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In 1990, an international coalition of scientists successfully argued for huge public investment to support their work to sequence the human genome. Proponents of the Human Genome Project described it at the time as ‘one of mankind’s greatest odysseys. It is a quest that is leading to a new understanding of what it means to be a human being’ (Bodmer and McKie, 1994: vii). According to its advocates, the resulting knowledge of human genetic make-up would not only impact on basic science, the practice of medicine and the delivery of healthcare; it would also do much to explain human behaviour, elucidating and even offering solutions to social problems and reshaping how humans think of themselves and relate to others. The Human Genome Project spurred renewed claims by scientists to speak authoritatively about what makes us who we are, challenging the position held by the social sciences, and in particular by sociology, since the end of the Second World War.

Over the past two decades, social scientists from different traditions – sometimes in alliance with sympathetic scientists – have risen to this challenge in two distinct but related ways: first, by engaging with and critiquing claims about the explanatory power of genetics; and second, by studying the myriad ways in which actors draw upon and interpret genetic knowledge as part of their identity-making practices. This latter programme of research and reflection has been particularly fruitful as a source of insights into the sociology of identity. Early fears that genetics would lend itself to a process of reification and standardisation of identities (Flower and Heath, 1993) have been superseded by a growing appreciation of the extent to which ‘individuals resist, appropriate, or accommodate themselves to genetic power/knowledge in line with diverse identity

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politics, not schemes of centralized or capillary control' (Brodwin, 2005: 142). Social scientists have accordingly assembled a rich and multifaceted empirical literature on the ways in which identities are formed where genetics comes to be involved. The articles in this Special Issue contribute to this sociological understanding of genetic knowledge and identity practices in two key respects. On the one hand, they emphasise just how deeply genetics has penetrated into many realms of social life. On the other, they illustrate the diversity of the ways in which identities are negotiated between self, others and institutions, and how the language and practices of genetics – and heredity more generally – have been integrated into those negotiations. Before discussing the contributions of the individual articles in this Special Issue, we briefly revisit the wider sociological literature on identity in order to specify the particular challenges raised by these new empirical analyses.

The Current State of Sociological Research into Genetics and Identity

In confronting genetic determinism and essentialism, sociologists have faced the need to articulate a social-scientific language for speaking about the effects of genetic knowledge in identity formation that does not carry over the determinist or essentialist notions of the scientific discourse. In so doing, they have reprised long-running debates about social identity and status marking. With genetics, internal biological determinants of identity take on the solidity that earlier social theorists, including Karl Marx, Max Weber, Karl Mannheim and Claude Lévi-Strauss assigned mainly to external material conditions of social life. While these theorists insisted that identities are socially produced, they nonetheless tended to see them as relatively stable and determinate, as firmly engraved into a person's or a social group's ways of being. In this view, class, culture, gender and professional identities were seen as integral to, and constitutive of, the individual as an embodied personality. Other commentators, meanwhile, motivated by a more immediate desire to change societal structures and alleviate the suffering and injustice they produce, formulated more critical accounts of the constitutive force or coercion of societal structures on the individual being. Feminist authors, from Olympe de Gouges (2003) and Harriet Taylor-Mill (1868) to Simone de Beauvoir's analysis of the social construction of *The Second Sex* (2009[1949]), have been influential in this context. Other major contributions to a general critique of the way that social forces necessitate and form personal identities include *The Authoritarian Personality* by Theodor W. Adorno et al. (1950) and Erving Goffmann's (1963) work on stigma as the burden of the marginalised. As a result of such analyses, and contributing to a better understanding of the social mechanisms of inclusion and exclusion, social scientists have developed a range of critical methods to explore what it means to belong to and 'be' a certain sex or gender, ethnicity, profession, class or family and the societal institutions that co-create these identities.

The tension between determinism and voluntarism in sociological accounts of identity formation can also be traced in the rather different ways in which sociologists have responded to the challenge of genetic determinism precipitated by the Human Genome Project. Some of the earliest responses can be found in the writings of Judith Butler and

Anthony Giddens. Both acknowledge that the complexity of individual experience and desires does not fit with stereotypical identities. Individuals are forced to match imposed (or seemingly imposed) societal expectations. But Butler and Giddens differ in the way they think about how the materiality of embodiment is implicated in identity formation. In *Gender Trouble* Butler (1990) reflects on the dualistic relationship between a material embodiment of sex in chromosomes and genitals on the one hand and the socially construed formation of gender identities on the other, struggling to find a correspondence between what she perceives as bodily facts and her Nietzschean ideal of multiple and changing gender identities. For Butler, there is nothing 'natural' about bodies. Rather, the individual and her or his body are alike shaped in relation to the unavoidable pressure to develop and to portray identities that can never be fully owned by the individuals who simultaneously are and present them. By contrast, Giddens dismisses the question of the naturalness of bodies, which he views instead as in effect material substrates or instruments through which identity may be performed voluntarily. In *Modernity and Self-Identity* (1991) he goes so far as to envisage selected modifications of a person's genome as a novel and empowering means of performing identity, and hence of becoming who one wants to be. He expresses the expectation that an increase in the technical ability to modify bodies and genomes will widen the scope of identities that can be adopted.

Butler and Giddens see performance of identity as what makes identities real, but take a different view on the role of embodiment and agency, which relates to a different ethics in relation to identity formation. For Butler, the gap between the inner self and the social identities embodied by an individual is an inevitable source of unhappiness or melancholy, motivating the desire for social change, which is a slow and embodied process. On this account, Butler positions the reflexive subject with an ethics of vulnerability and responsiveness against identity practices that she interprets as a form of violence (2005). From a more rationalist background, Giddens looks to technologies of body modification to enhance the personal freedom to choose who one wants to be. He stresses that performances of identity and their recognition by others and by institutions are at the heart of what an identity is, and he emphasises the choice aspect of identities. Yet both Butler and Giddens view identities as established and verified in and through social interactions. Identities are the product of power relations, and individual power lies in adopting and living those relations.

Recent developments in genomic science and its interpretation appear to favour following Butler's rather than Giddens' path. While technologies for radically altering bodies at will remain as remote as they were 20 years ago, genetic research has highlighted the extent to which ordinary bodily development is shaped and defined by social as much as genetic and other biological factors. Scientists and clinicians are nowadays much more inclined to assume that physiology, sexual desire and gender identity, far from being naturally linked or aligned with one another, are profoundly shaped by cultural idioms and individual experiences. Bodies, genes, processes of brain development and aspects of gender identity come in many irregular forms, including atypical genetic variations in the sex chromosomes, which occur in 1 out of 700 live births, as well as the many other ways in which bodies and desires trouble the hetero-normative ideal of sex and gender identity (Bancroft, 2009; Fausto-Sterling, 2000). Likewise, research in epigenetics is throwing new light on the responsiveness of the living genome to changes in the

environment, as scientists increasingly recognise that genomes and bodies may themselves be shaped by a wide range of everyday experiences and long-term practices, and not only by invasively radical changes such as genetic engineering. A range of identity-relevant areas of social practice, including the food we eat and the exercise we do or do not take, contribute to making us who we are physically as well as socially. While there are limits to how far persons can change their bodies through such practices, lifestyle affects what genes do and thus has an impact on many aspects of the organism, including appearance (aging skin and sun exposure, for example), metabolism (famine in perinatal development has been linked to disturbed insulin production 60 years later) and health (development of cancers). Research into epigenetics thus suggests that identities, including bodily markers of identity, are formed not only by how individuals and others classify, think and judge, but also through the way in which we live our lives. Biology and bodies are not just given but socially constructed. Such research opens up a new reflexive space for reconsidering the mutual interactions between genetics and identity, and between the genomic activities that occur in the body and the social practices of identity in which bodies are situated and constituted.

Yet, while considerations arising through engagement with cutting-edge genomic research may help to frame future social research and theorising, it has to be acknowledged that they do not, on the whole, reflect either common understandings of genetics or the way in which genetic technologies are currently used in social institutions. The common understanding of genetics, and the social practices in which it is employed, continue to be largely based on the assumption that genes cause or are stable indicators for individual characteristics. Genetic techniques for identifying sex, biological relatedness, physiological traits such as skin pigmentation or diseases such as breast cancer or Huntington's Disease are well developed, often readily accessible, and the prices are in free-fall. Currently, a specific genetic test can cost as little as £100 (e.g. Boots paternity test) while a full sequence of a person's genome can be bought for US\$5000 (Cadwalladr, 2013). Moreover, claims that such tests deliver a high degree of certainty about race, ethnic origin, kinship, propensity to hereditary diseases and other traits enjoy considerable credibility both for a wide range of institutional purposes and in popular imaginaries. Consequently, genetic tests and data are increasingly widely used to reorganise identities and inform social practices in areas including pre- and postnatal medicine, family relations, law enforcement and immigration. Many social institutions, including not just science and medicine but also insurance companies, employers, government departments, policing and childcare services, all seek to ascribe status and identity using DNA tests. Thus, genetic test data are in effect made to matter as determinants of identity.

Consequently, most current sociological research into genetics and identity continues to address the societal effects of what remain predominantly determinist beliefs and practices. Rather than speculating about how the anti-determinist implications of the latest work in epigenetics might be incorporated into a new sociology of embodiment, most sociologists continue to engage with the challenge of understanding how social actors respond to, take up or resist current applications of genetic testing, which typically include the attribution of identity and status among their aims. In this context, a common analytic theme is the tension between the ways in which genetics can be used: on the one

hand to support the kind of self-formation which is necessary if one is to act and to be someone; and on the other hand to reinforce or redefine the categories that social institutions use to determine who has agency and an identity that those institutions recognise. To what extent is genetics an instrument of social determinism; and how far is it useful for individuals as a means to pursue their own ideas and goals? Some sociologists question whether the technologies that have emerged in the context of the Human Genome Project form a new kind of disciplinary power that imposes novel regimes of surveillance and control on individuals (Raman and Tutton, 2010). Others explore how genetic knowledge and technologies inform and enable individual choice and are used to fashion personal and distinctive identity claims – a line that follows Giddens' early reading (Rabinow, 1996; Rose and Novas, 2004). And yet others examine the interplay between these divergent tendencies.

The Articles

The tension between the use of genetics to support status marking at the service of institutions and to enable new forms of negotiating individual identities persists. The articles in this Special Issue address this tension explicitly and implicitly. We selected articles that cover a wide range of identities in the formation of which genetics has become relevant. The articles are all empirically oriented, and cover aspects of health and disability, gender and family, and race and ethnic origin across different particular settings in which individuals or institutions mobilise new biological knowledge. These different kinds of identities are studied in the interaction between individual self-management and self-expression on the one hand and the attribution of collectively maintained and policed identities by social institutions on the other. Taken together, the articles illustrate diversity, complexity and the difficulties that arise for any current generalist social theory of identity. We summarise each article briefly with a view to highlighting this diversity. Beginning with studies that focus primarily on individual accounts and desires for specific identities, we move on to articles that pay more attention to institutional uses of genetics for purposes of identification. We end with a study that cuts across this individual-institution axis by addressing what commercial genetic testing may mean for practical identity politics in the tradition of the civil rights movement. The Special Issue contributions illustrate that sociological identity theory needs to be careful not to rush to a view of genetics as either an instrument of power or as enabling new social forms of identity struggles, but rather must attend to the multiplicity of identity engagements that happen on the ground.

In the first article, Angus Clarke considers how knowledge of the hereditary nature of a disease may be incorporated into individual identity formation. 'Stigma, self-esteem and reproduction: Talking with men about life with hypohidrotic ectodermal dysplasia' draws on in-depth interviews with a number of men who suffer from this sex-linked genetic condition that affects physical appearance. The findings show how Clarke's participants experience, negotiate and manage the stigma (understood in Goffmann's sense as 'spoiled identity') that they experience because of their appearance. Coping with stigma and bullying is one aspect, the other is how the individuals make sense and respond to the heritability of their condition. The participants express a sense of shared

identity with, and hence of responsibility for, actual or potential descendants who may inherit the condition and that this is salient in their decision-making about whether or not to have children. In the case of genetic conditions, spoiled identities and their management may be underwritten, consolidated and further problematised by trans-generational as well as personal and collective processes of self-identification – a finding with important implications for clinical practice as much as for the sociology of identity.

Self-identification and the power of stereotypes and expectations concerning gender performance are addressed in Kate Reed's 'Beyond hegemonic masculinity: The role of family genetic history in men's accounts of health'. A standard assumption guiding health promotion practice within the UK National Health Service, and corroborated by a number of sociological studies, is that men's performance of stereotypical male identity leads them to present a dismissive attitude toward health awareness. Care for one's health is seen as being associated with a female gender role, and hence not something men do. Reed's survey of men's health behaviour suggests that this assumption is incorrect, at least in relation to the use of family histories and knowledge of inherited health risk. Her research shows that men often engage actively and competently with inherited health risk and family histories. She concludes that widely accepted ideas about hegemonic gender identities appear to be inaccurate and hinder the development of effective health promotion strategies that speak to men. Sensitive, non-prejudicial notions of gender identity are therefore needed for better clinical and public health communication.

Moving away from the field of medicine and healthcare, the next article examines how processes of self-identification are affected by new genetic research into the history of human migration. As a result of such research, previously private and institutionally irrelevant identities are currently gaining public attention. Marc Scully and colleagues from the 'Impact of Diasporas' research group at the University of Leicester are investigating the motivations and beliefs of individuals who participate in such research. Their article on 'Remediating Viking origins: Genetic code as archival memory of the remote past' analyses some of the ways in which participants in a study of Viking settlement in early mediaeval Britain made sense of their involvement. The study throws light on the disparities between how scientific definitions of ethnic and ancestral identities are defined by population geneticists and how they are adopted by lay individuals. Based on findings generated through workshops and interviews with individuals who signed up for tests to determine if they carried genetic markers of Viking ancestry, the authors show how readily those participants were able to assimilate their test results to their private romantic beliefs about their geographical and ancestral origins. Scully and colleagues conclude that the increasingly widespread use of genetic ancestry testing, not only for academic research but also through direct-to-consumer genealogy companies, is more likely to materialise and consolidate myths and prejudices of national and ethnic origin than to establish scientifically credible narratives of ancestry and migration.

The explicit focus of the next article is how wider social and legal practices of attributing identity and relatedness interact with processes of identity formation within families. In 'Genetic knowledge and family identity: Managing gamete donation in Britain and Germany', Maren Klotz draws on data from anthropological fieldwork with individual parents, families and clinical practitioners and from analyses of regulatory and concerned group literature to explore how parents who have children through egg and

sperm donation build and manage their family identity. Klotz considers in particular what this means for the possible geneticisation of family relations. Many authors have argued that the new reproductive technologies and genetics may change understandings and practices of kinship, because they privilege biological over social parentage (Finkler, 2001; Rothman, 2000). Klotz's findings suggest that family identities are experienced as particularly difficult when influential expectations about living openly as a donation family conflict with legal and regulatory situations. Whilst her parent participants in the UK and Germany share the same strong belief in openness, the unregulated situation of sperm donation in Germany makes it more difficult for her German participants to feel confident about their identity as a family, because the law and the clinicians they have encountered discourage openness. Klotz's analysis shows that identity formation as kin and family is fragile when the societal conditions are unsupportive; whereas clear legal attribution of parental responsibility and regulatory standards for managing donor information in the clinic stabilise the parents' sense of identity as a family and invite the openness with which they want to live as a family.

A critical analysis of a potentially damaging disjuncture between individuals' understandings of their own identity and the identities attributed by large institutions is at the centre of Peter Aspinall's article 'When is the use of race/ethnicity appropriate in risk assessment tools for preconceptual or antenatal genetic screening and how should it be used?'. Aspinall examines an initiative adopted by the UK National Health Service in areas of Great Britain where the incidence of sickle cell disease and thalassaemia in the local population is assumed to be low. In those areas, family origin questionnaires (FOQs) are used to replace general genetic testing for those diseases in pregnancy. The use of FOQs is based on the assumption that racial or ethnic origins are effective indicators of whether couples are in high or low risk groups for these conditions, and are seen as a means of making efficient use of finite resources. However, Aspinall notes that the categories of ethnic and geographical origin specified in the FOQs do not necessarily match the self-assigned ethnic identities of those completing the questionnaires. As a result, FOQs are likely to fail their objective of achieving good health outcomes for the respective social groups. Aspinall's study analyses the methodological complications and potential discriminatory pitfalls involved in designing and using questionnaires that will mediate effectively and equitably between respondents' self-identities and the kinds of population categories operationalised by population geneticists and healthcare policy makers.

The inscription of racial identities through the management practices in the UK National DNA Database is the subject of David Skinner's article "'The NDNAD has no ability in itself to be discriminatory": Ethnicity and the governance of the UK National DNA Database'. The UK NDNAD is the world's largest forensic DNA database, created with the aim of extending the operation of police and state power through the development of new biotechnological powers of surveillance and detection. Skinner refers to sociological accounts of bio-sociality which focus on user-led forms of genetic identity formation to proclaim a new age of distributed and bottom-up 'biopower' and confront it with institutional practice, similar in that respect to Aspinall's article. Skinner shows how racial and ethnic categories are built into the organisation and operation of the NDNAD, and hence into the machinery of criminal identification, in a way that

clearly discriminates against certain racial and social groups. Moreover, he shows how public criticisms of the way in which the NDNAD operates, and the governance procedures enacted to ensure that it is used in an 'ethical' fashion, far from mitigating this discriminatory dimension may actually reinforce it by distinguishing artificially between the technical aspects of the database and the social processes by which it is populated and accessed.

The debate about race and whether genetics displaces or re-inscribes racial categories has been fierce for the past 30 years. Many advocates of the modern science of DNA now argue that population genetics undermines racism because it shows that social distinctions of race are unfounded in demonstrable genetic differences. At the same time, however, extensive research is being conducted to map the genetic variation between different human populations, for a wide range of scientific purposes including the reconstruction of population history and the targeting of medical interventions with the aim of maximising their efficacy and efficiency. For such purposes, as the articles by Scully and colleagues and by Aspinall have indicated, populations are usually defined in terms of differences of geographical origin or of ethnicity. A number of sociologists have argued that this serves tacitly to re-inscribe existing socially determined racial categories into the genetics of human populations (Appiah and Gutmann, 1996; Duster, 2003; Fujimura and Rajagopalan, 2011; Koenig et al., 2008; Reardon, 2004; Rothman, 2001[1998]).

How traditional social categories of race reappear in new forms in genetically based initiatives to build identities – here national identities – is explicitly considered in the article by Ernesto Schwartz-Marín and Eduardo Restrepo on 'Biocoloniality, governance, and the protection of "genetic identities" in México and Colombia'. Since the late 1990s, when the Icelandic company deCODE Genetics Inc. sought to establish a national genetic database with a view to screening the Icelandic population to identify genes for disease, national genome projects have proliferated, often initiated and run by government institutions, and commonly justified in terms of targeting healthcare innovations on the needs of indigenous populations. In less developed countries, such initiatives are often expressly presented as a means of protecting national genetic patrimonies from bio-colonial appropriation and exploitation by international capital. Schwartz-Marín and Restrepo examine two such initiatives in Colombia and Mexico. They show how, despite the anti-colonialist intentions behind these projects, racialised ideas about indigenous populations, inherited from earlier colonial discourses, underlie the genomic identities thus constructed and realised. They elaborate the concept of 'bio-coloniality' to describe this persistent racialisation of human genomic identities, and go on to propose that more robust and participatory governance arrangements are needed if science should reflect more adequately the interests of the communities it purports to represent.

A number of sociologists have also expressed concern at the reinsertion of race and ethnicity into the sphere of healthcare, as addressed by Aspinall above (Kahn, 2013). Catherine Bliss's article on 'The marketization of identity politics' examines this discourse and then turns to a more general discussion of the impact of genetics on identity politics in the early 21st century. Bliss analyses how recent developments in the genetic targeting of pharmaceuticals to racial groups, coupled with the sale of direct-to-consumer ancestry tests, reinforce the importance of race as a key aspect of identity and self-knowledge. But she also argues that the commerce-driven and predominantly

market-based nature of these developments is transforming the very possibility of identity politics, at least in the USA. In this context, the intersection of race and health sciences imposes imperatives of knowledge and responsibility on individuals that undermine organised agency of the kind that originally enabled US identity politics. The revalorisation of race as a key element of identity is thus coupled with processes of individualisation and commodification that displace group-based identity politics in favour of a politics of individual consumption, which subvert the political power of discriminated groups to challenge their social positioning.

The Special Issue also contributes a number of book reviews to the discussion, including a review symposium on one of the most influential books of the past 20 years on the social life of human DNA. Dorothy Nelkin and Susan Lindee's book *The DNA Mystique* was first published in 1995. Written when genetic testing was making rapid inroads into prenatal diagnosis and paternity disputes, the book addressed an expanding discourse on the increasing impact of genetics. Four scholars, Jonathan Marks, Nina Hallowell, Hub Zwart, and Brigitte Nerlich, present different perspectives on whether this book still has anything to contribute to today's discussion, and, if so, what. Finally, single reviews of four recent books on different aspects of the contemporary genetics of identity point readers to the work of scholars not represented in the Special Issue, and to the wider field of scholarship to which the present volume is a significant contribution.

Conclusion

The contributions to this Special Issue testify to the diversity of the ways in which genetics is incorporated into the everyday social practices of identity formation. On the one hand, they show how genetics serves and facilitates the top-down exercise of institutional power in the creation and imposition of identity categories for purposes including social surveillance and control, the pursuit of bureaucratic and economic efficiency, and the consolidation and advancement of nations and states. On the other hand, they document some of the ways in which genetics affects the pursuit of individual and group self-determination and self-expression through the appropriation, contestation and remodelling of identity categories. They underline that identities are the malleable products of struggles between the imposition of institutional will and control and the assertion of individuals to self-determine who they are in the dialogue between older categories of identity and new and emerging forms of association. Moreover, they demonstrate the irreducibly local and situated character of such interactions and contestations. There is no single overarching story of genetics and identity. Each of the multiple identities that an individual or group may adopt is shaped in a specific environment characterised by a particular configuration of social and technical resources and structured by particular interests, expectations and power relations. Identities have a public and a personal side, and are negotiated in the interplay of individuals, others and institutions that is at once informed by relevant laws, institutions, ideologies and beliefs, yet necessarily responsive to social change and to the influence and agency of individuals and groups.

It may seem that these points have been adumbrated in theoretical and empirical writing on the sociology of identity more generally. What the present set of articles adds, through the close engagement with the role of genetics as a new and powerful technology

in the life science repertoire, is an appreciation of just how complex and multifaceted the processes of identity formation may be. The contributions to this Special Issue highlight the diversity of the social relations and interactions that contribute to the formation of specific identities, and the technical sophistication of the activities and discourses through which those interactions are mediated. Methodologically, work in this field elaborates on the complexity of modern life, and on the breadth and depth of disciplinary expertise demanded of any sociologist who wishes to fathom it.

A more substantive contribution of the work on genetics and identity lies in its analyses of the power of material technologies and discourses of materiality to represent and realise social relations, in ways that add a distinct moral dimension to identity politics. As a number of the articles show, the use of genetics can reinforce identity-based claims to health benefits, social cohesion, fairness and autonomy, to the extent of validating and resuscitating identities that have become problematic following stigmatisation and discrimination. By the same token, however, genetics may serve to naturalise and justify identity-based forms of exclusion and discrimination. In addition, the emphasis on biology when aligned with laws and regulations can restrict the options available for making a family or being gendered. This shows that genetics does not possess a particular moral valency in its own right. Rather, the discourses and practices of materiality that characterise genetics gain their moral meaning from how they are articulated in relation to pre-existing classifications. Race and ethnicity, blood relationships, gender, appearance and health status evidently remain vital aspects of identity. Genetics has not bypassed or replaced either the personal struggle to make sense of one's position in society and secure recognition, or the power of stereotyping and stigmatisation. What genetics has contributed is the introduction of a host of new concepts and technologies that imbue identity politics with the weight of materiality and the force of determinism. As genetic technologies become more widely woven into the fabric of modern life, the power of identity politics depends on who is able to control the uses and meaning of those technologies.

This brings us back to the possibility that recent advances in genetics, and especially in the field of epigenetics, challenge the determinism that currently characterises most genetic knowledge and practice in areas such as health and physical appearance. The inherent possibility of an increased perception that biological aspects of physiology can result from social practices should be welcomed and actively fostered by sociologists – not least because a genuinely non-deterministic science of human identity must be based in the social as much as in the biological sciences. But in doing so, social scientists should be aware that there can be no way of predicting the consequences of such a transformation for the future of identity politics in general, nor for the outcome of any particular identity-based political struggle.

A key message emerging from this Special Issue is that, whether mediated by deterministic forms of genetics or not, identity formation and the politics of identity depend on the specific configuration of particular relations of power. This Special Issue illustrates that the continuous exchange between defined empirical work and the search for theoretical perspectives that has always characterised sociology is a necessary response to ongoing social changes – including, in this case, the new life sciences and the technologies they bring that affect key sociological concepts such as self, social identity and power.

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