps because he emphasizes the legitimacy of authority.

teleological aspects, related to the questions of sense or purpose. These idols or prejudices (judgments made before the final examination of all moments that determine a thing), as Gadamer called them, are rejected by science, but are central to hermeneutic experience.

For a more detailed view on this theory, which is only briefly presented here, the book edited by Skinner on *The return of grand theory in the human sciences* (1985) will be a good reference.

However, even if this theory has been greeted positively by many reviewers and authors in different fields, it raises a number of general problems which overstep the differences between authors. We will not consider here the more philosophical problems of hermeneutics, but mainly those pertaining more generally to an hermeneutic view of social science and then more precisely of demography.

First, as hermeneutists do not recognize any value to the usual methods of social sciences, and even say they have no methods of their own for human sciences⁹ (Gadamer, 1960), they are unable to provide any guidance for the actual practice of the social sciences. They insist that hermeneutics is not to be understood as a prescriptive methodology or epistemology but as ontology, which is at first approximation a study of what there is. This turns out to be a philosophical problem and as we said previously we will not consider it in this paper. However, Gadamer for example:

... characterizes science as a mere 'amassing' of 'verified knowledge', whereas the human sciences deal with an entirely different dimension of human experience, the realm of truth. (Applebaum, 2011)

He seems to have a very partial view of scientific research and does not offer a reflection on how in practice human research could be effectively conducted.

A second problem lies in the fact that hermeneutists consider that studied facts may be explained only by the particular ideas in vogue during a short period of time of their arrival. As Femia (1981) wrote about Skinner:

*[He] writes of the history of political thought as if it were merely a series of disconnected intellectual events. But if every historical utterance and action is a unique event, historical inquiry itself becomes impossible. The historian must, unavoidably, pursue analogies, make comparisons, identify regularities, and use general concepts. If all historical events are *sui generis*, then we cannot write history; we can only pile up documents.*

For the hermeneutist, every fact – like every text – is unique and should be viewed in its specific context in order to be properly understood. Such an absence of connections between events occurring in different periods of time is at the core of hermeneutic thinking, and simultaneously cuts any links existing between events occurring in times that are not belonging to the same era. This is not only true for history, but for every social science, for which different paradigms may have been created at different times in the past and are still used in the present. In this case there is no possibility, according to the hermeneutic perspective, of linking these approaches.

Another problem lies in the fact that written texts, which hermeneutists mainly consider, are from so many different authors often contradicting each other that we can wonder how they could extract from them any real scientific result. Even the seminal 1969 article of Skinner on *Meaning and understanding in the history of ideas* was originally titled

⁹ They often made a distinction between human sciences or humanities (philology, literary criticism, aesthetics, cultural history, etc.) and the other social sciences.

The unimportance of the great texts, a formulation which corresponds with the disrespectful aura of this article (Åsard, 1987). So, their main interest *should not be to explain, but only in the fullest detail to describe* (Skinner, 1966).

Rather than continue this general criticism of hermeneutics, we will go now to its application to population science and demographic problems.

Charbit (2010) presents the emergence of population sciences in the line of Skinner's approach. He concentrates on contextualizing the texts he examines, taking into account different dimensions of each author's thought, such as population doctrine, political philosophy or economic theory. But he remains always in the period of time in which these authors lived, thinking that the links between different authors living in different periods of time are not really useful for the detailed understanding of a given author. As Morley (2012) said:

Charbit could usefully have focused more on the tradition of the reception of those writers, the role of their ideas in later debates even if interpreted in anachronistic and dubious ways, but his chosen approach of thorough-going contextualism closes off that possibility.

He did not cross-examine the authors he studies enough to be able to give an original and new approach in the history of demographic ideas. For example, he was not able to understand the originality of Graunt's approach, only saying that he was using a "shop-Arithmetic", but he should have connected his thought to the general approach of science proposed by Bacon fifty year ago, to the Bayesian approach of population problems by Laplace more than a century later and to the development of demography during the last one hundred years (Courgeau, 2013).

Similarly, a number of demographers consider that the usual approach of population problems is not sufficiently contextualized, and too analytical. Petit and Charbit's (2013) charge against the so-called French school, which is in fact the usual scientific practice of demography in every country of the world since Graunt, clearly develops a hermeneutic proposal.

First, we find here the main hermeneutic theme that the social sciences, contrary to the natural sciences, do not need an explanative approach but only a comprehensive one:

That the social sciences, as though affected by a nagging inferiority complex, continually seek to justify themselves in relation to natural sciences- and, more especially, of a belief in the supremacy of causality and determinism.

It seems surprising that the authors describe the social sciences as linked so closely to causality and determinism. From a long time now probability, mainly subjective, has been at the core of these sciences, what provides a rigorous language to talk about chance and which is also often opposed to causality. We will not discuss further here the use of these terms which may lead to a more philosophical paper, but we think that with respect to contemporary demography these criticisms are misplaced.

Second, they think that each society, even each social group within the same population, needs to be treated separately. The uniqueness of each text is replaced in the population field by the uniqueness of each considered group. They state that: *the reductive approach to social complexity implied by demography entail an especially stark disembodiment of reality*. In this case no generalization of their approach is possible and each study is confined into its own particularism. There is no neutral external standpoint from which to objectively measure the meaning of a given system of actions prevailing in a given

group. So it may appear that the obtained *interpretations are self-confirming- an unhappy conclusion if we think that social explanations ought to have rational justification and empirical support* (Little, 2008).

Third, they seem unable to see that the methods they criticize -- saying that *demography subsequently became increasingly sophisticated (and therefore increasingly withdrawn and isolated)* -- on the contrary allowed demographers to invent new forms of analysis as people needed them in their daily life. For example, event history analysis allows us to analyse clinical trials in a new way on a small number of patients in order to save a great number of human lives (Andersen et al, 1993; Aalen et al, 2008).

Finally, they think that a rapprochement of disciplines such as demography, economics, quantitative sociology, human geography, anthropology, history and more comprehensive forms of sociology is possible under an interdisciplinary area of research. As Gadamer wanted full and permanent cooperation between humanities, they wanted the same between social sciences. However, such a utopian concept seems difficult to attain as the fields of these social sciences are so different, going from statistical reasoning to historical contextualization. It seems to us, on the contrary, that we demographers have *to resist the temptation to spread ourselves too thinly; we must strive, on the contrary, to focus our research on the specific object of demography* (Courgeau and Franck, 2007).

Discussion and conclusions

The greatest successes of demography, and its most prominent areas of practical application for the public good, involve statistical analysis and population forecasting. The use of the inductive approach, initiated by Bacon, is the best way to achieve this. As noted by Russell (1912): *we must either accept the inductive principle on the ground of its intrinsic evidence, or forgo all justification of our expectations about the future*. On the other hand, some demographers may be tempted to enrich demographic analysis by insights from arts, humanities and the world of politics, in order to deepen our understanding, aid explanation, increase societal relevance and help engage with the subject of the study – human populations and how they change.

In our view, the main challenge is to resist these idols, and to keep sight of the main source of “paradigmatic success” of demography (Morgan and Lynch, 2008), which is its empirical, scientific character. Nevertheless, it does not necessarily imply that population sciences should become a complacent ivory tower or that we should not allow additional insights, influences and inspirations, insofar these are constantly submitted to the rigours of the *inductive method*¹⁰.

However, we argue that demography is not yet a fully formed science but a science in the making (Courgeau and Franck, 2007). The overarching question, at least for the next fifty years of demography as a discipline, is under which circumstances additional insights, influences and inspirations can enrich the scientific study of human populations. These circumstances consist, in our opinion, in confronting continuously new insights with the gathering of secure relevant facts.

¹⁰ This method of induction is different than the one which is familiar to us (generalization from particular facts). It consists in discovering a system’s principle from a study of its properties, by way of experiment and observation (Franck, 2002).

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