

How can science assert itself in the age of “fake news”?

Presentations and discussions on a topical subject at the 7th Stakeholder Conference of the German Federal Institute for Risk Assessment

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The term “fake news” has become a bit hackneyed. It stands for falsified news distributed in the media network for manipulative purposes – most of them connected with a subtle political message. More and more often, science is becoming a target of fake news with a jump in simultaneous reports about falsified research (fake science) and pseudoscientific “predatory publications” (fake journals). Add to this criticism of science itself for a variety of reasons.

Scientifically supported arguments – may it be in climate research or the health assessment of plant protection products – only appear as an opinion, which people can share or not. Hard facts are substituted by perceived knowledge. This crisis of trust was reason enough for the German Federal Institute for Risk Assessment to hold its 7th Stakeholder Conference with renowned speakers in the auditorium of the Kaiserin-Friedrich Institution in Berlin-Mitte on 15 November 2018 using the motto “All a fake? Science in the Age of Many Truths”. A summary of the presentations and discussions is given below.

In theory, at least, the problem of fake news is easy to solve. “Science is the conformance of a statement with the matter about which it is made,” was the definition that **Bernhard Kühnle**, head of the Food Safety and Veterinary Health department at the Federal Ministry of Food and Agriculture, quoted from the Duden dictionary. On the way towards this truth science is indispensable, for instance in such areas as consumer protection. According to Kühnle its assessments form a sound basis for reliable decisions from consumer protection institutions as well as for food companies; it should also help people to decide in favour of a healthy and balanced diet. “Science must be strengthened and protected as a reputable and trustworthy source,” said Kühnle. Science helps to ward off fake news.

Science doesn’t belong in a drawer

To perform its task properly, science must be transparent, upright and of top quality, Kühnle demanded. Scientific work and publishing must be independent of political deliberations and economic interests. “Nothing that is ready for publication should be kept in the drawer”.

The sectors to which this appeal is addressed – politics, trade and industry, the media and civil society – have an obligation too, according to Kühnle: “There should be no tactical dealing with the truth.” This means that science is not only good when it supports their own positions and interests and doubtful when it contradicts them. “You can vehemently advocate a pesticide-free agriculture without discrediting those who conduct professional risk assessments of plant protection products,” remarked Kühnle. Scientifically founded facts are no substitute for political and social debate, they form its basis.

Glyphosate: Everyone an expert?

Some people live in a social media bubble and believe everything they read there, said **Alois Gerig** (CDU/CSU), chair of the German Federal Government Committee for Food and Agriculture. “They allow themselves to be manipulated.” An example of this is the unobjective

and sometimes hysterical discussion about plant protection products containing the active substance glyphosate. All of a sudden there were 80 million experts on this subject in Germany who were all driven in one direction by the media. These have a tendency to “emotionalise, moralise and polarise”. The boundary between facts and opinion becomes blurred and there are fewer reports about issues with a complex scientific background. “In the age of the internet, it has become much more difficult to distinguish between facts and fake,” said Gerig.

Just like the previous speaker, Gerig attributed an important role to science in the discussion about fake news. The BfR is an example here of good scientific work: “You help us to recognise the real risks”. In the “postfactual age”, the combating of fake news is a task facing all of society which should not be left up to science alone. The press and social media should also take on more social responsibility. Gerig can also envisage an internet platform on which reliable scientific information is provided – a “better Wikipedia”.

Speed not thoroughness decides debates

The first tweet, the first newsflash and the first quote from a politician in the Facebook timeline decide on how a topic is dealt with in the media, criticised **Carina Konrad** (FDP), deputy chair of the Federal Government Committee for Food and Agriculture who, like Alois Gerig, is a farmer herself. “Speed leads to superficiality,” said Konrad. The consequence is often an attempt to manipulate opinion about complex agricultural topics, such as plant protection products and animal welfare. This frustrates the affected farmers. “Young people no longer want to take over the farms from their parents,” she reported.

For Konrad, the challenge is to create a data basis as the starting point for reasonable decisions. More education is also required to counter manipulation of the public. “Fake news is just consumed, not questioned,” Konrad said. At school information is also imparted in a clichéd and one-sided manner, the politician criticised using the example of her daughter, who is in 6th grade. When dealing with the topic of livestock farming, organic farming was associated with self-produced organic feed and conventional farming with antibiotics. Only a visit to a farm with conventional agriculture which she instigated succeeded in dispelling several prejudices produced in the course of the lessons, Konrad reported.

A fraud at Stalin’s court

Fake in science too? In his presentation, BfR President, Professor Dr. Dr. **Andreas Hensel**, cast some light on several facets of a multi-structured and at its core not-quite-so-new topic. In the Soviet Union in the 1930s and 1940s, Russian biologist Trofim Lysenko falsified Stalin’s experiments, which were intended to disprove classical genetics and prove the transformation of species. Not always is fraud as obvious as in the case of manipulation of data and measured results. The arbitrary use of methods and results (“cherry picking”) until they fit into a particular concept, or a one-sided, often ideologically motivated interpretation of results, are very popular.

Sometimes wishful thinking leads to confusion, as with the “Mars worms” discovered by NASA scientists on a meteorite in 1996 which turned out to be an artefact. Mistakes of this kind are not reprehensible in themselves, because science lives from new ideas too, even if they ultimately prove to be inaccurate. There is a big difference, however, between “wrong” and “faked”.

Researchers have various motives for deception, ranging from a desire to advance their career, a struggle to receive grants, the pressure to publish (“publish or perish”) or to maintain

their good reputation. The consequences of fake science should not be underestimated. The credibility of science and the affected institutions are damaged in the eyes of the public. Faked study results also lead to a dead-end when assessing health risks, for example, or attempting to replicate results.

Thorough scrutiny before a study is published (peer review), transparency, quality assurance measures and independence are among the most important instruments for preventing fraud in Hensel's view. For scientists, "correct" science is only one side of the coin here. For Hensel, it's all about answering questions of the public too. "We've still got a lot to do here," said the BfR President.

Risk assessment: Is science failing?

We are still lagging behind what is possible where risk assessment is concerned, criticised Professor **Wilfried Kühling** (University of Halle-Wittenberg and scientific advisory board member of the environmental conservation NGO *Bund für Umwelt und Natur Deutschland*, BUND) using the example of the prevention of leukaemia among children in the proximity of high-voltage electricity lines. It has been scientifically proven for decades that the risk of leukaemia in children increases significantly from a field strength of roughly 0.2 microtesla. A legally binding protection standard derived from this would be 500 times lower than the current limit value of 100 microtesla. "Is science failing here?" Kühling asked.

Kühling also proposed that the combined effects of various influencing factors (e.g. carcinogenic substances in drinking water and breathing air, plasticisers, noise, radiation and stress) be given more emphasis than previously when estimating environmental health risks, and that the sectoral boundaries of each specialised field be overcome. Considerable improvements could be achieved here with legally anchored precautionary measures, especially in planning processes that are subject to consideration. Where standards and limit values are concerned, the judgement of science alone is not the objective, social groups should be involved in addition to the experts. "The solution lies in a joint assessment process," said Kühling.

Uncertainty is strength

Although life is uncertain, we still seem to manage it quite well. Which school should we send the kids to? What should we do with our savings? Only from science do we expect complete certainty. A scientist who doesn't emanate absolute certainty is soon regarded as unreliable. That is why climate research is often criticised as "fake", because it is still forced to deal with probabilities. But that is the particular strength of science, deliberated the philosopher and physicist **Rafaella Hillerbrand**. "Scientific statements are reliable not despite but because of their uncertainty," said the professor at the Karlsruhe Institute of Technology. "I cannot expect the same degree of precision when predicting climate change as I can when applying Newton's law of gravity". Those who discredit science for this reason diminish the scientific method as such – a dangerous chess move.

Science is not one opinion among many, as its critics suggest. Despite this, when communicating scientific results it would be wrong to state the facts only and not mention the uncertainties that always exist, said Hillerbrand. Especially in this age of "alternative" facts, these must not be allowed to become a fetish or even a surrogate religion.

The ordinary citizen between manipulation and mistrust

The discussion about fake news is “less about false facts, but rather about a lack of trust in expertise,” ascertained science journalist **Volker Stollorz** of the “Science Media Center”. “At the same time powerful people have recognised how the craziest things can be spread on digital communication platforms once they have found out how to manipulate people’s habits and feelings.” It’s more about targeted disinformation than fake news: “purposely distorting information that is fed secretly into the communication process with the goal of deceiving and manipulating”.

Disinformation, lies and rumours spread rapidly around the world in this digital age. Whatever is extreme and emotional arouses interest in social media. Whoever shouts loudest tends to get listened to. In Stollorz’s view, this kind of “digital environmental pollution” is even endangering democratic institutions in the meantime. With their megaphones, the populists are drowning out the people whose messages are more complex and differentiated and who really do want to examine things thoroughly, such as scientists and journalists. The situation is particularly threatening for science journalists – “a dying species” – because they do not have the necessary time and resources for thorough research, which is indispensable in a world dominated more and more by science.

The public and science: four guiding principles

Not only since the discussion around “fake science” is the work of scientists being viewed with a critical eye. In his presentation, Professor **Thomas Hestermann** (Macromedia University, Hamburg and Berlin) discussed how they can face up to the general public. “It all depends on the images,” said Hestermann referring to a mass death of seals, in the course of which photos of the sick animals shocked the public.

Attitude is important too. Nonchalance instead of commitment was demonstrated before the camera by the press spokeswoman of one of the federal states of Germany in light of findings of dioxin around a toxic waste dump, thus setting a bad example, as a TV report showed. “The decisive aspect is not only the “what” of a piece of information but also the “how,” explained Hestermann.

“It all depends on positive examples,” was Hestermann’s third hypothesis, which he illustrated using the example of “robot journalism”. Pessimistic title stories in “Der Spiegel” magazine (Hestermann calls it “the journal for melancholy future prospects”) about computers which take work away from us have proven to be untrue – see full employment. On the other hand though, electronic “scribes” are relieving journalists of bothersome tasks, the scientist showed using the example of texts on fine particulate measurements in districts of Stuttgart. They are written by computers using pre-prepared text modules and can be accessed online at “Stuttgarter Zeitung”.

Those who go public need courage too. Hestermann quoted a survey according to which only four percent of all Swiss scientists contribute 50 percent of media statements, meaning that the vast majority are rarely represented in the press, radio and TV, if at all. “Science slams” are a new way of presenting work. This can be embarrassing as well as the beginning of a success story, as was the case with medical student Giulia Enders, whose bestseller “Gut” was launched at a slam performance.

Fake journals are not fake science

A certain degree of scepticism towards science exists not only among the general public but also within the scientific community itself, as neuroscientist Professor **Ulrich Dirnagl** (Charité, Berlin) documented using the example of a survey conducted by “Nature” magazine. According to this survey, 90 percent of researchers are of the opinion that there is a moderate to distinct replication crisis which makes scientific results only credible to a certain extent. The sensational criticism of science by influential media relating to “rip-off journals” under the heading “Fake Science – The Lie Factory” misses the point, however. Just because science is published in a “predatory journal” doesn’t mean that it is faked. Claims of this kind are a distraction from the real weaknesses of the scientific system.

A genuine problem, in Dirnagl’s view, is the non-publishing of data, often because it simply doesn’t fit in with the researcher’s aims. Depending on the specialised area, this applies to 40 to over 50 percent of all studies, the physician estimated. “Story telling” also distorts the results. By means of statistical tricks, results are manipulated until they “fit into” the story. The good news in Dirnagl’s view involves new publication formats for studies in the life sciences, such as “bioRxiv” or “Open Science Framework”, which guarantee transparency and scientific openness.

“Publish or perish” is the essential measure of a career as a professor – a disastrous development in Dirnagl’s view, because the number of scientific publications is just as poor a measure of quality as the impact factor (the frequency of citations to articles published in a journal in which a study appears). It would be better if fewer but more reliable studies were published and scientists were assessed in line with their genuine impact in their specialised field or in society, said Dirnagl. Class instead of mass.

Science: reliable but uncertain

In the subsequent podium discussion, the “elephant in the room” was the term “uncertainty” according to neurologist Ulrich Dirnagl. It is of pivotal significance in science – as previously explained by philosopher Rafaela Hillerbrand – not as a weakness but as a strength, as knowledge of the possibilities and limits of insight. Dirnagl proposed that it be brought into public discussion as an important aspect. A nuanced assessment of scientific interconnections is not possible, however, in a “seven second statement” or single tweet.

Media scientist Thomas Hestermann countered that ordinary people expect reliability from science and not uncertainty. Journalist Volker Stollorz also sees science as a “mental sewage plant” which provides reliable knowledge as the basis for political decisions. Acknowledgement of uncertainty, on the other hand, is immediately instrumentalised by politics. A lack of action in climate change, for example, is justified in line with the motto: “Yes, but everything is uncertain ...”.

How reliable actually are scientific findings? Dirnagl raised this question using the example of “so-called nutritional sciences” which recommend in today’s media that we eat chocolate, then it is apples tomorrow before red wine becomes the favourite the next day. This “one thing today, another tomorrow” attitude awakens a feeling of arbitrariness in the newspaper reader, says journalist and moderator Sascha Karberg (Der Tagesspiegel, Berlin).

Researchers should face up to “the risk of publicness” and have the courage in interviews and talk shows to spread optimism and tell positive stories in a “world of many truths driven

by fear”, said Hestermann. BUND representative Wilfried Kühling also challenged his colleagues to leave their ivory tower and represent their convictions in public, even if this means they will have their backs to the wall at times.

Whoever researches in the internet is soon confronted with many truths. “A whole world exists out there that isn’t interested in facts,” commented BfR President Andreas Hensel. People have to ask themselves how trustworthy the information on their mobile phone is. Is knowledge to become a question of faith again in the end?

Complete videos of the event at:

<http://bfr.westream.biz/stakeholder/>

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. It advises the Federal Government and Federal Laender on questions of food, chemical and product safety. The BfR conducts its own research on topics that are closely linked to its assessment tasks.

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