Journal article

Somatographic Investigations Across Levels of Complexity

Stefan Beck Jörg Niewöhner*

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Abstract: The methods and theoretical repertoire of the biomedical sciences are undergoing rapid change fuelled, first and foremost, by advances in genomics and molecular biology. At the same time, social and environmental phenomena are being incorporated in new ways into medical frames of reference affecting professional practice as well as regimes of prevention and health promotion. In turn, these developments impact upon the social sciences and humanities concerned with new forms of dynamic corporealities in social and medical practice. This article outlines in a programmatic fashion three sets of issues that are likely to acquire significant relevance in this context: (1) looping effects will emerge along different pathways between medical diagnosis, selfhood, social practice and the body itself. The investigation of these dynamic interactions has so far received little attention in the social sciences and will require the development of a different methodological approach to do justice to different kinds of data and long-term effects. (2) Advances in the understanding of epigenetic regulation have begun to fundamentally change notions of inheritance and development and to differentiate the central dogma of genetics (DNA makes RNA makes Protein), with significant implications for notions of interand intra-generational responsibility and biographical time regimes. (3) The incorporation of 'things social' into medical domains is being taken to a new level of significance, fuelled by a number of fundamental shifts in medical reasoning and practice. The social sciences' current focus on (epi)genetics can only be a starting point for a broader interdisciplinary agenda to better understand the pathways through which 'the social and cultural' enters the body. The final section of this article discusses somatography as a practice-oriented approach attempting to address some of these issues in a symmetrical investigation across epistemic cultures.

Keywords: Altruism, Biolooping, Epigenetics, Responsibility, Social practice, Soma

*joerg.niewoehner@hu-berlin.de; ORCiD: 0000-0002-9034-9761

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In order to develop a better understanding of complex diseases and their aetiologies, the National Institutes of Health's *New horizons* agenda (NIH, 2001, 2003) has prioritized the integration of different *levels of analysis*, i. e. molecular, cellular, organ system, psychological/behavioural and social/environmental levels (Anderson, 1998). Interlinked with this agenda, research on epigenetics and non-genomic transmission of individual differences has begun to transform notions of inheritance, heritability and development (Lewin, 1998). As a result, *intra*-generational boundaries between levels of bodily complexity and *inter*-generational boundaries between past, present and future bodies have become porous and are being redefined. These developments affect the social sciences and humanities concerned with new forms of dynamic corporealities in social and medical practice. This article outlines in a programmatic fashion three sets of issues that are likely to acquire significant relevance in this context:

1. Looping effects: does dynamic interaction occur between indifferent and interactive kinds of constructions (Hacking, 1999)?
2. Epigenetics: how will social and moral responsibilities change and how will they be experienced and performed in everyday interactions as new bio-graphies emerge?
3. Incorporations: according to emerging epistemic practices, how does 'the social' get under the skin?

Looping effects

A recent article published in the *British Medical Journal* (Westin and Heath, 2005) draws attention to the fact that in parts of Norway current thresholds for 'normal' blood pressure and serum cholesterol label around 90 percent of the population over 50 years of age as being *at risk* from cardiovascular disease. The article discusses implications at five levels, four of which are of a technical and statistical nature. The fifth raises the issue of the psychological impact and the wider health consequences of this classification. Concluding that research on these aspects has delivered unclear findings, the authors

point out the need to discuss psychological and ethical implications. Critical medical anthropologists might like to broaden this agenda by including not only an analysis of the social and cultural implications of these developments, but also a more careful look at the effects scientific concepts and practices have on the construction of selfhood, patterns of interaction as well as perceptions and experiences of illness. Ian Hacking's notion of 'looping' appears a useful concept to analyse the relationships between scientific classifications and socio-cultural consequences.

In his book on social constructionism, Ian Hacking (1999) distinguishes between indifferent and interactive modes of classification. Indifference pertains to those objects that do not have the capacity to become aware of their classification, while those in the interactive category have the ability to recognize and respond to their classification. While the notion of natural kinds has proved troublesome to many, Hacking recognizes that complex diseases pose a dilemma within a constructionist framework as they may be indifferent and interactive kinds *at the same time* depending whether one emphasizes their biological basis or their rootedness in social practice. Looping effects characterize the dynamic interaction between the two kinds.[1] *Classificatory looping* operates via semantics and refers to those interactive kinds which change in response to the classification in such a way as to necessitate the adjustment of the original classification. *Biolooping* denotes a dynamic interaction between physical and mental states. Both types of looping deserve attention at three levels:

1. It has been well established by socio-cultural histories of medicine that concepts of self and body are likely to change in response to altered therapeutic practices and popularized medical theories. However, the notion of biolooping focuses on change as an interdependent process of conceptual *and* material modification—a process of dynamic interaction, for instance of psychology and physiology, which phenomenological and constructivist perspectives alone cannot bring into focus sufficiently. Recent practice-oriented work brings a science and technology studies repertoire to medical sociology and medical anthropology, enabling a focus on the interactions between materiality and illness as experience and as practice (Berg and Akrich, 2004; Mol and Law, 2004).

2. At the level of social practice, we need to know more about the way a medical diagnosis is handled within families and the wider social networks of those diagnosed. Bioethical work has for some time pointed towards the difficulties of dealing with diagnostic information with a relevance to (biological) kin, e. g. Huntington's disease (Cox and McKellin, 1999). Yet, while work on the new genetics and its implications for extended families has revealed the tantalizing moral dilemmas arising from genetic knowledge, particularly in decision-making (Konrad, 2005), there is still comparatively little work about these constellations with a view to

[1] We thank the reviewers for pointing out that Hacking himself has recently given up the idea of natural kinds. However, independent of this epistemological problematic, the idea of different kinds of interactivity persists. The looping concept hence retains its relevance as a framework to understand the different dynamic interactions between materiality and practice.

looping effects and how such genetic 'in-formations' change patterns of solidarity and altruism as moral practices (Beck, 2004, 2005; Rabinow, 1999, 2003). In this context, diseases with a currently minor genetic component, such as the metabolic syndrome or a range of psychiatric disorders (Carey, 2005), might serve as suitable case studies as they affect large numbers of people without changing everyday life as dramatically as diagnoses of many monogenetic disorders with a high penetrance invariably do.

3. To close the loop, research needs to investigate how effects of (1) and (2) are conceptualized at the level of physiology. From our perspective, this is an area of medical research that carries major potential to alter our understanding of the body and corporeality as well as disease aetiology and illness. Observing medical practice and its impacts in terms of classificatory looping, requires a social science methodology that differs from much current work with respect to the kind of data as well as the time frames that are considered relevant. In the same way that prospective long-term studies are needed in medical research to track whether particular medical diagnoses lead to physiological change (see Hodges et al., 2005 for a related meta-review), so do social science studies require long-term designs to adequately observe changes in concepts, practices and corporeality over time. Only studies that are able to take biographic time into account are able to comment on evolutionary and developmental discourses. The notion of biographic time does not simply point to the lifetime of an individual as a medically relevant time-span. Rather, biographic time as an agential concept in the sense of 'to biography', refers to different modes of socio-medical co-construction, which make time relevant in different ways for patients and practitioners alike. Different medical practices, e. g. physical examinations in primary care, anamnestic questions on family history or questions about stressors in the parental generation, help to produce different 'selves in time'. The consequences of these processes for concepts of present and future selves and associated responsibilities have not been well researched so far. While we share the worries that many have expressed towards current tendencies to an ever more intensified and lifelong medical surveillance of our bodies, we also agree that it can only be through engaging with this type of work and establishing a socio-cultural perspective that enlarges the historical depth of focus, that a range of relevant theoretical and methodological insights can be brought to bear (Cunningham-Burley, 2005).

Epigenetics

'Genome, meet your environment'—this headline from a 2004 issue of *The Scientist* (Pray, 2004) captures the essence of recent research efforts that are beginning to destabilize a central tenet of modern biology: Weismannism, 'the doctrine of the continuity of germ and the discontinuity of soma' (Griesemer, 2002: 97). Throughout the twentieth century, the understanding persisted that inheritance was based on genes and DNA sequence, while

development occurred somatically. Hence, somatic development had to start afresh in each living being, while DNA sequences continued along the germ line across generations guided on an evolutionary time scale by Darwinian selection. Research on epigenetics (e. g. Jablonka and Lamb, 2002) has introduced a new kind of genomic plasticity (Li, 2003) that blurs the conceptual boundaries between inheritance and development. New definitions have been proposed amidst a wider debate about the nature and implications of epigenetics (Lock, 2005a; Vijver et al., 2002) and Fox Keller has introduced the notion of 'gening' to circumnavigate the conceptual debates surrounding the gene as an entity and introduce a sense of agency to the way organization is handled in organisms (Fox Keller, 2006). In the context of this article, we take epigenetics to refer to the genome's postulated ability to 'learn' from its own experiences, e. g. via DNA methylation and histone modifications (Jaenisch and Bird, 2003), and as a concept that is beginning to have clinical implications (Rodenhiser and Mann, 2006).

The implications of these reconceptualizations are exemplified by a Swedish study on malnutrition (Kaati et al., 2002) that relates medical data on the health of 287 people, who were born and grew up in a specific district in Northern Sweden in 1890, 1905 and 1920, with social historical data on the living conditions and the nutritional status of their grandparents' and parents' generations. The findings indicate that, for the early nineteenthcentury male population, periods of food scarcity significantly increased the risk of their grandchildren suffering from diabetes mellitus type two, while periods of surplus during maternal pre-puberty led to protective effects against heart disease. Similarly, current research on the concept of 'allostatic load', i. e. the cumulative cost to the body of maintaining stability through change (allostasis, e. g. McEwen and Wingfield, 2003), suggests that it may not only be times of extreme hardship that produce somatic memo effects. Rather, this kind of imprinting may occur from all kinds of different chronic stressors such as social isolation or unhappy marriages (Robles and Kiecolt-Glaser, 2003; Troxel et al., 2005).

The emerging understanding of physiological historicity extends our bio-graphies beyond our own birth and death with manifold implications that have so far received little attention in the social sciences and humanities: Do I have to take responsibility for my biological substrate, for my own nature? When does prevention start, when—and for which metabolic pathways—might intergenerational prevention be perceived as mandatory? Which new responsibilities in childrearing and education (redefined as neurological and metabolic *Bildung*) might emerge?

Incorporations

Linear understandings of physiological change underpin most explanations of disease aetiology. For most complex or systemic diseases, these are rather crude, mechanistic perspectives that guide clinical practice rather than claim to fully represent (patho)physiology. This pragmatic reductionism serves medical science well as it enables the assembly of boundaries around objects of investigation. This boundary work legitimates the isolation of particular aspects of pathophysiology from the corporeality within which they take

place. Science and technology studies has challenged conventional notions of boundaries as delimiters of distinct ontological entities and instead emphasized their role as permeable passage points in constituting and maintaining epistemic cultures (Knorr-Cetina, 1999; Stengers, 2000).

The new modes of boundary work, alluded to in the sections on looping and epigenetics, facilitate the incorporation of refined notions of individuality and social life into thinking and modelling disease—notions traditionally part of the social science domain. In cardiovascular research, for example, eating and drinking behaviour (Anderson et al., 2002; Brunstrom et al., 2004), marital quality (Johnson et al., 2000; Troxel et al., 2005) or community structure (Diez Roux et al., 2002), as well as community atmosphere (Sampson, 2003), are being made relevant in medical frames of explanation. This, of course, is not new—in fact, the history of research on coronary heart disease shows that medical science has always embraced strands of research to a greater or lesser degree, which tried to incorporate social and mental phenomena into understandings of disease (Aronowitz, 1998). However, epigenetic research, as well as various imprinting hypotheses discussed in developmental biology (Barker, 1993), has taken these incorporations to a different level of intergenerational relevance and multi-level complexity. While a strong social science focus on (epi)genetics marks a sensible starting point, a wider approach will be needed to better understand the drivers behind these new kinds of incorporations. For example, some parts of immunology perceive DNA and RNA as part of the body's tool box with which to manage adaptation to external or internal change (Cohen, 2006). Deterministic arguments and blueprint metaphors carry less meaning in this context–yet immunology's understanding and handling of genetics nevertheless influences medical reasoning and practice.

Of great interest to today's science and technology community should thus be a close-up investigation of *how* social and cultural phenomena are incorporated into observational routines, how methods and theoretical perspectives are adapted and how changes in the meta-narratives of biomedical research are produced and how they manifest themselves. For instance, Young convincingly shows how the rise of molecular genetics and functional neuroimaging techniques in psychiatric research does not simply advance a reductionist agenda eliminating notions of the mind from mainstream research: 'Far from transporting itself into a mindless future, psychiatric science is busy reconstructing the mind along evolutionary lines' (Young, 2006). Similarly, cardiovascular research increasingly handles very heterogeneous entities. The construction of conventional statistical risk profiles is increasingly influenced by molecular work on neuroendocrine signalling (Ford et al., 2005; Hung et al., 2005; Rosmond, 2005; Sonnenberg et al., 2004), suggesting possible mechanistic pathways where so far only statistical correlations bridged the gap between social phenomena and physiological states. Yet, rather than simply moving risk assessment to the molecular level, these findings combine with evolutionary and developmental narratives to incorporate new temporal dynamics and social dimensions into risk profiling.

As materiality and sociality are being set into new conceptual frameworks, the skin, for a long time a trustworthy boundary of individuality and the last line of defence of human

authenticity (Bentley, 1941), is reconceptualized as a (semi)-permeable membrane: a regulating transaction zone with the ability to transform passing objects. Phenomena of *the outside*, be it social interactions or phenomena of the mind, undergo transformations and are incorporated to (re-)appear or be reproduced on *the inside*. Accordingly, the socially or culturally defined *inter* of social interaction, is increasingly scrutinized with a new kind of biomedical gaze.

Somatography

These three areas of interest to future research—looping, epigenetics and incorporations—have one thing in common: they demand an investigation integrating the perspectives of medical/socio-cultural anthropology and science and technology studies. While much of recent work has either investigated medical or social practice, treating the respective other more or less as a constant, research on biosociality (Rabinow, 1992), somatic individuality (Rose, 2001) and local biologies (Lock, 2004) has begun to adopt a broader perspective. Others have called for renewed conceptual attention to issues of embodiment and corporeality from an STS and medical anthropology perspective (Akrich and Pasveer, 2004; Berg and Akrich, 2004; Lock, 2004; Mol and Law, 2004; Van Der Ploeg, 2004). The research questions outlined in the sections above support this agenda while placing a particular emphasis on the need for transepistemic, practice-oriented empirical work that *symmetrically* links empirical investigations of medical and social practice (Lock, 2005b). This approach, aimed at strengthening the role of materiality in ethnographic investigations of social and professional practice, we call *somatography*. Concerned with ethnographically tracking the role of soma in socio-material assemblages, i. e. engaging ethnography and soma in a new way, we suggest four methodological cum theoretical characteristics of this line of research:

1. Somatographic studies should investigate dynamic interactions between different epistemic cultures and objects by empirically tracking pathways along the spectrum from indifferent to interactive objects of construction and vice versa (Hacking, 1999). Accordingly, phenomena that emerge in the context of laboratory studies and travel through therapeutic space into social practice receive the same attention that is applied to phenomena which travel in the opposite direction from social interaction into laboratories and computer simulations.

2. Different time regimes and their handling will be of central somatographic concern. The Darwinian or Lamarckian time of an evolutionary perspective, Kaati et al.'s intergenerational time of epigenetics, cumulative, allostatic intra-generational time as well as the performative time of the metabolic system dominant in today's medical practices, all operate on and apply to dynamic corporealities simultaneously (see also Cacioppo et al., 2000; Li, 2003). Studying these constellations and how they are made relevant within medical domains requires conceptual work and experimental designs that are sensitive to the temporal dimension of soma.

3. We expect this more encompassing perspective to have a distinctive impact on prevention regimes, e. g. changing the governance of soma through implicitly as well as explicitly suggesting new kinds of intra- and intergenerational responsibilities that will take epigenetic influences into account.

4. Last but not least, somatography entails comparative work to grasp the cultural dimensions of integrating different *levels of analysis*. Experimental and questionnaire designs in most areas of medical research adopt a perspective that treats sociality as aggregate or cumulative individuality. Consequently, they are not able to construct physiological effects as truly *inter*active. Observing how a cultural dimension, as a dimension with a strong influence on patterns of social interaction, affects medical research designs, clinical work as well as different strategies of appropriation will be a fruitful line of work for the social sciences in general and anthropologists in particular.

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