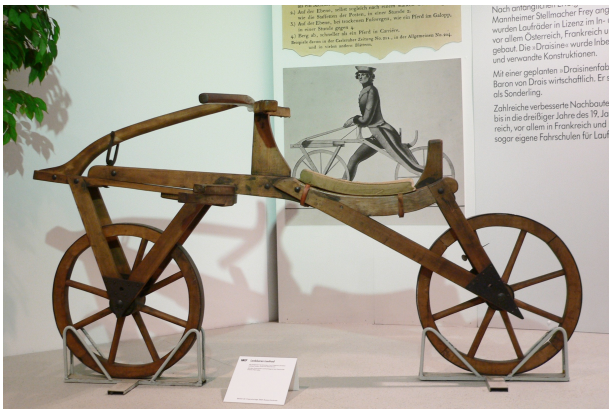
Invited emotions and the human being 2.0

By Alexander Bogner[1]



When Karl Drais, a forest officer living in Karlsruhe, Germany, went on a first ride with his new invention called 'draisine', the forerunner of our bicycle, he provoked an outcry. In 1817, the interested public didn't believe that this velocipede was safe. Were ordinary people really able to balance this two-wheeler 'running machine' and to master its alarming speed (up to 4 mph)?

Take the draisine, the railroad or anti-biotics as examples: All these innovations that have meanwhile developed into an everyday part of our life and are taken for granted have initially been refused for several reasons. Today, these innovations are accepted even though occasionally, questions arise concerning their risks and unintended consequences. Is it really surprising, therefore, that synthetic biology, from the public's perspective, not only represents a promising innovation but also a research field which fuels remarkable anxiety?

Ambivalent attitudes

In Mid-September, a public dialogue event initiated and organized by a SYNENERGENE mini consortium took place in Karlsruhe. By putting it into the wider context of the history of technology, the moderator introduced synthetic biology as an ambivalent innovation. In the same vein, and based on interviews with citizens, the short introductory trailer documented that laypeople are highly ambivalent about the benefits and the ethical challenges raised by synthetic biology. Maybe synthetic biology really represents a promising research field – but are there any useful applications at all to be expected in the near future?

Michael Liss, a geneticist and representative of the Synbio Industry in SYNENERGENE, provided some examples. So far, the most prominent success is the artificial production of artemisinin used as a vaccine against malaria. In the wild, the herb artemisia takes lot of time to grow. Thanks to the successful synthesis in engineered organisms, first carried out by a team in Berkeley in 2006, the vaccine can be produced at will. Generally, research for new and rapidly deliverable vaccines is one of the hottest issues in synthetic biology. It focuses, amongst others, on the fight against the Asian avian influenza (H5N1). With a view to energy and sustainability, synthetic biology might contribute to develop a procedure to convert carbon dioxide into renewable combustible raw material with the help of genetically enhanced algae.

Joachim Boldt, philosopher and member of the SYNENERGENE team, stressed that with synthetic biology a new engineering-like perspective has been established within biology. According to this model, nature is a universal system made up by a kind of Lego pie-

ces of all varieties. As the Lego pieces can be perfectly controlled and coupled to each other at will, nature can be designed. However, as Boldt mentioned, this model does not fully reflect reality since it neglects all the context variables relevant for living systems. Currently, the international research community strictly focuses on single-cell organisms and does not intend to re-design the human being. Therefore, we should not be too afraid of a future Synbio-based project called 'human being 2.0'. In fact, in pluralist societies there will never be a unanimous opinion on how the 'perfect' human being should look like. However, without such an agreement any technical solutions would not be productive, said Boldt.

Enabling two-way communication

Christopher Coenen, a political scientist and the project leader of SYNENERGENE, reminded the audience that the added value of a public dialogue event is to enable a two-way communication to introduce new aspects and perspectives by the non-experts. He especially invited people to bring in personal statements, emotions and even disgust. Even though a public dialogue on highly abstract issues such as synthetic biology must be based on some information from experts, people should not follow the academically narrowed path of discussion.
Although the organizer explicitly welcomed emotions, the public debate to a large extent centered on difficult and sophisticated issues showing some of the speakers' high level of expertise. They raised questions such as: what visions are relevant for the research in synthetic biology? What notion of progress is implied? Others problematized the research with a view to economic aspects: how to avoid the monopolization of expertise and products as in the case of agri-biotechnology? Even unintended consequences of the laboratory style of research were addressed.

Avoiding unintended consequences

Regarding unintended consequences, a participant stressed an example from the 1950s, when Mao Zedong's China embarked on a crusade against the 'four pests'. The aim was to exterminate mosquitoes, flies, rats and sparrows – the birds were identified as a pest because they ate grain seeds. This campaign resulted in the birds' near-extinction. Somewhat later party leaders realized that rice yields were significantly lower – sparrows ate a large amount of insects as well. From now on, poisons and pesticides were used to kill the ballooning populations of insects. According to the participant, this story nicely illustrated what consequences we might have to face when neglecting the ecological environment of living organisms.

How can we avoid such mistakes? For synthetic biology, lab research has necessarily to rely on models and heuristics not fully representing the complex reality. When a particular application of synthetic biology will be released and used in daily life – how can we secure that we had the relevant context variables taken into account? With a view to current research: Is there an organized exchange between biologists and, let's say, climate experts, meteorologists or insect researchers? How to ensure an interdisciplinary dialogue in an era when disciplines split up into sub-disciplines? Currently, boundaries among disciplines and research fields are vigorously held up, as Joachim Boldt pointed out, so he called for an early risk assessment of possible applications from an ecosystems' perspective.

The lively exchanges between invited experts and the audience was a result of the elaborate organization intended to enable the public to engage. Three different modes of consulting the audience were provided: Some participants entered the debate by taking the micro; others had their say anonymously by throwing into a box a message on a piece of paper that was then read by the moderator. Inspired by the 'fishbowl' type of conversation, more venturous people were supposed to enter the expert circle by taking the free chair on the podium. One participant confessing to be a teacher entered the podium and joined the experts' debate introducing aspects he had been confronted with in his classes. Unfortunately, the moderator forgot to ask him to return to the audience and to give the chair to other discussants.

In sum, the public dialogue event in Karlsruhe was highly appreciated. Participants interviewed after the event especially highlighted the variety of engagement methods applied. Most interviewees said that their interest in the new research field had definitely increased, and some stressed that – due to the scientific information – they had profoundly changed their attitude. "I learned a lot about the potential capacity of synthetic biology, so that the whole story now has a definitely positive connotation for me."

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