OPEN ACCESS oekom

RESEARCH ARTICLE

Co-constructing ancestry through direct-to-consumer genetic testing

Challenges and implications

Alexander Lang, *Institut für Höhere Studien – Institute for Advanced Studies (IHS), Josefstädter Straße 39, 1080 Vienna, AT (lang@ihs.ac.at)* 0000-0002-1952-5064
Florian Winkler, *Institut für Höhere Studien – Institute for Advanced Studies (IHS), Vienna, AT (winkler@ihs.ac.at)* 0000-0002-7160-6566

Abstract • Direct-to-consumer (DTC) genetic ancestry tests offered via the internet supposedly uncover the ancestry of those tested. While these tests might be seen as a means to find a biologically inscribed and fixed genealogy, this paper explores how companies and customers co-construct ancestry through genetic ancestry testing. The study draws on a review of relevant literature, qualitative interviews with experts and stakeholders, a website analysis, and an autoethnographic self-observation. It shows how DTC genetic testing companies create specific concepts of ancestry in their marketing, development of specific databases, and presentation of results, but also how users interpret and incorporate their results into their own genealogies and lives. Looking at the potential social impact of DTC ancestry testing, the paper questions its categorization as recreational activity or entertainment.

Die Ko-Konstruktion von Herkunft mittels Direct-to-Consumer-Gentests. *Herausforderungen und Implikationen*

Zusammenfassung • *Direkt an Konsument*innen (direct-to-consumer, DTC) über das Internet vermarktete genealogische Gentests sollen die Abstammung der Getesteten aufzeigen. Während diese Gentests als Mittel verstanden werden können, die biologisch fixierte Herkunft zu bestimmen, untersucht der vorliegende Artikel, wie Unternehmen und Kund*innen die Abstammung mittels dieser Gentests ko-konstruieren. Die Studie stützt sich auf eine Analyse relevanter Literatur, qualitative Interviews mit Expert*innen und Stakeholder*innen, Webseitenanalysen und eine autoethnographische Selbstbeobachtung. Es wird gezeigt, wie DTC-Gentestunternehmen durch ihr Marketing, die Entwicklung spezifischer Datenbanken und die Präsentation der Testresultate bestimmte Konzepte von Herkunft kreieren, aber auch, wie die Kund*innen ihre Testergebnisse interpretieren und in ihre Biographien und ihr Leben einbauen. Mit Blick auf die möglichen sozialen Auswirkungen von DTC-Gentests wird ihre Einstufung als Unterhaltung hinterfragt.*

Keywords • *direct-to-consumer (DTC) genetic testing, ancestry, genealogy, co-construction*

Introduction

Since 2000, companies have been selling direct-to-consumer (DTC) genetic ancestry tests over the internet. Customers receive a test kit allowing them to take their own DNA sample in the form of a saliva sample or buccal swab. Having sent the sample to the companies who perform the DNA analysis, they then receive the results via the companies' online platform, by email, or by post. Depending on the service, the results identify different types of ancestry, following either a maternal or paternal lineage thousands of years into the past, or indicating a more recent and broader pattern of composite ancestry. In addition, customers are able to use the companies' services and databases to search for, and allow themselves to be found by genetic relatives also using this service (Shriver and Kittles 2004). In this paper we do not discuss the latter in detail, but focus on the ancestry testing features of these services.

Companies offer genetic ancestry tests for somewhere between 100 € and more than 1.000 €. It has been estimated that, by early 2019, the four largest companies in question had sold more than 26 million of these tests (Regalado 2019). Some companies sell them in conjunction with lifestyle- or health-related

https://doi.org/10.14512/tatup.30.2.30
Received: Feb. 03, 2021; revised version accepted: May 11, 2021;
published online: Jul. 26, 2021 (non-blind peer review)

genetic tests, not all of which are available in Europe. The companies advertise genetic ancestry testing as a form of entertainment and a tool for recreational genealogy, and as a means of widening one's social network and finding out more about oneself. Some of their customers may also be motivated by the desire to contribute to biomedical research with their genetic and personal data (Mählmann et al. 2016).

In DTC genetic testing, ancestors are determined in biological terms as people in the lineage of the tested person. However, the process of identifying ancestors through DNA testing is complex and involves a range of scientific, technical, and social factors (Royal et al. 2010). In addition, customers interpret their results in various ways (Panofsky and Donovan 2019; Roth and Ivemark 2018). This *social co-construction of ancestry* is the focus of our paper. The concept of *social construction of technology* is based on the fundamental insight established in science and technology studies that technologies are shaped by the social circumstance in which social actors make use of them, or for that matter, choose not to (Bijker et al. 1987). By using the concept of *co-construction* (Oudshoorn and Pinch 2003), we furthermore highlight how social and technical practices jointly create ancestry against the backdrop of broader socio-historical ideas of ancestry. Reviewing existing empirical insights as well as exploring the field of DTC genetic ancestry testing ourselves, on the one hand, we examine how the companies in question determine ancestry in marketing and conducting these tests. On the other hand, we investigate the customers' role in the creation of ancestry through their uses of the test results. Our paper further develops ideas from a technology assessment study on new applications of DNA analysis (Lang et al. 2020).

Methodology and data

This paper is predominantly based on reviewing existing empirical studies complemented by explorative qualitative inquiry. We conducted a literature review covering foremost peer-reviewed academic publications gathered via Scopus, PubMed, and Google Scholar. In addition, we carried out, transcribed, and analyzed semi-structured interviews with a molecular geneticist, a population geneticist, a genealogist, a user of DTC ancestry tests, and a manager of a DTC genetic testing company. Furthermore, we analyzed the websites of the four most popular DTC genetic testing companies (23andMe, Ancestry, FamilyTreeDNA, MyHeritage). These websites frame the process, meaning, and outcome of genetic testing in specific ways, and therefore play a crucial role in the social construction of DTC genetic testing. Additional data was drawn from an autoethnographic self-observation: The two researchers involved in our study conducted product research and reflected on their own decision-making process towards voluntarily taking or not taking a DTC genetic test. In the course of the study, we continuously documented, reflected upon, analyzed, and discussed our personal experiences with one another. In the end, one researcher ordered a genetic ancestry test, while the other stepped back from doing so. This reflective self-observation gave us the opportunity to directly experience (non-)customers' perspectives and to access specific information firsthand, e. g., on interaction with customer services or information provided in the course of ordering and conducting a test. The Institute for Advanced Studies' ethics committee approved the self-testing. Results from this self-observation have been estranged for privacy reasons.

Direct-to-consumer genetic ancestry tests are embedded in broader socio-historical conditions and address existing social desires with new technological means.

Co-constructing ancestry in genetic testing

Social context of DTC genetic ancestry tests

Throughout history, the ability to demonstrate one's ancestry has been of social, political, or economic significance. For centuries, ruling elites justified their grip on power on the basis of their noble descent. The rights enjoyed and duties owed in society may be linked to proven group membership (e. g. citizenship). The verification of a biological relationship (e. g. paternity) may lead to financial obligations or entitlements. For many individuals, their belonging by birth to a nation, ethnic group or family is a crucial facet of their personal identity. On the other hand, sociologists have pointed to the flexibility and processual nature of identity in modernity (Abels 2010). The functions and meanings assigned to *genealogy* – as a recreational activity, an ancillary or fully-fledged discipline in its own right, and/or sociopolitical tool – also vary (Teicher 2014). Thereby, the curiosity in one's family ancestry might reflect a general societal interest in the past and history (Tutton 2004, p. 106). Genealogy as historic research uses a variety of approaches including archival research or interviews with relatives to reconstruct or verify family trees. In the recent decades, online archives and various digital tools facilitating the collation and sharing of genealogical information have become increasingly important.

Dtc genetic ancestry tests are embedded in broader socio-historical conditions and address existing social desires with new technological means. Nordgren and Juengst (2009) have argued that these tests offer an opportunity to negotiate the individualism and uniqueness required of every person in modern societies, but also appeal to other desires. They suggest that the tests address "a pre-modern interest in elaborating a naturalistic account of personal identity, a modern enthusiasm for science, and a post-modern emphasis on radical individual self-determination" (Nordgren and Juengst 2009, p. 161). It is this social context in which DTC genetic ancestry tests are co-constructed, in which they receive and support social meaning and practices.

Dtc genetic testing companies constructing ancestry

The marketed genetic ancestry tests are designed to determine one's ethnic background and/or where one's ancestors lived. Lineage testing identifies maternal or paternal ancestry, by analyzing the mitochondrial (mtDNA) or y-chromosomal DNA (Y-DNA) respectively, and assigns those tested to specific temporally more distant ancestry (haplogroups). Both mtDNA and Y-DNA maintain their distinctive features in the process of reproduction and can therefore be used to identify geographically localized groups of people with the same female/male ancestor. "Ancestry Composition" (23andMe) or "myOrigins" (FamilyTreeDNA) admixture tests analyze so-called ancestry informative markers in the autosomal DNA (atDNA) to determine the extent to which various geographically localized ancestral groups have fed into the lineage of those tested (Shriver and Kittles 2004). For example, the tested researcher in our self-observation received both a written and a graphical overview of his ancestry graded by different levels of detail. At the top level, he was classified as being entirely of European ancestry. At the next level, this European ancestry was broken down by current nation states, making him partly French (41,1 percent), German (20,9 percent), Spanish (14,2 percent), and so on, all the way to Dutch (0,6 percent) and Swedish (0,1 percent). These shares were then broken down further by regions (e. g., Normandy or Bavaria). Not least by combining these various levels of detail, the test results construe ancestry as a *singular and plural entity at the same time*. Also, in line with the possibilities of the testing approaches, a single, temporally more distant ancestry (haplogroup) and more recent multiple ancestries (ancestry admixture) are presented. This sense of ancestry as singular and plural is present throughout the companies' advertisement: „Discover when different ancestries were introduced into your DNA. Learn how many generations ago you had an ancestor that was descended from a single population or ethnicity" (23andMe 2020 b).

In this, the companies use an essentialist language. Ancestry is presented as an *objective fact that merely needs to be exposed*. The companies regularly use notions such as "uncovering" or "discovering" ancestry inscribed in the DNA: "Uncover your ethnic origins and find new relatives with our simple DNA test" (MyHeritage 2020). At the same time, their marketing strategies emphasize the constantly evolving nature of the test results. Companies are forthright about the fact that their test results rest on estimates whose precision and reach is likely to increase: "Explore your ancestry's breakdown by region […] with results becoming more refined as our database continues to grow" (23andMe 2020 b). Despite acknowledging some limitations, this optimization of the analysis was also emphasized by the manager from a DTC genetic testing company who we interviewed. The results of the ancestry tests are dependent on the quality of reference databases. In most cases, the reference data for specific regions comes from present-day individuals who are assumed to have ancestors in the regions in question; ancient DNA from archaeological finds often does not have sufficient quality for a thorough analysis. Companies are not always transparent about the ways in which they create reference panels using their own customer-based databases and existing scientific data. However, some companies outline that, e. g., customers are considered for a reference panel if "they have four grandparents all born in the same country – and that the population of that country didn't experience massive migration" (23andMe 2020 a). Yet, even candidates who meet such criteria may still be excluded based on statistical calculations, as described by Ball et al. (2020). The companies present problems of this approach, such as the inadequate consideration of genetic diversity within certain regions/populations or the impact of migration (Bardill and Garrison 2015), rather as manageable challenge for research than as inherent limitations of their approach. While such accounts relativize the significance of the testing results (Ball et al. 2020), they do not question the genetic determination of ancestry per se but reinforce the *identification of an objective, genetically fixed ancestry by continuously improved technological and scientific means*.

Direct-to-consumer genetic testing companies use an essentialist language through which ancestry is presented as an objective fact.

In this, ancestry is not only presented as purely geographical localization. Rather, DTC genetic ancestry tests are advertised

as a *means of empowering oneself by strengthening one's sense of identity* (Lee 2013; Wagner et al. 2012), or as a company puts it: "More ways to discover what makes you, you" (23andMe 2020b). The notion that ancestry can help people make sense of their current lives hinges on the companies' conflation of regions of origin and cultural heritage and the claim that customers could effectively tap into this heritage once they know their test results (Walajahi et al. 2019). In some cases, companies even provide means of ostensible direct access to this heritage, e. g., by providing personalized music playlists (Ancestry 2020) or helping with travel arrangements (23andMe 2020c). Several companies carrying out DTC genetic ancestry tests also cross over into traditional genealogy, offering complementary online genealogy services such as digital access to historical records or family tree applications: „We recommend that anyone who takes a DNA test create a family tree, to make the most of DNA results and uncover the full story behind them" (MyHeritage 2020). However, in their marketing, the genetic makeup of an individual is described as definitive evidence of ancestry. Classical genealogy only contextualizes the genetic information and supports its interpretation.

Users co-constructing ancestry

The DTC genetic testing companies' websites tend to imply that the test results they provide will have nothing short of "an instantly transformative effect on [the] identity" (Scully et al. 2016, p. 178) of their customers. However, research points to a more ambivalent picture and shows that users actively co-construct the meaning of their genetic ancestry test results.

In their study on white nationalists' discussion of their test results in an online forum, Panofsky and Donovan (2019) showed that within one and the same community, users interpret and thus construct the meaning of genetic ancestry test results in varying ways. On the one hand, test results categorizing individuals as being entirely of European ancestry were given credence as evidence of racial "purity" (Panofsky and Donovan 2019, p. 675). On the other hand, of those who received less clear-cut results, many simply denied the validity of the test altogether. Others did not go this far, instead reinterpreting the results, e. g., by "dismiss[ing] low levels of anomalous ancestry as 'statistical error'" (Panofsky and Donovan 2019, p. 667). Further scholars too have highlighted that users do not just "swallow whatever the tests say" (Roth and Ivemark 2018, p. 176). Instead, they adapt the test results to match their identity-related aspirations. People hoping to establish their 'pure' ancestry are more likely to experience a disruption of some parts of their identity; others who embrace the idea of plural identities may welcome results indicating a diverse range of ancestors (Roth and Ivemark 2018). In some cases, even customers who indicated that their genetic ancestry test result was "just information" (Shim et al. 2018, p. 56), concurrently described how it was significant for themselves as proof of their identities (Shim et al. 2018).

The interpretation of genetic ancestry tests can also be in line with broader social and/or political aims. Genetic research and testing have been interlinked with the (re-)definition of indigeneity and the ensuing political claims (TallBear 2013). Genetic ancestry tests may in some cases fragment and in others strengthen social groups. Johnston (2003) outlines how in the USA, the tribal membership of the Black Seminoles, descendants of black slaves who became members of the Seminole Nation under specific historic circumstances, was questioned based upon genetic testing. Analyzing another case, Leroux (2018) describes how a group of descendants from European settlers used genetic ancestry tests to "regularly portray […] its members as the only authentic Indigenous people in 'their' territory" (Leroux 2018, p. 88). Through identifying some (tiny) shares of Native American DNA they genetically supported their political claims to indigenous land. Another case in point has been discussed by Sommer (2010): Pointing to their genetically identified Macedon ancestry, people from the (back then) Republic of Macedonia (since 2019: Republic of North Macedonia) substantiated their entitlement to name their native country Macedonia against demands of Greece that has a region of the same name. At the same time, the genetic testing company repeatedly dismissed these claims as mere propaganda and insisted that genetics were apolitical.

While these examples illustrate that the results of genetic ancestry tests can have consequences for those who receive them, in other cases they may have little impacts. For the researcher who took the test in the context of our autoethnographic study, the results were not particular noteworthy. Most striking about them was ultimately how difficult it was to interpret them in any meaningful way. In part, they simply confirmed what the researcher already knew about his family history. In part, the results did little more than confirm the insight that, not least due to migration, most people's ancestry is more diverse than they might think. Given the high number of potential origins, engaging with all these different regions the tested researcher otherwise does not have any affiliation with, did not evoke curiosity but rather overload. Cases of such *meaningless ancestry test results* have been reported elsewhere too (Horowitz et al. 2019; Shim et al. 2018).

Since DTC genetic ancestry tests often comprise a variety of different functionalities to find more or less deep ancestry but also living relatives, the customers' assessment of these products in total may be rather ambivalent. The interviewed genealogist and lay user were rather critical about identifying their links to specific ancestral tribes or people, but embraced other modes of use (especially finding relatives) as starting point for further genealogical research – in line with the company's assessment that genetics and classical genealogy complement each other (see above). Thus, they deemed these services to be *partially meaningful and partially useless*. In addition, the customer's option to retrieve the genetic raw data as digital file enables users to transform these DTC genetic ancestry tests into means of obtaining genetic data which then can be reanalyzed for other, even health-related purposes on third-party platforms (Nelson et al. 2019).

Discussion

Examining genetic ancestry tests through the lens of co-construction directs our attention towards the various ways in which they can be understood and used. In most cases, DTC genetic testing companies try to promote an objectivistic understanding of genetic ancestry tests and insist on being apolitical. However, users have repeatedly tried and often succeeded in subverting this understanding of genetic ancestry tests by using them in ways that transgress the intended use as conveyed by the DTC genetic ancestry companies.

Genetic ancestry tests may support genetic determinism, racism, and social discrimination.

Our study of genetic ancestry tests calls into question their framing as a simple form of recreational activity or entertainment as others have done before. Scholars have highlighted the risk of genetic ancestry tests supporting genetic determinism, racism, and social discrimination. Emphasis on the genetic identification of ancestry could weaken or undermine various social, political, or cultural modes of integrating social groups (TallBear 2013). The ways in which the reference panels are formed carry the risk of defining ancestry in terms of current populations rather than genuine historical communities and of side-lining or ignoring the diversity and distinctiveness of historical populations (Blell and Hunter 2019). This has the potential to reproduce racial categories and prioritize differences between rather than similarities within populations (Duster 2014). Moreover, on an individual level, the tests may well achieve the exact opposite of their ostensible purpose and create "genealogical disorientation" (Nelson 2008).

Our investigation has several limitations that mirror broader desiderata. Some research has been undertaken on the ways in which customers belonging to specific groups interpret and use genetic ancestry tests, as we have outlined in the section on users co-constructing ancestry tests. Larger studies on the impact of DTC genetic testing on customers in general have mainly focused on the rather specific context of the USA as immigration society with a history of slavery that continues to have a social effect on present day society (Horowitz et al. 2019; Roth and Ivemark 2018; Rubanovich et al. 2021; Shim et al. 2018; Wagner and Weiss 2012). In the European context, larger surveys have explored the attitude towards ancestry tests amongst other DTC genetic tests, such as a recent study amongst Danish citizens (Gerdes et al. 2021), but these rather focus on lifestyle- or health-related impacts of the respective tests. Single qualitative studies have analyzed how in England (Scully et al. 2016) or Switzerland (Sommer 2010) specific groups of users make sense of their test results. However, to the best of our knowledge, we still lack empirical insights about the overall dimension of genetic ancestry testing ordered by a variety of European customers including its impact on those using the tests and their wider social environment.

Funding declaration

This study was funded by the Foundation for Technology Assessment TA-SWISS (https://www.ta-swiss.ch/).

References

23andMe (2020 a): Ancestry composition guide. Available online at https://www.23andme.com/ancestry-composition-guide/, last accessed on 15. 12. 2020.

23andMe (2020 b): DNA ancestry. Available online at https://www.23andme.com/en-int/dna-ancestry/, last accessed on 15. 12. 2020.

23andMe (2020 c): DNA travel. Available online at https://www.23andme.com/en-int/dna-travel/, last accessed on 18. 12. 2020.

Abels, Heinz (2010): Identität. Wiesbaden: VS Verlag für Sozialwissenschaften.

Ancestry (2020): Spotify. Available online at https://www.ancestry.com/cs/spotify, last accessed on 18. 12. 2020.

Ball, Catherine et al. (2020): Ethnicity estimate 2020 white paper. Available online at https://www.ancestrycdn.com/dna/static/pdf/whitepapers/Ethnicity2020_white paper.pdf, last accessed on 11. 05. 2021.

Bardill, Jessica; Garrison, Nanibaa' (2015): Genetic ancestry testing. In: International encyclopedia of social and behavioral sciences, pp. 898–904. https://doi.org/10.1016/B978-0-08-097086-8.82075-9

Bijker, Wiebe; Hughes, Thomas; Pinch, Trevor (eds.) (1987): The social construction of technological systems. New directions in the sociology and history of technology. Cambridge, MA: MIT Press.

Blell, Mwenza; Hunter, Michael (2019): Direct-to-consumer genetic testing's red herring. "Genetic ancestry" and personalized medicine. In: Frontiers in Medicine 6 (48), pp. 1–7. https://doi.org/10.3389/fmed.2019.00048

Duster, Troy (2014): Social diversity in humans. Implications and hidden consequences for biological research. In: Cold Spring Harbor Perspectives in Biology 6 (5), p. a008482. https://doi.org/10.1101/cshperspect.a008482

Gerdes, Anne-Marie et al. (2021): Direct to consumer genetic testing in Denmark. Public knowledge, use, and attitudes. In: European Journal of Human Genetics 29, pp. 851–860. https://doi.org/10.1038/s41431-021-00810-3

Horowitz, Adam; Saperstein, Aliya; Little, Jasmine; Maiers, Martin; Hollenbach, Jill (2019): Consumer (dis-)interest in genetic ancestry testing. The roles of race, immigration, and ancestral certainty. In: New Genetics and Society 38 (2), pp. 165–194. https://doi.org/10.1080/14636778.2018.1562327

Johnston, Josephine (2003): Resisting a genetic identity. The Black Seminoles and genetic tests of ancestry. In: The Journal of Law, Medicine & Ethics 31 (2), pp. 262–271. https://doi.org/10.1111/j.1748-720X.2003.tb00087.x

Lang, Alexander et al.; TA-SWISS (eds.) (2020): Neue Anwendungen der DNA-Analyse. Chancen und Risiken. Interdisziplinäre Technikfolgenabschätzung. Zürich: vdf. https://doi.org/10.3218/4038-8

Lee, Sandra (2013): Race, risk, and recreation in personal genomics. The limits of play. In: Medical Anthropology Quarterly 27 (4), pp. 550–569. https://doi.org/10.1111/maq.12059

Leroux, Darryl (2018): 'We've been here for 2,000 years'. White settlers, Native American DNA and the phenomenon of indigenization. In: Social Studies of Science 48 (1), pp. 80–100. https://doi.org/10.1177/0306312717751863

Mählmann, Laura; Röcke, Christina; Brand, Angela; Hafen, Ernst; Vayena, Effy (2016): Attitudes towards personal genomics among older Swiss adults. An exploratory study. In: Applied and Translational Genomics 8, pp. 9–15. https://doi.org/10.1016/j.atg.2016.01.009

MyHeritage (2020): DNA. Available online at https://www.myheritage.com/dna, last accessed on 09. 11. 2020.

Nelson, Alondra (2008): Bio science. Genetic genealogy testing and the pursuit of African ancestry. In: Social Studies of Science 38 (5), pp. 759–783. https://doi.org/10.1177/0306312708091929

Nelson, Sarah; Bowen, Deborah; Fullerton, Stephanie (2019): Third-party genetic interpretation tools. A mixed methods study of consumer motivation and behavior. In: American Journal of Human Genetics 105 (1), pp. 122-131. https://doi.org/10.1016/j.ajhg.2019.05.014

Nordgren, Anders; Juengst, Eric (2009): Can genomics tell me who I am? Essentialistic rhetoric in direct-to-consumer DNA testing. In: New Genetics and Society 28 (2), pp. 157–172. https://doi.org/10.1080/14636770902901595

Oudshoorn, Nelly; Pinch, Trevor (2003): Introduction. How users and non-users matter. In: Nelly Oudshoorn and Trevor Pinch (eds.): How users matter. The co-construction of users and technology. Cambridge, MA: MIT Press, pp. 1–25. https://doi.org/10.7551/mitpress/3592.001.0001

Panofsky, Aaron; Donovan, Joan (2019): Genetic ancestry testing among white nationalists. From identity repair to citizen science. In: Social Studies of Science 49 (5), pp. 653–681. https://doi.org/10.1177/0306312719861434

Regalado, Antonio (2019): More than 26 million people have taken an at-home ancestry test. In: MIT – Technology Review. Available online at https://www.technologyreview.com/s/612880/more-than-26-million-people-have-taken-an-at-home-ancestry-test/, last accessed on 21. 05. 2021.

Roth, Wendy; Ivemark, Biorn (2018): Genetic options. The impact of genetic ancestry testing on consumers' racial and ethnic identities. In: American Journal of Sociology 124 (1), pp. 150–184. https://doi.org/10.1086/697487

Royal, Charmaine et al. (2010): Inferring genetic ancestry. Opportunities, challenges, and implications. In: The American Journal of Human Genetics 86 (5), pp. 661–673. https://doi.org/10.1016/J.AJHG.2010.03.011

Rubanovich, Caryn et al. (2021): Impacts of personal DNA ancestry testing. Journal of Community Genetics 12, pp. 37–52. https://doi.org/10.1007/s12687-020-00481-5

Scully, Marc; Brown, Steven; King, Turi (2016): Becoming a Viking. DNA testing, genetic ancestry and placeholder identity. In: Ethnic and Racial Studies 39 (2), pp. 162–180. https://doi.org/10.1080/01419870.2016.1105991

Shim, Janet; Rab Alam, Sonia; Aouizerat, Bradley (2018): Knowing something versus feeling different. The effects and non-effects of genetic ancestry on racial identity. In: New Genetics and Society 37 (1), pp. 44–66. https://doi.org/10.1080/14636778.2018.1430560

Shriver, Mark; Kittles, Rick (2004): Genetic ancestry and the search for personalized genetic histories. In: Nature Reviews Genetics 5 (8), pp. 611–618. https://doi.org/10.1038/nrg1405

Sommer, Marianne (2010): 'Wer sind Sie wirklich?' – Identität und Geschichte in der "Gensequenz". In: L'Homme – Europäische Zeitschrift für Feministische Geschichtswissenschaften 21 (2), pp. 51–70. https://doi.org/10.7767/lhomme.2010.21.2.51

TallBear, Kim (2013): Genomic articulations of indigeneity. In: Social Studies of Science 43 (4), pp. 509–533. https://doi.org/10.1177/0306312713483893

Teicher, Amir (2014): „Ahnenforschung macht frei". In: Historische Anthropologie 22 (1), pp. 67–90. https://doi.org/10.7788/ha-2014-0105

Tutton, Richard (2004): 'They want to know where they came from'. Population genetics, identity, and family genealogy. In: New Genetics and Society 23 (1), pp. 105–120. https://doi.org/10.1080/1463677042000189606

Wagner, Jennifer; Cooper, Jill; Sterling, Rene; Royal, Charmaine (2012): Tilting at windmills no longer. A data-driven discussion of DTC DNA ancestry tests. In: Genetics in Medicine 14 (6), pp. 586–593. https://doi.org/10.1038/gim.2011.77

Wagner, Jennifer; Weiss, Kenneth, (2012): Attitudes on DNA ancestry tests. In: Human Genetics 131, pp. 41–56. https://doi.org/10.1007/s00439-011-1034-5

Walajahi, Hina; Wilson, David; Hull, Sara (2019): Constructing identities. The implications of DTC ancestry testing for tribal communities. In: Genetics in Medicine. https://doi.org/10.1038/s41436-018-0429-2

ALEXANDER LANG

has been working as a researcher at the IHS since 2011. His sociological research focuses primarily on the meaning and challenges of new and emerging technologies. He also undertakes research on questions related to end-of-life care and the good death.

FLORIAN WINKLER

studied Sociology and is currently doing his Masters' in Science and Technology Studies. Since 2016, he has been research assistant at the IHS. He is interested in phenomena at the intersection of novel technologies and social practices.