

## COMMUNICATING EVIDENCE? ON THE INTERACTION OF POLITICS, DATA AND THE PUBLIC

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*Abstract: Using the example of a fairly recent case of (data-based) political decision-making in Germany, namely the so called ‘energy transition’, I shall analyse how data are used in the communication processes between politics and the public. Based on the well-known notion of statistical literacy as well as on the seminal work of Nowotny, Stehr and Weingart, I shall present a sociological model that will help to understand both the importance of data and the (tacit) assumptions about citizens and their statistical skills. Pointing out problems that arise when taking these assumptions for granted, I shall propose a refined perspective of how statistical literacy should be discussed and implemented in an educational context. As a result of my analysis, I shall suggest broadening the very construct of statistical literacy.*

### INTRODUCTION

Increasingly, political decision processes in Germany (and elsewhere) are being based upon scientific expertise. This development is part of a general trend towards evidence-based politics, relying heavily on large amounts of (numerical) data. In order to cope with (meaning to understand and evaluate) this kind of information, a new ideal of citizenship has been put forward in the last two decades: the *scientific citizen*.

The notion of the scientific citizen [...] entails the ideas of rights and duties: thus the right of being informed about science and technology, to join in and have a say, but as well the duty to inform oneself, to face things up, to back decisions, to act in the interest of a collective one feels being part of. (Felt 2003, 19)

As scientific and technological knowledge is based on the analysis of empirical data, unsurprisingly this new paradigm is accompanied by the concept of statistics education, promoting the idea of *statistical literacy* (cf. Ben-Zvi & Garfield 2004; Gal 2002; Watson 2006).

[T]he term ‘statistical literacy’ refers broadly to two interrelated components, primarily (a) people’s ability to interpret and critically evaluate statistical information, data-related arguments, or stochastic phenomena, which they may encounter in diverse contexts, and when relevant (b) their ability to discuss or communicate their reactions to such statistical information, such as their understanding of the meaning of the information, their opinions about the implications of this information, or their concerns regarding the acceptability of given conclusions. (Gal 2002, 2-3)

In what follows, I shall present a sociological model that will help to understand the (mostly tacit) assumptions about citizens and their statistical skills. Moreover, I shall analyse how data are used in communication processes between politics and the public. To do so, I shall use the example of a fairly recent case of (data-based) political decision-making in Germany: the so called *energy transition* (Energiewende), the term designating a shift towards a post-carbon energy economy. Finally, I shall re-evaluate the idea of statistical literacy and propose two enhancements.

### THE KNOWLEDGE-SOCIETY

Between the years 1960 and 1990, sociologists have diagnosed a process of cultural change in modern societies. I shall focus on just two major aspects relevant for my case.

The first one is *democratisation* in the context of political decision-making (cf. Gerhards 2001; Nowotny 2004; Weingart 2001). In the wake of a general shift from personal/social authority towards impersonal/fact-bound authority, the public gets a voice and is invited to participate, while politics is under growing pressure of (impersonal) legitimation. In this context, auditing and assessment procedures, performance indicators and evidence-based policies are implemented as tools of mediation between politics and the public.

The second one is *scientification* (cf. Stehr 1994; Weingart 2001). Following a general trend towards the so-called (scientific) ‘knowledge society’, all spheres of life are being penetrated by scientific knowledge, thereby devaluating other forms of knowledge, and establishing (scientific) knowledge production as an (economic) production sector of its own.

The promise of the knowledge society – knowledge understood as a means of imparting meaning to the world – is not only to offer (scientific) answers to problems in society as a whole, but to provide solutions that are socially more equitable, economically more effective, politically more rational, and ecologically more sustainable. To embrace this promise and to enter into a strategic partnership with science appears to be self-evident for politics, as science can provide politics with (impersonal) expert knowledge and hence with democratic legitimation – in exchange for institutional safeguarding and assigning of resources. This, in turn, requires by necessity a scientifically literate public. Thus, the scientific citizen is born.

As scientific and technological innovations become increasingly central to the functioning of modern societies and to the daily lives of individual citizens, the argument goes, so the importance of technical and scientific knowledge within the mass public is concomitantly augmented. (Sturgis & Allum 2004, 55-56)

## SCIENTIFIC CITIZENS IN ACTION

Recent research has clearly shown, however, that the ideal of scientific citizens does not hold in reality. According to a recent poll in the EU,

[a]t least half of the respondents expect that, 15 years from now on, science and technological development will have a positive impact on [...] energy supply (58%), protection of the environment (57%), fight against climate change (54%) [...]. (European Commission 2014, 7)

The figures for Germany are similar. In other words: A considerable number of EU citizens do not believe in the promise of the knowledge-society.

Again, sociologists have different explanations to offer. One position claims there is a certain ignorance in the public concerning science, including a loss of interest, a lack of understanding, and a loss of trust. As a solution, confidence in science has to be restored – awarding a mandate to (science) journalism and media (cf. Felt 2003; Sturgis & Allum 2004). Another position claims there are deficits in the public concerning scientific literacy. There is

a wider belief in scientific and policy circles that this [science-centeredness] is naturally how the world is. The assumption appears natural that science is unitary and coherent, and that it should be central to everyday beliefs and practices. This allows us not only to measure how far people fall short of some level of scientific understanding – that is, their ‘ignorance’ – but also to assume that such ignorance indicates a deficit of democratic capability. (Wynne 1991, 112)

As a solution, deficits have to be reduced, mandating educational institutions with this task. However, both diagnoses are only partially true. The perceived ‘lack of confidence’ is not totally unfounded, as the proliferation of scientific knowledge does not simply solve problems, but at the same time produces new problems such as risk perception, the limits of scientific knowledge, ignorance, and the politicisation of science (cf. Felt 2003; Weingart 2001). Likewise, the perception of ‘deficits’ is ambiguous:

Thus the main insight here is that public uptake (or not) of science is not based upon intellectual capability as much as social-institutional factors having to do with social access, trust, and negotiation as opposed to imposed authority. When these motivational factors are positive, people show a remarkable capability to assimilate and use science or other knowledge derived (inter alia) from science. [...] Our research shows people to be astute at taking up science as a means (when the right social conditions prevail) but wary about its ends and interests. (Wynne 1991, 116 & 120)

Having made these observations, the obvious thing on the agenda is to renegotiate the interplay of politics, science, and the public.

Expertise has never before been so indispensable, while being simultaneously so hotly contested. The question of whose knowledge is to be recognised, translated and incorporated into action has been exacerbated under the pressure for democratisation. (Nowotny 2003, 151-152)

Bearing this in mind, the question of statistical literacy, i.e. of demands on statistically (and thus scientifically) empowered citizens is open to renegotiation, too.

#### A CASE IN POINT: THE ENERGY TRANSITION

In publishing a brochure called *energy concept* (Energiekonzept) in 2010, the German government set the framework for the energy transition as a far reaching long-term political process:

[T]he German government set itself the goal of making Germany one of the most energy-efficient and environmentally sound economies in the world while maintaining competitive energy prices and a high level of prosperity. (FMET & FME 2012, 2)

With this concept – being a direct implementation of the *EU 2020 climate and energy package* enacted in 2009 – Germany became one of the global pioneers in establishing a sustainable energy economy. Not surprisingly, this political bravura performance had been thoroughly prepared in advance. Among other things, a group of experts had been commissioned to model data-driven *energy scenarios* (documented in a 267-page brochure of the same title) in order to assess the consequences of possible political decisions.



Figure 1. Cover pages of the brochures discussed in this text (from left to right): *energy concept* (FMET 2010), English summary of the *first monitoring report* (FMET & FME 2012), *energy scenarios* (Prognos AG & EWI & GWS 2010).

I shall use the *energy scenarios* to demonstrate how the theoretical framework of knowledge-society and scientific citizens developed above works ‘in action’. As an in-depth analysis of the brochure is beyond the scope of this article, I shall confine myself to discussing three representative extracts from the summary: a text excerpt, a table and a diagram. The brochure begins by explaining the background:

In their coalition agreement [...] CDU/CSU and FDP have agreed to put forward an energy concept in 2010 [...]. Basis for the energy concept are both a reference scenario and four different target scenarios for the future energy supply of Germany [...]. The key parameters of the scenarios have been developed in an ongoing discussion process between clients (FMET/FME) and experts. The retrofitting costs of nuclear power plants have been specified in two different sets of data [...]. The four scenarios have been simulated with both sets, respectively. (Prognos AG & EWI & GWS 2010, 1)

Table 1. Key parameters of the energy scenarios (Prognos AG & EWI & GWS 2010, 4).

	Scenario I	Scenario II	Scenario III	Scenario IV	Reference Scenario
<b>Greenhouse gas emissions</b> (compared with 1990)	- 40% by 2020  - 85% by 2050	Expert proposal			
<b>Lifetime extension of nuclear power plants</b>	4 years	12 years	20 years	28 years	No lifetime extension
<b>Energy efficiency (increase)</b>	endogenous determination	2.3-2.5% per year	2.3-2.5% per year	endogenous determination	Business as usual (1.7-1.9% per year)
<b>Renewables</b>					
share in gross final energy consumption 2020	≥ 18%	≥ 18%	≥ 18%	≥ 18%	≥ 16%
share in primary energy consumption 2050	≥ 50%	≥ 50%	≥ 50%	≥ 50%	Expert proposal

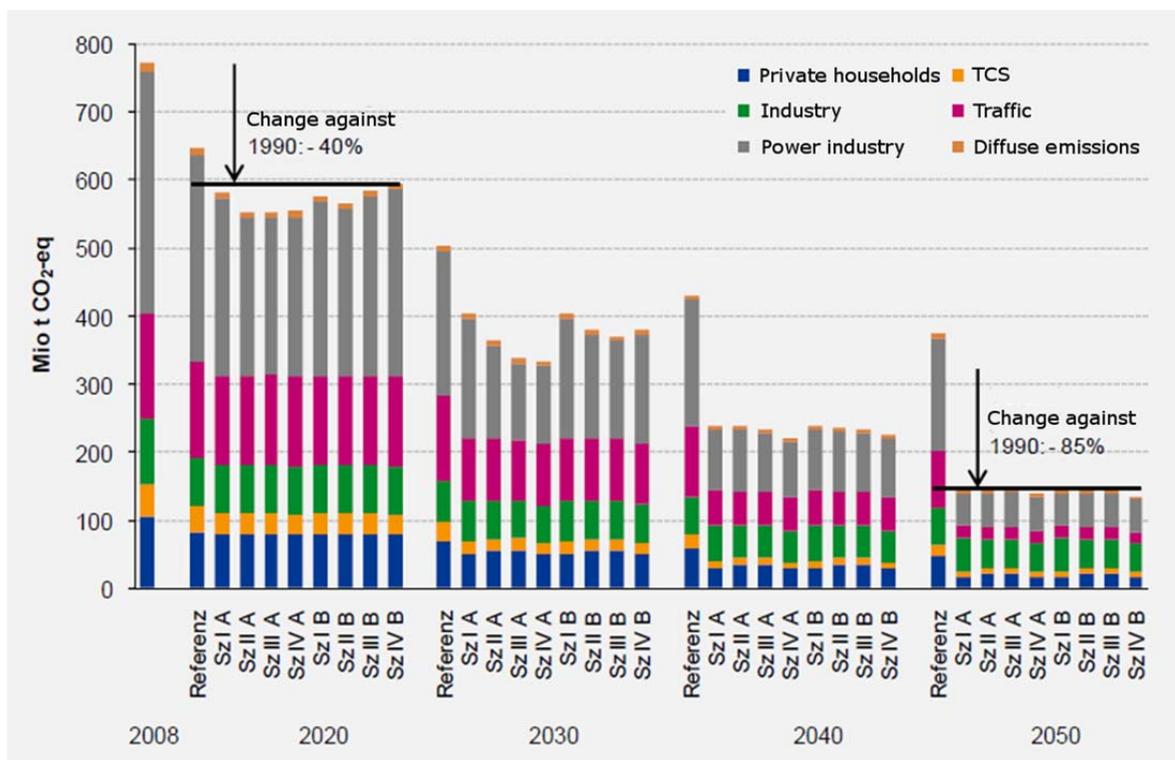


Figure 2. Greenhouse gas emissions according to sectors 2008-2050, in Mio t CO<sub>2</sub>-eq. (Prognos AG & EWI & GWS 2010, 6).

Then, the function of the energy scenarios is set forth:

Scenarios describe possible futures. They don't raise a claim to show the (from today's view) most probable development. Target scenarios point out possible ways of how to attain given targets. In the target scenarios examined here, the central question is: What technical measures of reducing energy consumption and greenhouse gas emission are suitable for attaining the targets? [...] The purpose of the target scenarios developed here is to provide against the background of the defined requirements a factual basis for energy- and climate-political decisions as well as to show the necessary measures to attain the targets. (Prognos AG & EWI & GWS 2010, 2)

Taking a look at Table 1, the scenarios' targets can easily be identified: by 2020 a 40% cut in greenhouse gas emissions and at least 18% energy from renewables, by 2050 a 85% cut in greenhouse gas emissions and at least 50% energy from renewables, as well as an annual increase in energy efficiency by 2.3-2.5% – these numbers being in accordance with the EU *climate and energy package* and Germany's *energy concept*, of course. (I have skipped the somewhat technical difference between gross final energy consumption and primary energy consumption.) Only one parameter is systematically varied in the four scenarios: the lifetime extension of nuclear power plants, the costs of retrofitting being modelled by two different sets of data, respectively.

Figure 2 shows the simulation results for greenhouse gas emissions over time, arguably the most important parameter. As expected from target scenarios, they all meet both the targets for 2020 and 2050, showing

that the greenhouse gas reductions striven for are feasible under the prerequisites and measures stated in the target scenarios. Therefore, it is a question of anchoring within society and politics, whether the targets [...] are achieved. (Prognos AG & EWI & GWS 2010, 191)

On closer examination of these extracts, three things can be observed. First, this example is obviously a case of communicating data-based evidence and draws heavily on the notion of the scientific citizen, presupposing statistical literacy in virtually all its facets – with all the difficulties this reference entails. To understand (and dispute) Germany's energy politics means (among others) to understand the *energy concept*, which in turn means to understand the *energy scenarios*, as these allegedly demonstrate the feasibility of the energy-political targets (allegedly, as meanwhile, most of the targets for 2020 have been established as virtually unattainable; cf. EC 2014, 8-11). So, in order to get a voice in this policy, citizens need a sound understanding of numbers and percentages, have to read and translate between texts, tables and diagrams, and are supposed to delve into the intricacies of mathematical modelling (to name just a few points).

Second, the case study exemplifies that not all elements of statistical literacy are of equal importance, context knowledge outranking the others by far – illustrating once more the well-known difficulties that arise when honestly addressing authentic data in an educational context. To begin with, there is a considerable amount of professional jargon and technical language to cope with. More importantly, a detailed context knowledge about the energy political discourse in Germany is necessary for a deeper understanding of the expert modelling. In fact (and in full accordance with my theoretical assumptions), the energy scenarios turn out to be a scientific argument in a political debate about lifetime extension of existing nuclear power plants – a topic quite emotionally debated in public dialogue.

In 2002, the *law on controlled phasing out the use of nuclear energy for the commercial generation of energy* had been passed by a centre-left coalition of SPD (Social Democratic Party) and Grüne (the Greens), fixing the planned shut-down of the last nuclear power plant in Germany in 2022 – a heavily contested decision pushed by the Greens, the then coalition's junior partner. Three years later, the Greens lost their participation in government, and 2009 a centre-right coalition of CDU/CSU (Christian Democratic Union/Christian Social Union) and FDP (Free Democratic Party) planned to weaken the phasing out of nuclear energy by extending the lifetime of existing nuclear power plants up until 2036, declaring nuclear power a 'bridging technology' (Brückentechnologie). Accordingly, it takes no wonder to read in the *energy concept*:

On behalf of the German federal government, external experts have simulated different scenarios in regards to the energy concept, to demonstrate the challenges but also approaches and measures as well as ecological and economical implications. [...] A limited extension of the operating lives of existing nuclear power plants makes a key contribution to achieving the three energy policy goals of climate protection, economic efficiency and supply security in Germany within a transitional period. It paves the way for the age of renewable energy, particularly through price-curling impacts and a reduction in energy-related greenhouse gas emissions. (FMET 2010, 5 & 15)

Considering the choice between coal-fired power plants producing greenhouse gases versus nuclear power plants producing radioactive waste, however, it seems rather obvious that an extended operation of nuclear power plants results in less greenhouse gas emissions, which in turn questions the real meaning of the expert modelling.

These considerations lead to my third point: By mixing (up) political targets and model results, the energy scenarios undermine the very principles of transparency and acceptance they are supposed to uphold— demonstrating the need of re-evaluating the ‘critical’ dimension of statistical literacy. And again, it is more than a passing remark that after the Fukushima nuclear disaster in 2011, when public opinion in Germany strongly opposed the use of nuclear power, the very same government decided within weeks upon an ‘accelerated’ energy transition with a phasing out of nuclear energy by 2022 (cf. Grasselt 2015, 137-140) – albeit this time based on a broad social consensus.

## CONCLUSION

Politics and science in Germany and elsewhere have entered into a strategic partnership and established data-based evidence as an important tool for communicating political decision-processes to the public. In doing so, the German government holds traditional assumptions about citizenship, presupposing an interested and proactive scientific citizen. This finding is in agreement with findings from studies in other countries (for the UK cf. Miller 2001), suggesting that Germany is but one example and my argument can be generalised.

In any case, consequences on the way statistical literacy should be discussed and implemented in class-rooms are profound. First, the very idea of statistical literacy, and even statistics education itself, is part of a transition of modern societies towards a knowledge society. Thus, the strong disciplinary focus in statistics education needs rethinking: the use and misuse of data-based evidence is not guided by statistical considerations alone, as my case study illustrates vividly.

Second, this change of focus entails a revised time frame when analysing authentic data in educational settings. Delving into a context, as is well known, takes time – but this time is well spent when students can experience that statistics is a means of imparting meaning to the world, and not vice versa. Third, fostering esteem towards statistics cannot be overestimated, but has to be balanced by clearly outlining the limits of statistical methods. All too often, statisticians still believe in having privileged access to truth – which leads back to my first point.

Drawing heavily on Gal’s analysis up to this point, in the light of my results I suggest broadening the very construct of statistical literacy in terms of interest and initiative by adding two aspects.

The first one is the aspect I term *ignorance knowledge*. Transcending the mere factuality of content knowledge, statistical literacy has to address questions such as: What do we want to know? What do we *not* want to know? How can this distinction be justified? And can citizens legitimately not want to know? Considering the example at hand, can citizens ‘vote out’ of knowing about sustainable energy, climate change, and the political course taken, and if so, at what costs?

Being part of the knowledge-society, it is no wonder that the state of not-knowing is scarcely accepted and seems to be the poor cousin of current research. One of the notable exceptions is Dorniok (2015), who argues convincingly that ignorance is one (but not the only) precondition for social development and acts as social stabiliser as well as stabiliser of the individual self. The above example can serve as vivid example of Dorniok’s argument that more evidence, more data, and more scientific expertise do not necessarily lead to better decisions. On the contrary:

A conscious use of ignorance [...], e.g. a selective sorting (out) of knowledge provides protection and brings about a more conscious knowledge handling by incorporating the limits of knowledge, its quality and quantity, so that actions and decisions founder on the wealth of knowledge. Only this self-protection allows for handling existing and achievable knowledge and for remaining able to take decisions and to act [...]. (Dorniok 2015, 28-29)

This brings me to the second aspect I term *mediation knowledge*. Modern societies have to cope with very abstract and global notions as, for example, energy supply. To foster democratic participation in a knowledge-society, where (scientific) expertise is not only indispensable but at the same time hotly contested, as Nowotny so appositely comments, these abstract notions have to be mediated with the everyday and local experience of people. Thus, numerical data, and therewith statistics still seem to be the proper means, even though their (epistemologically) problematic tendency of (de)contextualisation has to be taken into account.

This challenge is not new, but similar to the case of ignorance, statisticians and statistics educators are hesitating to let go of the privilege of expertise (in its present, hierarchical form). Maybe, a change of perspective is pending. Statistics should be considered neither as an end in itself nor as a means to an end. I suggest thinking about statistical knowledge in terms of a knowledge infrastructure (cf. Edwards 2010, 1-25; Ullmann 2015, 5): similar to electricity or the internet, it is ubiquitous, reliable (within certain limits), widely shared and comprehensible. Statistical knowledge is in hand and ready for use – and will be used, if and when what Wynne calls ‘motivational factors’ are positive. In the end, as it turns out, statistics (education) is about a shared meaning of a shared world.

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