Disposition and determinism – genetic diagnostics in risk society

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Abstract

This article investigates the relationship between genetic determinism and the discourse of risk by making use of an elaboration of the concept of governmentality developed by Michel Foucault. After a short outline of the theoretical profile of the employed risk analysis, the main part of the text distinguishes three core level of analysis. With a view to illustrating several aspects of a 'genetic governmentality' the increasing social impact of genetic information is examined from the angle of truth programs, power strategies and technologies of the self.

The decoding of the human genome makes available an ever growing body of increasingly accurate knowledge on the structure and function of human genetic material and provides more sophisticated genetic testing methods.[1] It is already evident that the application and evaluation of this new information on the genome will have far-reaching effects which go well beyond the original goals of developing forms of medical diagnosis, prevention, and therapy. The availability and use of genome analysis and genetic testing will alter the way individuals experience pregnancy and birth as much as it will change social institutions (such as the health system, the legal and insurance systems) and influence the way we collectively treat disability, illness and death.

However, in contrast to the longstanding scientific interest and the advanced technical work related to human genetic research, the discussions on the possible social consequences and ethical implications of such interest have only just begun. Many critics fear that the real significance of the human genome project is not so much the advancement of biological knowledge or medical therapies, but rather the resurgence of genetic determinism which already in the past served as a heuristic for all kinds of social and individual divergence. Generally speaking, the socio-political impact of genome analysis project is seen 'in the replacement of social solutions by genetic engineering solutions' (Beck, 1988: 43) and in a 'geneticization' of society (Lippman, 1991: 19). Criticism focuses primarily on the 'illusion' (Procter, 1992: 82) that biological, psychological and social differences between individuals can be explained by differences in their DNA, and warns against a 'genetic fatalism'

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(Assheuer, 2000) that replaces the principle of self-determination and autonomy by the fate of the genes and derives individual and collective phenomena from the genotype.

I would like, by contrast, to adopt a somewhat different evaluation. In my view the 'social power of genetic information' (Nelkin, 1992) lies less in the resurrection of genetic determinism and more in the construction of genetic risks. The analytical methods and procedures employed in genetic diagnostics are not so much designed to generate clear causal chains or to reduce all possible information to the genome, but rather seek to highlight probabilities, possibilities and expectations, referring less to a model of determination than to the mode of dispositions. In place of the guarantee of certainty and assurance what can now be observed is a dominance of risk semantics and 'apparatuses of insecurity'. My thesis is that it is this recourse to 'risks' which makes it possible to call for autonomy and self-regulation in bioethical and human genetic discourses. Rather than being viewed in terms of objective fate, genes today are increasingly seen to represent subjective potential: they refer to the supremacy of the consumer, who aims at profitable optimization of individual human capital and personal quality of life.

In the following, I wish to investigate the relationship between genetic determinism and the discourse of dispositions and risks. Prior to this, it is necessary to outline the theoretical profile of the risk analysis employed here; on the one hand, parallels are drawn to the problematics surrounding the theme of governmentality developed by Michel Foucault (1991; see Lemke, 1997) while the differences to realist and relativist concepts of risk are expounded on the other. The main part of this article distinguishes three core levels of analysis, with a view to illustrating several aspects of 'genetic governmentality'[2] by examining the 'geneticization' of society from the angle of truth programs, power strategies and technologies of the self. I shall conclude by examining the Foucauldian account of bio-power in the light of the current practices in human genetics.

1. The government of genetic risks

The 'government of genetic risks' I intend to outline entails two particular theoretical features. First, it differs from the notion of risk society that underlies the work of Ulrich Beck. Although Beck stresses that risks are to a certain extent 'open to social definition and construction' (1992: 23), this refers solely to the appraisal and perception of risks, not to the risks themselves. As a result, in Beck's account risks primarily appear as technical threats which are socially relevant only to the extent that they are linked to a social impact (Beck, 1988; 1992).[3]

Instead of this realist notion of risk I have opted for a nominalist concept: risks do not correspond to or depict natural facts, they are rather instruments and effects of a more complex social-material reality. In this respect, 'genetic risks' are not found but invented; their 'reality index' rests not on their existing as scientific data beyond all social definitions and assessments.[4] Genetic risks are, in other words, not biological-empirical matters of fact, but the result of a 'problematization' (Foucault, 1985: 115).[5] They represent a specific knowledge, a way of thinking about occurrences and are to this extent not arbitrary. On the contrary: predictive genetic tests are part of a broader movement toward management of probabilities and risks – they appear in an existing landscape of social and cultural trends that indicate a switch from a reactive to an active orientation toward uncertainty and are to be observed in a multiplicity of areas of society. Put differently, the nominalist approach allows us to focus rather on technologies of power than on the power of technologies (Pearce and Tombs, 1996; O'Malley, 1996; Ericson and Haggerty, 1997).

Secondly, the concept of risk cannot be reduced to insurance risks. Genetic risks differ from insurance risks by dint of the fact that they obey less a logic of compensation and capitalization and more an imperative of prevention and prevision. Lorna Weir (1996) has rightly pointed out that clinical risks constitute a risk type of their own. While, on the one hand, they require statistic and epidemiological knowledge on the spread of cases in a population, unlike insurance risks they do enable the risk to be diagnosed directly in the body of the individuals. Unlike the system of insurance risks, which does not for example attempt to identify later victims of car crashes and prevent these, genetic risks can be localized, predicted, and (if possible) avoided. Instead of deciphering genetic risks as the expression of instrumental reason, they should be considered as the instrument of a political rationality, which undertakes the recoding of power relationships and entails the individualization and privatization of social risks (see also Ogden, 1995; Kavanagh/Broom, 1998).

In order to operationalize this distinctive concept of genetic risk I propose to distinguish between three analytical dimensions: truth programs, power strategies, and technologies of the self. These all draw on the concept of governmentality which articulates Foucault's working hypothesis of the reciprocal constitution of forms of knowledge, power techniques, and subjectivation processes. Let me explain what I mean by each of them.

2. The construction of a consensus genome and discourses of deficiency

The attempt to link complex behavioral patterns and social phenomena back to a genetic basis has repeatedly been criticized as genetic 'reductionism'.[6] A series of objections have been raised, focusing above all on the 'unscientific' and 'ideological' character of such arguments. The debate has hinged on geneticization as a process which rests on a 'false', 'distorted' or 'one-sided' form of scientific knowledge. Scholars from the humanities and social scientists have contradicted the 'gene myth' (Hubbard/Wald, 1997) and pointed to the significance of social regularities, psychological factors and historical knowledge (Nelkin/Lindee, 1995; Duden, 2002). Indeed, even within the biosciences the 'molecular dogma' has by no means gone undisputed. Above all, insights from the biology of evolution have been presented as an opposing paradigm, but even within genome research itself there are increasing references to the complexity, and multi-causality of genetic activity (Strohman, 1994; Williams, 1997; Keller, 2000; Lewontin, 2000).

This form of critique of genetic reductionism is indispensable. It bears pointing out that human (and non-human) life is more than the sum or interplay of genes and that individual and social phenomena cannot be grasped solely by resorting to explanatory approaches, or possible solutions based on genetic reasoning. At the same time it does not suffice to rebuke molecular genetic research for being one-sided, ill informed, or geared only to specific interests. The purpose cannot be solely to assert its reductionism or to illustrate the complexity of the problems addressed. Rather, the issue is also how this reductionism functions in practical terms and what social consequences it will have beyond all scientific debate. In this respect it is important not only to study whether genetic reductionism is true or false, but also to explain how it produces truth. Theoretical attention must be focused on 'spaces of representation' or 'regimes of signification' (Rheinberger, 1997 resp. Kay, 2000: 18) that organize an epistemo-political field of the visible and the expressible, which controls the diverse forms of signification, and defines the conditions for truth and falsehood. What is involved is a representation of reality which guides practical interventions and structures the terrain for possible action. In other words, instead of juxtaposing reality and reductionism, we should study the reality of reductionism as a 'truth program'. I shall concentrate in this regard only on two elements which I shall now briefly present, namely the construction of a consensus genome and the discourse on deficiency.

If each deviation from the norm can be attributed to genetic causes, what then is the norm? What serves within genomics as the genetic norm, when we likewise know that the actual genomes of two randomly chosen individuals differ in terms of at least three million base pairs? In view of this constitutive 'deviation', the genome project is aimed at nothing less than the *construction of a consensus genome* (Flower and Heath, 1993: 28, see also Lloyd, 1998), ie a uniform genetic standard which can be derived from the DNA sequences of various individuals without therefore being identical with the DNA of a single natural person. 'The human being' in the human genome project is, in other words, a canonical sequence compiled from many individuals (Schmidtke, 1997: 153). This certainly does not mean that in the case of this artificial human we are dealing with was a 'democratic' representation of individuals or a general statistical median of the population. Instead, the human in the 'human genome' is a very special person 'who will possess both an x and a y chromosome. It will therefore be a man. This 'he' will be an average collection in terms of his chromosomes, of sequences (ie the chemical structures found in his genome) which occur in men and women of different nations, the United States, Europe, and Japan. In other words, he will be an average male from the industrialized nations, who together are internationally researching the genome' (Feyerabend, 1997: 38).

When constructing this norm genome, the object is not to ensure that idea and reality concur, for reality itself becomes an ideal that must be permanently perfected. Genetic research corresponds to a *discourse of deficiency* (Gottweis, 1997: 65) which analyzes life by means of concepts such as 'absences', 'faults' and 'defects': bacteria, animals, plants, and humans require supplementation, assistance, and correction by means of genetic interventions, and in this respect the code always provides incomplete information in need of improvement. For this reason, the advances in deciphering the genome engender an ever growing number of genetic risks, susceptibilities and dispositions of illness.[7] We can also observe that not only is the concept of genetic disease extended from 'mono-genetic' (eg, Huntington) through more complex diseases (eg, cancer, Alzheimer); indeed, we are seeing a radical break with the old concept of disease and its transformation. Edward Yoxen has shown that over the last decades the meaning of this concept has shifted, with a re-definition occurring that has led to diseases increasingly being identified as deviations from the genetic norm. The emergence and expansion of the notion of 'genetic diseases' prepared the ground for the growing social and medical significance of molecular genetics (Yoxen, 1984; Koch, 1993; Kerr, 2000; Temple *et al*., 2001). The concept of genetic disease has now turned into 'an extremely large category, encompassing not only genetic disorders that are thought of as diseases but also genetic abnormalities associated with no known disorder as well as disorders that may be neither genetic nor diseases' (Keller, 1992: 292, and 291–3; Smith, 2001; Lemke, 2003). A productive circle has been established which derived illnesses from genetic anomalies and attributes illnesses to genetic anomalies, which construes illnesses as risk and risks as illnesses. In this perspective, disease does no longer refer to an exceptional or limited state but becomes a normal handicap and a constitutive deficit: No body is perfect (Rabinov, 1996).

However, it does not suffice to decipher genetic reductionism as a truth program. Moreover, it is important to address the problem of the 'tactical polyvalence' (Foucault, 1979: 100) of knowledge on molecular genetics. In principle any number of goals can be pursued by recourse to the genes and there is thus no unambiguous political program to be derived from it.[8] Molecular genetics may provide the basis for traditional forms of racist and sexist discrimination, but also of new rights (eg for animals) and it may even contribute to call into question the patriarchic/anthropocentric perspective itself (Haraway, 1991). Put differently: the question arises of how this truth program functions in the framework of power strategies and political rationalities.

3. Spaces of visibility, promises of certainty and regimes of (in)equality

The emergence and popularization of the genetic paradigm is not at all the necessary consequence of scientific and technological progress. The massive financial support and public acceptance of human genetic research in western liberal societies are part of a comprehensive transformation that is increasingly individualizing and privatizing the responsibility for social risks. Since the 1970s, the security systems offered by the welfare state are being supplemented and replaced by mechanisms of uncertainty and 'strategies of precarisation' (Bourdieu, 1998: 99). The individual is expected to show explicit willingness to take risks and to conduct a forward-oriented risk management. In the domain of health care, the retreat of the state goes hand in hand with an appeal to personal responsibility and self-care, as well as the establishment of self-regulatory competencies among individual and collective subjects (Knowles, 1977; for a critical account see Crawford, 1977; Bell, 1996; Minkler, 1999).

In this changed social context, genetic explanations for individual behaviour and personal health acquire a greater significance. Genome analysis and genetic diagnostics not only provide a specific form of representation for individual and society, they also articulate a controlling knowledge which simultaneously accesses a whole terrain for action and intervention. In this way, the 'geneticization' of society can be construed as a power strategy which couples a knowledge of molecular genetics with forms of social regulation and individual self-control.

In the framework of this 'government of risks' genetic diagnosis might be important both in political and economic respect. Prediction and prevention together with individual self-management could replace the dangers of explicit state prescriptions and proscriptions. Genetic diagnostics presumably avoids general and anonymous control mechanisms and creates the possibility of compiling individual risk profiles with a concrete list of susceptibilities and dispositions to disease.[9] At the same time the use of genetic information helps to transform human existence into some kind of 'risk capital', open to the logic of investment and the imaginary of possible losses and desired profits. While the body is on the one hand conceived as a disposable resource and exploitable material, it is also the source of a new and richer identity and the object of interventions that aim at improving the value of life by diminishing diseases or optimizing performances. By localizing and identifying genetic risks it is possible to construct an 'ideal' style of life for each and every individual – and in this way genetic diagnostics provides a political technology defined by specific constellations of visibility/invisibility, certainty/uncertainty and equality/inequality.

First, genetic diagnostics is located in the tradition of enlightenment insofar as it creates *spaces of visibility*. It inaugurates a new, prognostic view which not only offers information on the future health status of individual persons, but in addition makes available a new, trans-generational transparency of the body, which may affect the individual tested and/or his/her descendants depending on the type of inheritance and illness concerned (Uhlemann, 1999: 4; Scholz, 1995: 40–1). Admittedly, in order to see we depend on visual aids. There is no visibility without (enlightenment) experts who explain to us what there is to see. Predictive genetic tests will show us that, although we are ostensibly healthy now, we probably will become ill in the future and are therefore in fact already ill. Unlike the 'invisible' social and economic risks, genetic risks can be verified by testing devices. However, genetic diagnostics contributes to ensuring the social and economic risks remain 'in the dark', by re-coding these as biological risks and presenting them as a matter for the individual. Thus, the recourse to the molecular text blots out the social context.

The translation of social into genetic risks not only sheds light on individual risk profiles, it might also allow this visibility to become profitable in both political and economic terms. One example for this strategy is the use of genetic testing in the workplace. Instead of simply forbidding potentially harmful products or putting pressure on enterprises to change hazardous production procedures (eg those known to cause cancer), it might prove more 'economic' or politically suitable to develop and use expensive genetic tests for the diagnosis of these diseases inside the human body. In this respect, genetic governmentality favors more a reactive than a preventive strategy: While the change of the conditions that cause illnesses might be more appropriate, scientific research and social interest concentrate on the 'genes for diseases'. Thus, the hope of a 'victory' on cancer, Alzheimer etc. coincides with the prospective knowledge of their molecular structures and the promise of a 'genetic medicine' (Hubbard/Wald, 1997: 90–2; Draper, 1991; Childs, 1999).

It is worth noting that already in the present the genetic diagnostic procedures have contributed to producing a new category of individual, people who in the framework of genetic examinations and tests have been diagnosed as running the risk of certain illnesses which they may or may not possibly contract in the future: they are known as 'asymptomatic ill' or 'the healthy sick' (Nelkin, 1992; Scholz, 1995: 48). As surveys in the United States and other countries have shown, these 'risk individuals' are confronted with real forms of genetic discrimination in the present. For example, married couples are prohibited from adopting children if one of them has the disposition for a genetic disease. In other cases, the 'handicap' can manifest itself simply in the form of qualifications for a certain job ceasing to apply in the case of genetic risk and the person thus being dismissed. It also happens that health or life insurance companies terminate contracts or refuse to conclude them if their (potential) clients have been shown by genetic tests to have the disposition to contract an illness (Billings *et al.*, 1992; Low *et al.*, 1998; Thébaud Mondy, 1999; Geller *et al.*, 2002).

Second, genetic tests constitute a specific *promise of certainty*: they appear to be objective and convey an impression of accuracy and of lack of arbitrariness. Genetic diagnostics promises control over what was hitherto uncontrollable and seems to offer certainty in planning and unequivocality in an age of general uncertainty. For example, in the legal domain 'genetic fingerprints' are now considered an especially accurate form of proof. Ever more frequently, courts base their decisions on insights offered by human genetics. Not only in criminal law, but also in claims for damages, in inheritance and family law, people are resorting to genetic diagnostic instruments and examinations of human genetics, while expert opinions in other areas of science (above all of a psychological or psychiatric nature) are more and more losing their validity and are being downgraded (Nelkin and Tancredi, 1994: 133–58; Hubbard and Wald, 1997: 145–57; Cole, 2001: 287–311; Petrila, 2001).

The promise of certainty is in turn based on the uncertainty which genetic diagnostics has strongly helped to create. It is the linking of genomic knowledge with risk forecasts, the redefinition and delimitation of disease, and the evaluation of genetic variabilities which enables to visualize and diagnose genetic risks. Moreover, prognostic certainty cannot necessarily be translated into greater personal freedom of choice. Under contemporary social conditions and a political climate that favors further reductions in collective security systems the possibility that in the future individuals will fall ill with an incurable sickness or give birth to a handicapped child spawns new fears and biographical uncertainty. The knowledge of genetic risks itself engenders risks: it generates ethical, social, and psychological risks which would not exist without such knowledge (Lupton, 1993; Rapp, 1995; Hallowell, 1999).

Third, genetic diagnostics establishes a specific *regime of equality*. It not only represents social and biological risks in like manner as genetically caused, but also affirms that all these risks are in principle similar. Rich and poor, black and white, young and old – they are all subjected to the dictate of the genes. In this view, our social position has less to do with power strategies or exploitation structures and more with biological differences. The recourse to the power of the genes renders the question of social power relationships irrelevant. Yet even if all people are fundamentally exposed to the same genetic risks, they are all empirically unequal: apart from identical twins there are no two identical genomes. Genetic diagnostics thus couples the hypothesis of our fundamental equality as regards risks with proof of the actual inequality of individuals, thus suggesting a natural basis for inequality. Collective uncertainty as regards individual risks is replaced by recognizable inequality, which is transformed from a social problem into a natural fact, indeed a fact which at the very latest becomes socially relevant when deviations from the norm are detected in an individual's genetic profile and this triggers preventative measures and discrimination mechanisms.

Genetic governmentality transforms different opportunities in life into variations of the same DNA and paves the way for a biomedical view of the world in which differences as regards material and immaterial resources such as education, income, and working and living conditions fade into the background. It implements a revolutionary program which is no longer geared to the transformation of the social conditions of inequality responsible for social and personal suffering but instead ensures the dynamic 'adaptation' and profitable 'optimization' of individuals to these conditions. The vision of social progress is replaced by a therapeutic regime of self-improvement which rests on specific forms of subjectification.

4. Risk individuals and rational subjects

It does not suffice to analyze 'geneticization' in terms of truth programs and power strategies – it also depends on the development of 'technologies of the self' (Foucault, 1988). What is relevant is not only the question how genetic information is generated and produced, how it is circulated and used, but also how it is appropriated and 'consumed': What consequences do genome analysis and genetic diagnostics have for the personal and social identity of subjects and the way they lead their lives? How does the genetic code inscribe itself as bio-graphics in the life of subjects?

Indeed, the government of genetic risks does not abolish the bourgeois individual, but it seeks to produce, if seemingly paradoxically, a new form of autonomous subjectivity. He or she is conceived not as a passive recipient of medical advice, but as an active seeker of information and consumer of genetic testing devices and health care services (Petersen/Bunton, 2002).The social significance of genome analysis and genetic diagnostics lies less in that they offer a factual deterministic relationship and more in that they generate a 'reflexive' relationship between individual risk profile and social requirements. The reference to personal responsibility and self-determination in the biosciences only makes sense if the individual is more than a victim or prisoner of her or his genetic material. If there is indeed a direct relationship between genotype and phenotype in the sense of genetic determinism, then it would be far harder to uphold the appeal to individual autonomy. By contrast, the construction of individuals, couples, pregnancies 'at risk' makes it easier to moralize on deviant behavior and to assign guilt and responsibility (Douglas, 1990). The construction of risk spaces enables therapies and forms of prevention to come to bear in a non-medical and a supra-individual sense and raise predictive genetic diagnostics to the status of a social medicine (Rose, 2001).

My assumption is that the concept of information is crucial in this context. In the molecular genetic perspective, information at the same time serves as the 'code of life' and as the 'key to freedom'. If the body is nothing other than a genetic program, then disease points to a communication problem. However, this means that the emergence of an illness indicates a functional disturbance which can in principle be avoided to the extent that sufficient information and risk management is undertaken and the life style led adequate. Genetic enlightenment (as the deciphering of the 'dark' code) therefore also entails a precise notion of 'Mündigkeit' (maturity), which is linked to possessing adequate medical information and to the knowledge of one's own code. What we observe today is not the reduction of individual responsibility by reference to genetic dispositions and inborn traits. The affirmation of genetic factors does not result in a position that negates or forecloses the responsibility of the subject; quite on the contrary, we can observe the contours of a new discourse on 'genetic responsibility' (Hallowell, 1999; Novas and Rose, 2000: 21–7). The new genetic knowledge is the central point of reference to expand moral duties, it engenders new modes and fields of responsible action.

Here, more is involved than the constitution of a 'rational' health-aware citizen; the autonomy of the morally responsible subject should be brought into line with the freedom of the autonomous market participant. Health is a type of knowledge, but this knowledge has a price tag. Health becomes a commodity, objectified, measured and evaluated in cost/benefit analyses like any other commodity. Being mature thus means assessing supply and demand, and selecting the suitable item for yourself or deciding how much health you can buy for what price. The old authority of the welfare state, which attempted to compensate for health risks, is replaced by the mature patient as active demander and sovereign consumer. In this way, rationing of medical services can even be presented as rationalization: the 'client as king' always knows best which medical services can be 'dispensed with' – without state parochialism, taking the cue only from the laws of market (Bertrand *et al.*, 1995: 141–7).

While advances in genomic research and genetic testing may contribute to the individualization and privatization of health risks, they also give rise to new forms of social identity and political activism. Self help movements and support groups have actively lobbied for research to map genes and find treatments, discovering cures for particular genetic disorders. As more and more people identify themselves as being 'at risk' of a genetic disease, we find collective experiences of 'biosociality' (Rabinow, 1996) and the appearance of 'new genetic citizens' that participate in political struggles to eliminate discrimination and stigmatization and to promote recognition of (genetic) difference (Petersen/Bunton, 2002: 180–207; Rabeharisoa/Callon, 1999; Lemke, 2004). Indeed, by referring to the notion of genetic governmentality I do not intend to suggest that subjects just 'incorporate' or 'adapt' to the proposed genetic (risk) information. Rather than analysing the actual impact of genetic diagnosis, I am concentrating in this paper on more or less coherent programs, strategies and technologies. The use of genetic diagnosis in institutional settings as well as in everyday life is still a very contested terrain; in fact it is not at all clear that provision of genetic information about individual risk profiles or susceptibilities will result in changing health related behaviour and what direction this change will take (see Davison, 1996; Marteau/Lerman, 2001).

5. Bio-power and the molecular politics of genetic risks

Let me summarize the main points of the argument before I conclude with some remarks regarding the concept of bio-power. An account of genetic diagnosis and genome analysis in terms of truth programs, power strategies and technologies of the self provides useful insights that might inform political critique and scientific inquiry in several respects. It shifts the focus of analysis away from the preoccupation with problems of reduction, reproduction and repression, allowing for a better understanding of the relationship between changing forms of knowledge, power and subjectivities.

(1) It is not sufficient to blame the 'falseness' of the theoretical presumptions of molecular genetics by juxtaposing them to 'reality', ie the natural laws of biochemistry. Indeed, such an approach must itself prove reductionist insofar as it does not take into account the effects of this reductionist programme, since it ignores how this 'ideology' can seize hold of reality. Instead of exposing the phantasmic substance or the reductionist character of molecular genetics (although this is an important and necessary task), we should conceive of the genetic paradigm as a 'truth program' which enables a specific representation of individual and society, nature and technology. Regarding DNA as a program of the organism from which all possible characteristics and features can then be read must itself be analyzed as a program, as a machinery for producing truth (cf. Kay, 2000; Van Dijk, 1998).

(2) The representations of nature, society and the individual provided by this truth program help to form new social relations and alter existing ones. Thus, we are confronted with the question: What social consequences does the 'geneticization of society' have, even if genome analysis and genetic diagnostics cannot redeem the high expectations we have of them? At this level, the object is to analyze the coupling of a scientific-technological and a socio-political development – both are not independent variables and yet cannot be reduced to each other. The notion of power strategy allows us to construe the relationship between technology and society other than in narrow terms of cause and effect. Instead of pointing to the inherent social and political implications (Nelkin/Tancredi, 1994: xxiii) of genetic diagnostics or assuming that social solutions are simply replaced with those generated by genetic technology (Beck, 1988: 43), it would be more precise to investigate a power strategy that aims less at abolishing the social than at re-coding it, as a space where the instruments of genetic diagnostics and genome analysis could both have an important role.

(3) A fundamental aspect of this social transformation is that it entails the increasing individualization and privatization of risks. The success of this strategy assumes a change in the technologies of the self, aiming at 'responsible' subjects with 'due foresight' who (wish to) use genetic

> diagnostics. Predictive medicine might contribute then to constituting a 'homo geneticus' (Gaudillière, 1995: 35) who submits to practices of self-control and personal management of the body – which comprises an embodiment of risk technologies that goes well beyond processes of exclusion or mechanisms of repression. Eugenic programs decreed by the state which make use primarily of repressive means and are geared to achieving 'racial hygiene', are replaced by the government of genetic risks geared to optimization of human capital in the name of self-determination, personal preventative provisions, and freedom of choice. While this 'genetic responsibility' individualizes and establishes a new body politic, which calls on us to be as economic as possible with our own body, health or 'quality of life', it is also possible to discern new forms of social identity and political participation. Genetic support groups and individuals that are at risk for genetic diseases claim civil and human rights, call for respect for difference and demand resources for biomedical research.

What follows from this theoretical perspective for the understanding of contemporary bio-power? Foucault understood the term to 'designate what brought life and its mechanisms into the realm of explicit calculations and made knowledge-power an agent of transformation of human life' (Foucault, 1979: 143). He distinguished historically and analytically between two dimensions of this 'power to life', namely between the disciplining of the individual body, on the one hand, and the social regulation of the body of the population, on the other. While anatomo-politics focuses on the production of 'normal' individuals, the bio-politics of the population is geared to a 'technology which is aimed not at individual disciplinary training, but at something like homeostasis through something like a global balance, ie at the security of the whole against its inner dangers' (Foucault, 1997: 222).

This perspective of bio-power probably needs to be supplemented and corrected (see also Haraway, 1991; Rabinow, 1996). Philosophers and social scientists claim that individual disciplining and social regulation are today recoded in a 'post-disciplinary' and 'post-social' rationality (Deleuze, 1990; Rose, 1996). Here, dangers are essentially replaced by the recourse to risks, and the link between 'apparatuses of security' (Foucault, 1991: 102) and a reference to the body of the population is increasingly severed as it comes to be replaced by the management of uncertainty of (individual and collective) subjects. The focus of the new bio-power might be more on preventive guidance of 'risk factors' than on direct therapeutic or disciplinary interventions on individuals and populations (Castel, 1991).

In the framework of this social transformation, genome analysis and genetic diagnostics could play an important role. They create a new level of intervention in addition to the traditional poles of bio-power – individual disciplining and social regulation – establishing a control matrix with different forms of visibility and new types of intervention (see Flower/Heath, 1993;

Rabinow, 1996; Gottweis, 1997). Genetic diagnostics allows for a 'sub-cellular panoptism' and a surveillance regime which is aimed neither at individuals nor at the population, but covers 'dividuals' (Deleuze) as risk carriers. These are classified by genetic characteristics and selected or aggregated to form genetic pools and risk populations. Alongside anatomo-politics and bio-politics we thus have a 'molecular politics of (genetic) risk'. This is a politics that goes beyond disciplining or discrimination, aiming at design: instead of resocializing individuals or excluding collectives, the future focus might concentrate by means of genome analysis on the deliberate configuration of 'healthy' human existence.

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Notes

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2 The notion 'genetic governmentality' was first introduced by Michel J. Flower and Deborah Heath (1993: 31), but they did not use it as a conceptual tool as proposed in this paper.

3 For a more comprehensive analysis see Dean, 1998; Lupton, 1999: 58–83; for a critical examination of theories of reflexive modernity with respect to the new human genetics see Kerr/Cunningham-Burley, 2000.

4 Likewise, they are not the result of ideological strategies which can be/are instrumentalized by 'interest groups' for their own ends. Elisabeth Beck-Gernsheim focuses in her study of the social construction of genetic risks on the example of prenatal diagnostics in particular on the rhetorical means brought to bear by representatives of science, medicine, politics, and the business world in order to promote the application of genome analysis. Now, while it is important to explore the contours of the rhetoric of acceptance, threats, and salvation and the interests articulated therein, the analysis of the construction of genetic risks cannot be reduced to this approach of ideology critique (see Beck-Gernsheim, 1996).

5 Thomas Osborne distinguishes problematisations from constructivist approaches: 'Problematisations are not modes of constructing problems but active ways of positing and experiencing them' (1997: 174; cf. Kay, 2000: xvii–xix).

6 In the following paragraphs I make use of material already published elsewhere (see Lemke, 2000).

7 The number of medical articles that deal with the term 'genetic risk(s)' in the title/or abstract of the MEDLINE database increased rapidly from the end of the 1960s to the beginning of the new millennium. While only four articles are listed for the period from 1967 to 1971, ten years later 67 'genetic risk' articles were published (1977–1981); another ten years later the count is 211 (1987–1991), while it goes up to 1082 for the period from 1997 to 2001.

8 The same is true for the history of eugenics. Eugenic goals were pursued by socialists, conservatives, liberals, fascists and feminists (Kevles, 1985).

[9] See eg Collins, 1999: 34–5 for an illustration. For a popular description see the internet publication 'Your Genes, Your Choices' by the *American Association for the Advancement of Science* that emphasizes the importance of 'genetic literacy' (http://www.ornl.gov/TechResources/Human_Genome/publicat/genechoice/contents.html, 3rd July 2003).

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