The Body as a Substrate of Differentiation

Shifting the Focus from Race Science to Life Scientists' Research on Human Variation

O corpo como substrato da diferenciação

Mudando o foco da ciência racial para a pesquisa dos "cientistas da vida" sobre variação humana

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Abstract This article suggests to focus on the history of human variation instead of focussing on the history of race science. It views the latter as a subset of the former, hence views race science as embedded into the larger field of life scientists' investigations into human variation. This paper explores why human variation is such an attractive and productive object particularly for the life sciences. It proposes that knowledge about human variation is incomplete in a promising way, and that it is of high instrumental value in the life sciences. I briefly illustrate the main points with an exemplary case, namely, population genetic studies of 'Roma'.
Keywords human variation, race, isolation

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Resumo Este artigo sugere focar na história da variação humana ao invés de focar na história da ciência racial. Considera-se a última como um subproduto do primeira, por essa razão considera-se a ciência racial como incorporada em um campo mais amplo de investigações dos "cientistas da vida" sobre a variação humana. Este artigo explora porque a variação humana é um objeto tão atrativo e produtivo, particularmente para as ciências da vida. Propõe-se que o conhecimento sobre a variação humana é incompleto, mas de uma maneira promissora, e que é de valor altamente instrumental nas ciências da vida. Ilustro brevemente os principais pontos com um caso exemplar, a saber, os estudos de genética populacional nos "Roma".
Palavras-chave variação humana, raça, isolamento

What is it, that thing that exists?

Does race exist? Do races exist? Politically charged as these questions are, my take on them is that they are posed in a misleading way, as it falsely predetermines a certain disagreement. "Race" is a term that people often use erroneously for "human variation".[1] The question about whether, or how, this thing exists or not, needs to be framed as "Does genetic variation exist?" Asking this question will not evoke the same kind of ideologically charged disagreement, but rather an overwhelming majority of answers that include a "Yes", or a "Yes, but". Different from the question above, it will not push natural scientists in one direction and social scientists in the other, leaving both with irreconcilable inconsistencies inherent in each of the two positions.[2]

1 The use of the term 'race' in the USA and UK differs considerably from how these terms are being used or tabooed in European countries (this issue is discussed in many recent publications on race, see the articles in SCHRAMM; SKINNER; ROTTENBURG, 2011; in the Special Issue of STHV, SCHRAMM; M'CHAREK; SKINNER, 2014; LIPPHARDT, 2012, 2013, 2014, 2015).

2 I am aware of the longstanding debate about whether race is socially constructed or "natural". BRUBAKER, 2015, presents a most insightful account of this debate. However, as I am studying the history of the life sciences, my argument is seated on a different level, namely that

One could then ask: "Are the structures of human genetic variation best captured by the term race?"[3] Responses from the social sciences and the humanities may be summarized as a clear "No".[4] However, what is more interesting here, by asking this question a noteworthy disagreement between different proponents *within* the life sciences becomes visible. Many life scientists maintain that race, or racial taxonomy, is not helpful in understanding and describing human genetic variation. Instead, they hold that racial taxonomies (or census population categories that overlap with common-sense racial classifications) can serve as useful *proxies* towards human genetic variation, while emphasizing that caution is necessary when it comes to the interpretation of data produced within a racial categories matrix that is often taken from administrative ordering techniques (Yudell, 2016; Widmer; Lipphardt, 2016).

By looking at the history of this field in the 20th century, my aim is to shift the focus from race science to research on human genetic variation.[5] This article continues my deliberations on human genetic variation by exploring why human genetic variation is such an attractive and productive object particularly for the life sciences. I start from the observation that human variation, or human diversity, is a fascinating topic for researchers in a great variety of disciplines; indeed, without regarding variation, the human sciences and most fields in the humanities would

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the discussion could be more productive and move beyond this dichotomy by reframing the question under a large umbrella term. Hence, I am mostly focussing on arguments that propose (or reject) race/human variation as a biological or genetic reality, which is certainly a more dominant concern of debates in the life sciences.

3 To be sure, 'human genetic variation' in its general meaning does entail more than only those genetic differences that life scientists attribute to geographical ancestry. Yet, very often, 'human genetic variation' is used synonymously with 'human genetic variation that relates to geographical ancestry'.

4 For a philosophical discussion, interested readers may consult the debate between Adam Hochman and Sesardic, HOCHMAN, 2016; LUDWIG, 2015.

5 A most crucial contribution to this field has recently been made by SOMMER, 2016, *History Within*. Sommer demonstrates how researchers have interpreted bones, organisms and DNA as documenting the evolutionary past. My emphasize here is rather on the instrumental value of genetic differences, from blood groups to DNA, in various research strands.

never have acquired the status they have today. Researching across and with human variation is a fundamental practice that has helped scholars asking new questions and develop fertile new research directions. Yet, on the other hand, it also brings about considerable tension, as researchers endow the variation they mean to observe with different degrees of fixity, ontological power, and temporal persistence, as we shall see below in greater detail. In order to substantiate my point, I will draw on the case I currently investigate together with Mihai Surdu, namely, population genetic studies on so-called 'Gypsies'. As this research strand has a hundred year old history, this example helps to demonstrate the continuities of the field of human population genetics through the 20th century. It also helps to show how researchers focus on the genetic differences between two or more groups as an object of their curiosity, but also, how they may *use* these differences instrumentally for understanding other phenomena, say, disease distributions.[6]

I shall emphasize that, by drawing attention to the widely shared curiosity of scientists in many disciplines, I do not wish to render this interest in human variation a harmless, innocent one. Addressing or employing human variation in research is never an innocent or harmless move. Rather, if researchers implicitly or explicitly suggest that their work regarding human variation is innocent and harmless, this might be viewed as a gesture of concealing unease, attempting to signify objectivity and distance from older, discredited work. If I am not mistaken, there is quite some embarrassment on the side of those researchers who work with and about human variation, because any categorization of humans entails epistemic inconsistencies as well as ethical issues; and the degree of reflection seems to vary considerably. What comes with this work, in any case, is a great amount of responsibility: not only an ethical responsibility, but also a high responsibility for the scientific standards applied in this field.

6 For how this interest of researchers ties in with interests and practices of administrations and health services around the world, and particularly emphasizing the circulation of population categories derived from all of these contexts in this interplay, WIDMER; LIPPHARDT, 2016.

Substrates of differentiation

Language, according to anthropologist Franz Boas, is "a window on the soul" (Harris, 1993, p.20). By talking about the soul, I suppose, he was not attempting to make a spiritual statement, but rather wanted to emphasize that we can learn something about what it means to be human, about the essence of being human, by peering through the window of language.

In view of Boas' oeuvre, in which cultural diversity figured ever more prominently while physical anthropology became ever more contested, his message could also be understood as follows: the study of culture — or of the diversity of cultural objects — teaches us something essential about humanity, much more than the study of the body — in all of its diversity — ever could.

In what follows, I would like to play with this image of the window, and to look through a variety of windows at a variety of objects. In accordance with Hans-Jörg Rheinberger's terminology, the window one looks through at one moment could, in the next, become the object upon which we look: The window-thing, initially used as an instrumental object to understand something else, can itself become an object of curiosity, and vice versa (Rheinberger, 1997).

The diversity of humanity is one such object, an object that continuously points to others, eternally oscillating between being at the center of curiosity and being a tool to understand other objects of curiosity. Thinkers and researchers have looked through various windows to view humanity as diverse, and to get a handle on the guises and supposed meanings of diversity. Boas is one example, a researcher who observed humanity through the diversity of language. Others have considered humanity by looking at the diversity of other cultural products, artifacts, ways of life, narratives, or through social, demographic, or other characteristics.

The field of life sciences, however, which encompasses biological and medical fields, has always looked at human variation through the window of the body. Concepts of the body as a bearer, originator, or

symbol of human variation have a long tradition even outside of the biological sciences. Some linguistic and cultural scientists also focussed on the body, seeking the origins of diverse cultural products written in the body itself. Disputes between these various window-builders regarding how to best research diversity, and what aspects of diversity even deserve consideration, or what certain observations of diversity can stand in for (or not) have not yet been resolved even in the present day.

Certainly, in many historical cases, the body has served *race* scientists and *race* theorists as a window on the alleged natural hierarchy within the human species, a hierarchy they strongly believed in. However, it makes a difference whether a scientists starts from the assumption that "races exist", from the assumption that "racial classification allows for a correct and objective representation of human variation" — or whether he or she just *uses* racial categories in one of the research steps of his or her project. To narrow the history down to research that was explicitly dedicated to explore "race" or "races" falls short of acknowledging how broad, how practical, technical and fundamental human variation was embedded in most crucial research premises and practices of the life sciences.

While extending the time frame to the late 20th century, historians of science have recently begun to explicitly frame their work as investigating the history of research into "human biological diversity" (Ventura Santos; Lindee; De Souza, 2014), instead of investigating the history of race science. However, I suppose that the adequacy of such an approach that takes into consideration a broader, more contextualized history into human variation in the life sciences, also for the 20th century in total, has not yet been fully acknowledged. The next section suggests — rather as a contribution on the level of public understandings of science — that this might have to do with a widespread narrative about the history of race science that persists in many media, even though history of science has demonstrated its inadequacies.

The weakness of a wide-spread historical narrative about 'race science'

According to widespread opinion, race research became obsolete after the end of National Socialism. In this view, races are only a social construct, and all serious scientific fields have sworn off the concept of race since that period. Race research has been discredited as a pseudoscience. It has been said to not be a science at all, but rather a racist ideology under the cloak of ostensible scientific objectivity.[7]

In history textbooks, used in high school and undergrad education, at least in Germany, during the last two decades, the story of race research is narrated as follows: the first racial classifications of humanity originated in the early modern period; shortly after, almost every well-known scholar, from Kant to Herder and Blumenbach, dealt with the topic sooner or later. Historiography holds that the primary objective of these accounts was the hierarchical differentiation between superior and inferior races. Scientists studiously measuring skulls from the 19th century onward, the narratives tells us, have fallen victim to this judgmental mania, as have the race theorists who created the theoretical foundations upon which much of that work was based. This racial fanaticism, so the narrative continues, culminated in the racism of the Nazi regime, in which German scientists were deeply entangled — with horrific consequences.[8] After 1945, the common narrative holds, the international scientific community took a clear stance against the concept of race in multiple UNESCO declarations, and the scientific consensus resulting from this is that races do not exist.[9]

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7 I discuss this historiography in more detail in LIPPHARDT, 2015. On understandings of race science as a "pseudoscience," see LIPPHARDT, 2008.

8 For an academic example, see MOSSE, 2006.

9 This brief and polemic summary of the general historiography is not meant to ignore that, by today, history of science and science and technology studies have succeeded in establishing a much more adequate and differentiated view onto race science and its history, even in detail for single aspects of that history, such as the UNESCO statements. See, for example, the recent

This narrative, firstly, ignores the fact that race research was an international and broadly differentiated field of research, with many enthusiastic proponents in all countries with an academic system. In addition, many race researchers around the world — and not only those notorious ones in Germany — were adherents to one of the prevalent racial theories of the time that have been wholly discredited today.

Secondly, with regard to the latter, the narrative confuses the fate of race research with that of race theories and racial typology, both of which were quickly dismissed and distanced from after 1945. Investigating race in the life sciences, as an assemblage of research practises, techniques, concepts and research foci continued after 1945, albeit not in a straightforward way. Researchers in this field came to adopt the term "populations" instead of race, and they gradually came to abandon body measurements as the most telling markers of difference. The new trustworthy difference markers were now blood groups, proteins, and a handful of other genetic makers. These markers seemed to allow for clear cut, stabile research results, instead of ambiguous results from markers that were subject to modification by the life circumstances of the measured invidual.

The narrative, thirdly, fails to contextualize race research within the broader field of research on human variation. By starting from the history of this broader field of inquiry, and by taking race science as only one facet of this larger field, I wish to illuminate and problematize continuities with earlier research on human variation that have persisted into the present. I believe positions that consider race research a thing of the past contribute, willingly or not, to trivialize its effects. As hinted at above, my goal is not to prove that research on human diversity is purely

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and crucial work of SOMMER, 2016; DE SOUZA; VENTURA SANTOS, 2014; VENTURA SANTOS; LINDEE; DE SOUZA, 2014 and CHOR MAIO; VENTURA SANTOS, 2015. To name two outstanding collections of papers: Special Issue of Current Anthropology, LINDEE; VENTURA SANTOS, 2012; Special Issue of Studies in the History of Philosophy of the Biological and Biomedical Sciences, BANGHAM; CHADAREVIAN, 2014. This version of the history of race science is nevertheless still the basic narrative for teaching the history of racism and hence determines much of the perception of debates about human variation, in the media as well as in some more scholarly work.

scientific, objective, harmless, and free from racism, nor that this perspective should also be applied retroactively to race research. Instead, my objective is to extend the critical attitude historians naturally have toward race research to the entire field of diversity research. This objective also requires us to look beyond any single national context in order to contextualize diversity research in a much broader transnational history, for instance by including considerations of colonial and postcolonial constellations as key settings for this research (Widmer; Lipphardt, 2016).

The body as a substrate of differentiation; difference as a source of fascination

Most people today — including those with no racist motivations — would agree that, very generally spoken, people from different continents have differing external or physical traits. But beyond and despite the apparent general acceptance of such an understanding, there is nothing simple about this knowledge. Scientists are still tearing their hair out over this phenomenon today. The riddle of human diversity remains unsolved, and disputes over the causes, history, and meaning of diversity are far from over. Why, I would like to ask, is the diversity of the body specifically such an inexhaustible field of knowledge? How does it retain its power to fascinate?

Let us first turn to the history of race science. In 1905, anatomist Richard Weinberg — whose work aimed at discovering racial differences by looking through the window of brain weight — remarked: "Since Blumenbach [Johann Friedrich Blumenbach, 1752-1840, zoologist and anthropologist], the observer, armed with a compass and measuring tape, has delved […] ever deeper into the racial body. We have amassed a wealth of facts and results, which will hopefully one day bear a rich harvest." (Weinberg, 1905, p.5-10).

Weinberg was wrong — at least in his optimistic hopes for the future of anthropometric methods and instruments, and the possible truth claims about 'racial bodies' that could potentially be produced therewith. The field's endless data points never sufficed in providing

an integrated understanding of human diversity. This is regardless of its being discredited for political entanglements in racist policies: Even the most dedicated physical anthropologists were not successful with producing meaningful data on human variation, so that in 1960s, the abandonment of body measurements seemed inevitable. The authority to speak meaningfully on human variation was conferred to those researchers who had turned to population genetics methods.

And yet, the Weinberg quote does make a noteworthy statement on the incomplete nature of the research field he felt part of: first, it accurately describes the exploratory direction of human variation research — penetrating ever deeper into the body — which has led into the nucleus of the cell and, in the late 20th century, even to the level of DNA. Today, research on human diversity is no longer conducted as anthropometric race research, but rather as molecular genetics, molecular genealogy, molecular anthropology (Sommer, 2015), or population biology, or — lately — 'Genetic History'.

Second, the quote describes an almost timeless basic mode of diversity research: now as then, it is all about the prospective collection of all sorts of data that would later — it is hoped — allow researchers to make groundbreaking discoveries. What Weinberg could not have guessed, though, was the proliferation of markers that were added to the tool box throughout the 20th century. Body and skull measurements, skin, eye, and hair color were in the focus of research until around the end of the 19th century. In the 20th century, the spectrum of body parts and body performances being researched expanded significantly: without abandoning anthropometric measurements, scientists began to study blood, brains, fingerprints, saliva, urine, earwax, stool samples, intestinal parasites, skin microbes, metabolic rates, physiological performance spectrums, growth rates, sexual maturity, menstruation, and many more details, from the perspective of human variation. In the second half of the 20th century, they also added gene and allele frequencies, proteins, and finally, DNA (Lipphardt, 2015).[10]

10 For the overlap between anthropometric and genetic markers, see LIPPHARDT, 2014.

A third reason for this incompleteness lies in the allegedly great usefulness of diversity research, and the field's ability to integrate with other scientific pursuits. This has been a great promise coming in many variants, however, by far not all of these promises have been fulfilled. To be sure, human variation has been put to many uses in medical, forensic and other contexts, and the number of usage contexts is growing. Numerous body-related fields today, including above all healthcare and police work, use knowledge about diversity in a wide variety of ways. Being able to narrow down a field of suspects based on scientific knowledge is a spectacular achievement in and of itself; today, experts maintain they are also able to determine whether the perpetrator's family is more likely to come from Turkey or Denmark (M'Charek, 2005). In many countries around the world, including the USA and Germany, information on ethnic belonging is routinely collected during medical studies; this data serves as a research tool for posing questions about heredity, reproduction, and the genetic dimensions of illnesses and immunities. As mentioned above, this can lead researchers down new paths: diversity is not only an object of research in and of itself, but also a window to previously unknown objects of knowledge. And medications manufactured specifically for certain ethnicities can open up new markets for the pharmaceutical industry. These applications have drawn numerous critiques, demonstrating how problematic the research itself and its uses are, how often they fall short of meeting the standards required (Koenig; Lee; Richardson, 2008; Wailoo; Nelson; Lee, 2012; Bliss, 2012; Duster, 2006; Brubaker, 2015, p.48-85; Nash, 2015; AG, 2009; Reardon, 2005).

But I would like to return to the question why scientists value variation in a variety of research endeavours. I suggest that, beyond that promising incompleteness, certain aspects of human variation make it an indispensible research tool that has a core relevance in much of the life sciences.

First of all, there is no way to understand evolution without assuming variation. A fundamental principle of the theory of evolution, after all, is that it is based around the concept of variation within a species.

"Race" is an entirely unnecessary word in this theory; it can be easily replaced by words like "variety," "sub-species," "sub-type," or "population." But the concept of inner-species variation is indispensible for the field of evolutionary biology because it is the only point of origin for new species.

Secondly, researching heredity is entirely dependent on variation. Without varieties, one could not even see any hereditary processes at work. Since Mendel's laws were rediscovered, diversity has also had an instrumental importance for experimenting heredity: Mendel completed breeding experiments with two varieties of the same species of plant with different colors of blossoms. However, it is only possible to study genetic cross-breeding phenomena if one is certain one has established two "pure lines" which can then be bred. Since we know we cannot perform breeding experiments with human beings, human geneticists searched for "pure lines" throughout the 20th century — in this case: isolated, endogamous groups — and for interbreeding events between such groups. The "breeding experiment" is, therefore, seen as already completed in the case of supposedly isolated human groups. In short, by looking through the window of diversity, human geneticists hoped to be able to study inter-breeding, inbreeding, and genetic processes in human populations. And vice versa, inbreeding groups were the window they used to understand human evolution, differences and diseases.

Thirdly, and importantly, human genetic variation is seen as stabile over the generations, and as being free from social, cultural or political influences, unlike language or behavior. It is seen as rooted in DNA, spelled out in the base sequence, in a relatively stabile way, and archived on the chromosomes. Those processes of mutation and recombination that do actually bring about changes in the DNA sequence, are not seen as a hurdle, but, quite to the contrary, as a wonderful resource for studying human evolution. Epigenetics has apparently nothing to do with it, since epigenetic processes modify certain structures on the DNA, but not the DNA sequence itself. Likewise, whereas CrispR-Cas9 seems to make it possible to insert a mutation in one of the genes for eye color and hence determine the eye color of an embryo, no technological

sophistication will allow an individual to change the marks of geographical ancestry in the DNA of his or her germ cells. In short, from the perspective of the life sciences, genetic variation is not subject to intentional manipulation, but is instead seen as natural and stabile, and hence accessible to 'objective' research designs. The nature of the body is thought to provide unambiguous information about the biological essence of humanity.

One might ask whether other difference markers, such as age or sex, do not attract the same sort of attention as that portion of human genetic variation that has come to be called 'race'. All of them are, in the understanding of most life scientists, grounded in biological processes and would hence qualify for variables a life scientist can work with. Here, one could turn the gaze onto what work these differences do for the researcher when he or she enrolls them into the research procedure. Some of these differences suggest themselves as control variables: Researching any aspect of human life, be it a disease, a behaviour, an anatomical structure, a physiological process or any other trait, a researcher can check its object of curiosity for sex differences; for age differences; or for differences between ethnic groups. Any noted difference could become very meaningful for the following research steps. Hence these checks can produce noteworthy differences in response and thus can provide a new starting point for further inquiries.

In this game of differences, I suggest that 'human genetic variation' that seems to correlate with ethnic groups does some very specific work for the researcher. It is specific in its being stabile over a life time. Aging is, of course, an inescapable biological process, but individuals are not permanently assigned to a certain age for their entire lives. With regard to sex, the tendency of the life sciences to ascribe sex as inescapable or inherent, and hence stabile over a life time, is similar to the way they speak of 'human genetic variation' in the sense of ethnic variation. However, this attribution is binary, whereas 'human genetic variation' in the sense of ethnic variation entails more categories, hence more possibilities to contrasts; it purports to allow a more flexible, purpose-driven manner of assigning classifications. This means that a very fine

classifying grid can be applied to diversity studies on the micro-level, whose application on a global level would imply many hundreds or even thousands of categories — these, however, can be masked on a micro-level. On a macro- or even global level, where such a large number of categories would exceed the framework of the possible from a research and technical standpoint, a small, manageable number of categories can be selected. Here, it frequently happens that global categories are similar to those used in early classifications of the races, or on common sense racial classifications.

Therefore, while a focus on "sex" can only determine differences between two groups, the window of "diversity" can be used to establish biological differences between very different groups and groups of different sizes, such as between the residents of different continents, islands, mountain villages, or socially isolated populations. It also helps to find more meaningful differences for a huge range of human traits, as any difference between ethnic groups could hint to a part of human evolution. What emerges from these difference games in the field of 'human genetic variation' is an enormously productive research paradigm. Furthermore, in the last two decades, the analyses of mtDNA and Y-chromosomes have been employed by researchers to make arguments about differential migration patterns of males and females: combining two systems of bodily differences enforces the resolution power of such investigations, the scientists involved maintain.[11]

Finally, there is another reason diversity is thought to be well-suited for revealing information on the essence of humanity. Biodiversity, so highly valued today, seems to tell its own story; that is, life scientists study biological diversity to understand how it came to be. The casual way geneticists read evolutionary mechanisms into the histories of certain people groups is striking: selection, migration, cross-breeding, isolation — these terms, which are normally applied to populations of animals, plants, or bacteria, rewrite stories of military conflict, genocide, population displacement, slavery, and sexual violence, as well as

11 For a critical discussion, SOMMER, 2016.

of peaceful coexistence, intercultural understanding, and social change. They rewrite in the reduced idiom of biological processes, and hence contribute to an unparalleled reification of human history.

Research on human genetic variation, as this last point makes especially clear, is a way to essentialize particular notions of group histories. It must therefore not only be considered in a critical light due to its potential ideological slant or problematic ethical implication, but must also be taken seriously as an epistemological undertaking and criticized as such.

A case study: genetic studies on Roma

To substantiate some of my arguments about the productivity of human genetic variation in biomedical research, this subchapter will briefly outline a research history hitherto neglected.[12] It aims to demonstrate how this historical case study helps us to understand genetic difference as a source of fascination for scientists, and the blood or DNA samples taken from 'Gypsies' — or 'Roma' — as substrates for differentiation.

In the early 20th century, 'Gypsies' were believed to belong to a large transnationally migrating group that, in the eyes of the police and numerous researchers in a variety of European countries, was coherent by its nomadic life style (Surdu, 2016). Earliest ethnological and linguistic work had determined their place of origin as of India, and much empirical work had followed on that track; the time line of their migration route through the Balkans to Europe was debated to some extent. The wide spread notion of 'Gypsies' as an ethnic group, or, in the language of the day, a 'race', entailed an understanding of their being socially and biologically isolated in Europe, on their staying separate and exotic. In contrast to the Jews, who were also considered an isolated transnational group without a homeland, residing in Europe, the history 'Gypsies' seemed less well documented. Yet on the side of academia, the eagerness to subject

12 This case study is part of a research project I conduct together with Dr. Mihai Surdu at the University College Freiburg. This subchapter outlines first and preliminary results.

them to all kinds of research, including anthropometric and genealogical work for forensic and eugenic purposes, was a growing one.[13]

In 1921, the 'Gypsies' were made an object of inquiry by the methods of seroanthropology (Verzár; Weszeczky, 1921). This new research strand had just emerged from the seminal work by the Hirszfelds, published in the Lancet in 1919 (Hirszfeld; Hirszfeld, 1919). The Hirszfelds had taken blood samples from war prisoners from all over Europe, and even beyond, and mapped the frequencies of the respective blood groups onto ethnic groups and countries in order to see distribution patterns (Spörri, 2014). This method was soon deemed more reliable than anthropometric methods, at least by those who claimed to be in accordance with state-of-the-art genetics. Yet only after 1945, when distancing from old-fashioned race science became a sine-qua-non condition for building a career on researching human genetic variation, the population genetics approach towards human genetic variation succeeded quickly and became the new authority on questions regarding 'race'.

Until after 1945, the 'Gypsies' were researched by anthropometric methods, and with clearly eugenic and eliminatory agenda in the case of NS Germany (Margalit, 2007). However, population genetic studies on 'Gypsies', using blood groups and other monogenetic markers, were continued throughout the 20th century, and replaced seamlessly by DNA analysis studies at the end of the millennium. No historical study has touched upon this strand of research, and thus, for researchers in the life sciences today, it seems to be completely innocent and politically untainted by racist agendas.

From 1921 until today, some 220 publications have addressed 'Gypsies' as an object of population genetics, medical genetics or forensic genetics. Circa 150 of these studies appeared after 1990. In most, but by far not in all studies, the group label 'Gypsies' is today being synonymously replaced by 'Roma', despite the incongruency between these two groups. Over the second half of the 20th century, most studies were conducted

13 For a detailed account of administrative, scientific and police practises to count and control 'Gypsies', or 'Roma', see SURDU, 2016.

by medical researchers in Eastern European communist countries; in Spain, a second hotspot of studies emerged, but later and less productive than the Eastern European counterpart. Only recently, Spain took the lead in publications on Roma/Gypsies. Yet with regard to population genetics, with the advent of DNA analysis in the late 1990s, researchers teamed up and began to exchange data in order to understand larger migration patterns all over Europe.

Some of these studies start from a collection of data from clinical patients in special units for monogenetic diseases; others start from DNA that was taken from inhabitants of some neighboring villages. Both approaches can lead to publications about the history of Roma in Europe, supposedly stretching a millennium. Again others look into genetic factors for disease susceptibilities, with regard to both infections and common diseases such as diabetes. A small, but well distinguishable set of papers is dedicated to forensic genetics with a focus on Roma.

To identify an individual as 'Roma' or 'Gypsies', various identification strategies were and are being used in these studies. From an ethical viewpoint of today, self-identified ancestry should be the only acceptable way of adding an individual DNA sample to the 'Roma' population sample. However, self-identification is no straight forward communication practice; particularly not if researchers, state administrations and health systems suppose from the outset that some of the targeted group members will not answer truthfully (Surdu, 2016).

To make sure that ancestry is covered sufficiently well, human population geneticists additionally rely — at least in theory — on the 'Four-grandparents-method': In order to be included, a proband needs to confirm that all four grandparents were of the same ancestry, or had not intermarried with an outsider, or had spoken the same language or adhered to the same culture, and so forth. In practice, however, this proves to be a condition quite hard to fulfill: Not all grandparents are known, alive, willing or able to give information. Languages and culture are no clear-cut markers, and biological fathers are not always known either. Compromises need to me made, which may lead to inconsistent sampling. Although the four-grandparents-method of accounting for

common ancestry is meant to work particularly well in isolated, supposedly 'endogamous' populations, the complexities of family relationships that is often maintained in social studies and policy papers on 'Roma' is hardly discussed as a problem for sampling in genetic studies.

Even though there is much exchange of data between research teams, and a common building up of a large amount of interconnected data sets all over East Europe and the Iberian peninsula, the sampling of 'Roma DNA' cannot be considered a simple task, and as it seems, it can neither ever come to end. To the contrary, although new studies repeatedly draw on already accumulated data provided by other teams in the last decades, they also add newly acquired samples in order to gain new insights.

Moreover, the bio-markers these studies use and the way they use them can be interpreted as that above-mentioned oscillation between epistemic objects and instrumental objects. Mutations that cause rare monogenetic diseases (and biomedical markers for certain more prevalent health risks) come to be used as markers in population genetic studies of 'Roma' migration routes. Vice versa, population genetic studies of 'Roma' delineate and describe groups at risk and may be used by physicians for targeting individuals for preventive measures. Medical and population genetics studies on 'Roma' mutually reference each other, explaining that the respective other research strand is one of the main reasons for pursuing that research. The added value for 'Roma', in the form of enhanced health services, is being emphasized in many studies, but it does not always become clear what that added value entails, beyond being suggested as an object for more research.

Without doubt, numerous valuable contributions to the health services provided to 'Roma' communities in various countries could emerge from these projects. It is, however, also possible that they could yield numerous less positive outcomes for those who are grouped under the label 'Roma'. For example, in many countries, 'Roma' are considered to be involved in criminal offenses more often than others, hence fall suspect and undergo screenings more often than others. DNA samples from these individuals end up in forensic databases in much higher

proportions than their share of the overall population. This also leads to a much higher resolution of genetic data on this one societal subgroup, with many unforeseeable negative consequences for those who have been sampled despite of their innocence. Furthermore, while press releases from the labs of medical geneticists praise the chances to learn from this small and peculiar 'genetic isolate' for the health of people all over the globe, one might question whether there will be fair returns for those who gave DNA samples. Moreover, as some genetic studies (wrongly!) suggest it were so easy to distinguish 'Roma' from 'Non-Roma', politicians who are invested in racial purity of their countries may wish to employ this method for their purposes. So far, not enough (and not enough substantial) protest has been ushered by geneticists against the scientific validity of such an exclusionary practise.

Most significantly, however, newspapers report on population genetic studies that frame 'Roma' and 'Gypsies' as an ethnic group, as exotic, isolated by their own voluntary segregatory rules, as 'not of Europe' and not adapted in any sense of the word. The reader takes away a message that confirms what many hold to be the truth about 'Roma' anyway: nomadic, uneducated, foreign — yet a very good resource for European science and medicine. There is no single word on all those Europeans whose 'Gypsy' ancestors have settled in European countries during the last centuries and decades, whose families have adapted well without giving up on their sense of 'Roma' culture. With every re-telling of the 'Roma' as a genetic isolate, the successful integrations become erased, and those Europeans become exoticized and excluded from the history of Europe and its member states.

Conclusionary remarks on various forms of curiosity

Today there are large numbers of people — not only in the life sciences, but also among a broader public — who are interested in the biological diversity of humanity. There is also considerable interest in genetic studies on ethnicity and human evolution, and also in research that stabilizes

notions of difference. Certainly there are some whose interest is based on racist convictions, but it would be grossly misleading to ascribe such motives to all of them. Not every reader of the newspaper reports on genetic studies of 'Roma' brings an exclusionary impetus to this literature, but might rather find the exotic and unusual history of 'Roma' exciting and inspiring. Interest in genetic history of all kinds of groups has grown considerably, and a positive notion of the most peculiar groups, sometimes even a certain sympathy with their vexed historical fate, just adds to that interest. Should we condemn all sorts of curiosity that take an essentialist notion of a vulnerable group as its starting point?

I would like to suggest an answer in a hopeful and optimistic mode.[14] Curiosity is not always a sign of a discriminatory attitude, or of the will to stigmatize. Bodies perceived as looking different than 'one's own' awaken curiosity about the history of the other, and about the history of his or her ancestors. Where does that person over there come from? Where does his or her family come from? How did he, or she, get here? What has he or she experienced, and what is he or she doing here?

Despite the unavoidable lurking of stereotypes and hierarchies in such questions, they can also represent an open-minded and good-natured mode of being curious about the person in front of us. All too often, however, they come with bias and racialisation if not racism instead. But if we assume that the answer that comes to one's mind with greatest ease is an answer that rests on learned practices, on previous ascriptions, and on previously acquired experiences, one can also formulate questions that might help to trouble preconceived notions, for example: Could one also imagine answers to these questions that are completely different from those that lend themselves most easily? Could these ways of answering be reflective in a way that, if completely

14 My suggestion does not explicate how much it owes to longstanding debates about perceptions of otherness in and between scholars from social psychology, cultural anthropology, sociology, and also to my rejection of the perspective of evolutionary biology onto the same topic. Yet again, my argument is seated on a somewhat different level, namely, how one can pragmatically provide methods for reflecting on one's intuitive reactions to perceived otherness, for example, in educative situations.

avoiding stereotypes and hierarchies is impossible, helps to develop an informed awareness and sensitivity of what is at stake in the encounters?

On an educational level, one might ask what sources we can make available to bring people to adopt a routine of non-stigmatizing curiosity? Or, one could go one step back even and ask what sources are actually available today to the individual for answering these questions? The more ethnically homogeneous one's own surroundings are, the less differentiated such prior knowledge usually is, and the more stereotypical one's own fantasies about the origins of other people will be. The answers each individual gives themselves to such questions may also spring from the knowledge they already possess, which they have gained from books, newspapers, from TV, or from other media. In any case, individuals will probably ascribe a rather simplistic history to a person who looks different, and have no chance to explore the alternatives.

In science as in daily life, then, knowledge about human variation often starts from the body, inscribing the body with conceptions of history that appear to admit no alternatives. Advocating a form of curiosity that does not answer these questions with stereotypical images, and practicing an open-ended form of asking and guessing, could be a way out, just like warnings against the self-fulfilling prophecies of essentialist group concepts, and like troubling counter-questions that bring out the fallacies of taken-for-granted notions of marginalized groups.

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