

## **Bionetworking over DNA & food: Critical design probe for nutrigenomics**

Denisa Kera

National University of Singapore

Bionetworking is a convergence of Personal Genetic Information services (PGI) or Direct-to-Consumer Genomics (DTC) with web 2.0 platforms and social networking applications (Kera 2010). Genealogy and health related communities (<http://www.23andme.com>), clinical trials 2.0 (<http://www.diygenomics.org>) and new forms of families and relations based on sharing biological identities (<http://www.genepartner.com> and <http://www.donorsiblingregistry.com>) show different aspects of this convergence. The rise of social networking over DNA profiles and other biodata demonstrates the importance of interactive media design in rethinking the social and political implications of consumer-oriented genetics and citizen science projects. The convergence of these two powerful technologies creates biopolitical and biosocial interaction that brings together social and biological aspects of our collective and individual identities. Every new service and design idea around bionetworking is a test connecting nature and politics in a novel way via data that people monitor, share and crowdsource and over which they form new practices and communities. Bionetworking services provoke us to rethink the future in which cloud computing as a medium of an almost unlimited data collection and aggregation becomes a type of a social contract or even constitution via which we define relations between people and almost a type of politics in real time. I will describe one cultural probe (Gaver & Dunne 1999) that uses consumer genomics services and the emerging science of nutrigenomics to rethink the future of dining and interaction over genes and food.

The convergence of biosciences with web 2.0 democratizes scientific practices and opens issues of “biologization of politics from the perspective of citizenship” and “political economy of hope” (Rose & Novas 2004) leading to issues of “pastoral power” and “technologies of the self” (Foucault 2009) but also “cosmopolitics” (Latour 2004) as a possibility to rethink policy in terms of design. Bionetworking as a “cosmopolitical” tool connects design and politics by testing how newly defined parts (units, actors) form new assemblages and communities. The notion of cosmopolitics as “collective experimentation” and “progressive composition of the common world” (Latour 2004) offers a framework for understanding this connection between philosophy, policy and design. Bionetworking interfaces in this sense serve as probes for testing future collectives which transform the notions of human subjects, community and politics. Food is an interesting case for testing these future collectives because dining and “messing” together in various private and public forms is loosely related to social and political

structures. History of “messaging” together, communal eating and the social life organised around meals and dining (Grew 2000) defines our politics and society as a series of metabolic exchanges that are biological and political at the same time. American fast food soliloquies, communal and family organised hawker style eating in Singapore, European restaurant enclaves for small elites after all mirror the various political and economic systems.

Cultural probes are an experimental design research method that facilitates discussion between people who experience new interfaces or system and the people who design that experience. It is a design intervention that helps us gather initial data and generate unexpected ideas while avoiding the gap between the researchers and the “researched”. In this sense we designed a social experiment with messaging, food, DNA and politics that is looking into new social rituals around dining and new political and social metabolism for a bionetworked society. With this probe we hope to understand how politics, messaging, DNA identities and food relate to each other and how it can influence future debates on policy. The cultural probe named “23andme Dinner” becomes an experimental politics working with small and niche communities, trying to define a new “diet-tribe” or even “food-cult” similar to the ones that are starting to appear around applications and tools ranging from the DIY sous-vide appliances used by Paleo Dieters to geo-locative foraging services like Fallen Fruit for “freegans” to the crowd-sourced bio-data visualizations of nutri-genomics enthusiasts.

The design experiment will be conducted in May 2011 in two Hackerspaces in Prague and Bratislava and later in the year in Singapore. We decided to choose Hackerspaces as a symbolic place where innovation directly connects politics with design, community building with prototype testing, and offers an experimental setting for following the impact of emergent technologies on society. Hackerspaces are an alternative R&D places existing outside of the government funded universities or even corporate R&D labs. They are part of a larger phenomenon (FabLabs, Makerspaces, DIYbio labs, Citizen science projects based on Participatory Monitoring and Crowdsourcing of Data) that represent alternative approach to R&D that combines decentralized approaches to management and policy with P2P, open science and open innovation approaches based on open source hardware and software infrastructure. Global and alternative innovation networks are developing around Do-It-Yourself (DIY) and Do-It-With-Others (DIWO) subcultures, such as Direct to consumer (DTC) genomics, DIYbio labs, DIYgenomics, Clinical trials 2.0, Hackerspace hackathons, Maker fairs and FabLabs competitions. Communities of people monitoring, sharing and making sense of various scientific data and technological practices are exploring these new global

networks around low-tech DIY and open science protocols.

We are interested to follow the practices of dining and messing together in the age of personal genomics by proposing a dinner for people with 23andme.com profiles that are obsessed with data on their bodies. For this project we created an experimental cooks collective “Secret Cooks Club Singapore” ([www.secretcooks.org](http://www.secretcooks.org)) where we are testing ideas on how strangers interact over food. The popularity of personal genomics on the side of the public and the increasing importance of epigenomics for the scientific community create an ideal setting for the emergence of a new generation of social networking services that use DNA profiling and biodata as means of interaction over food. While the scientific community strives for more data that will explain the interactions between our genome and the environment, the general public seems to enjoy the serendipity behind interactions involving DNA profiles as we can see in the case of match-making and family tracing applications that connect complete strangers.

Nutrition modifies the expression of genes and it can protect the genome from damage or even directly alter gene expression and nutrigenomics is trying to define these interactions between our genome and food. The social experiment and probe “23andMe Dinner - You Are What You Eat but you can also Eat What You Are” is a scenario in which gastronomy meets nutrigenomics, simple dinner dedicated to the father of gastronomy - Brillat-Savarin, and the emperor Rudolf II. who served as a model for Arcimboldo’s portrait of the Roman God Vertumnus, reducing a human to an assemblage of vegetables in a manner similar to which scientists show how we share parts of our genome with various flora and fauna. Guests in this dinner simply enjoy food, interact over available information on genes and play with a near future scenario on dining in the age of personalized genomics trying to answer questions such as: What happens when DNA decides on your menu? How will restaurants use DNA data? Will it be all health related or we can think of some entertainment value of DNA data? How will people connect and interact over such data? How will this affect their experience of dining?

The menu is defined by different services related to 23andme profile. The starter is an “Ancestry Map: DNA tour in time & space” where genes and food meet to create a genealogical portrait. Food is used to represent the genetic and culinary inheritance and the closest region where DNA mixes and creates the unique individuality of the person. For example, one of the guests whose genetic ancestry states that “You test 70% Tuscan, 24% Lithuanian, and the rest Mideastern. The spot on the map, which is probably a good guess, is

near Trieste. The chromosomes show clear, recent, Mideastern mixing. The parts of the chromosomes showing the Mideast are roughly 50% Mideastern, perhaps Jewish, while the rest are western European” will have the following starter: “XY, on your plate Tuscany brochette with pecorino which is 70% of your plate meets Ashkenazim and East European stuffed mushrooms (or potato pancakes) and to add to uncertainty we put 6% of hummus to refer to that Mideastern mess. The hummus is a celebration of your 6 chromosome which is your most Mideastern part and which plays important role in the immune response but also sexual attraction since it is the base for the 100 genes that are part of the Major Histocompatibility Complex closely linked olfactory receptors.”

The main course will work with several genes related to sugar intake and metabolism of folates (ADRA2A, MTHFR & TAS2R38 variations). For example meat will be served in portions of different sizes depending the sugar intake efficiency status (ADRA2A gene) with the right balance of green veggies like asparagus, spinach and broccoli that will balance individual needs for folates (MTHFR gene). The 8q24 region, SMAD7, LOC120376 and 15q13.3 regions are also part of designing the menu to decide on meat consumption. The green, leafy and healthy veggies will also test the PROP status (TAS2R38 gene) of the participants, the ability to detect taste and various bitter combinations. It will become a playful reminder that the first gastronomers were people with elevated PROP status and sensitive bitter receptors foraging and testing the surrounding flora. The goal is to check how many of the participants preserved this taste curiosity and whether the TAS2R38 gene works as described. The drinks will be served based on the opioid receptor gene (OPRM1) and the final cup of green or black tea is based the COMT gene status will reveal some “behavioral issues and secrets”. Based on the analysis of the gene related to alcoholism, the same guest will get a certain number of drinks with a following card and explanation on the personalized menu created before the guest made a reservation:” Your opioid receptor gene OPRM1 entitles you to only one and a half glass of wine. Having two copies of the A version at the SNP rs1799971 increases your odds of severe alcoholism 2.16 times because you have more than 12 years of education. We can serve you that extra half of a glass because your education, the odds of severe alcoholism are 3.3 times higher for individuals with two A copies of the OPRM1 SNP rs1799971 when combined with less than 12 years of education. Unfortunately however, you have two copies of a variant in the DRD2 gene affecting the neurotransmitter dopamine receptors and increasing the risk of severe alcoholism 1.85 times. To add some words of comfort, this configuration of your OPRM1 SNP decreases sensitivity to social rejection so you will not suffer when people criticize you that you are drinking less and you will not feel being a burden to others. People with two A copies of the

OPRM1 SNP rs1799971 have significantly lower levels of sensitivity to social rejection and even pain. Your lower brain activity in the anterior cingulate cortex and the anterior insula, brain regions associated with the processing of both physical and emotional pain, make you more resilient than the people with one or two Gs.”

We hope this design (cultural) probe will explore certain extreme versions of cosmopolitics of food, human and non-human interaction and metabolism formed around food and genes. The prototype will connect discourses, rituals and objects related to food, DNA, taste and pleasure. These performative and evocative qualities of the prototype explore the chemical, discursive and social affinities and associations between words, science facts and social customs. Prototypes become tools for provoking collective and individual associations, fears and hopes, balancing between apocalyptic and prophetic visions. It becomes a tool for experimental collectives (cosmopolitics) between humans and non-humans in what Bruno Latour envisions as a Parliament of Things. Eating here represent the ultimate form of “cosmopolitics”.

## References

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