– a precondition for a successful climate communication?

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- a precondition for a successful climate communication?

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In this Chinese proverb "*Precise knowledge of self and precise knowledge of the threat leads to victory*." Perhaps we could replace in a less ambitious sense "threat" by "challenge", and "victory" by "achievement". Then the saying implies we need to know our own limitations, our own blind spots, or the assumptions of our knowledge claims, before being able to enter into a meaningful communication with individuals and groups outside the scientific community. Such communication may or may not lead lead to changes in the social world. If persuasive and therefore effective, the communication will not only change the social world for our partners, as they act upon it but also for us scientists. But the proverb refers also to "knowledge of the challenge" – which means that we have to recognize that the productiom of scientific knowledge is a social process as is the communication of scientific findings and that our partners may well their own ideas and knowledge with respect to similar features of the world In fact, their claims that may be in conflict with current scientifically constructed and accepted knowledge.

For a successful communication it does not only need a clear and understandable language, good images and pedagogical skills as well as the attentiveness of the intended recipients but the recognition of the presence of a competition of knowledge claims in guiding societal decisions, in explaining how the world functions. Such a competition for relevant knowledge is not automatically "won" by those with more scientific arguments.

In a nut-shell, this is what we want to convey with our presentation. Implications for regional climate servicing are added in the end.

But before we enter the discussion about knowledge competition and its consequences of climate change communication, we should clarify the meaning of "knowledge", as we use it here. We follow Nico Stehr's (2012a) definition, according to which "**Knowledge** may be defined as a *capacity for action*. Our use of the term "knowledge" as a capacity for action is derived from Francis Bacon's famous metaphor that knowledge is power (*scientia est potentia*). Bacon suggests that knowledge

derives its utility from the capacity to set something in motion; for example, using modern examples, new communicative devices, new forms of power, new regulatory regimes, new chemical substances, new political organizations, or financial instrument. Thus, knowledge has no connotation such as “right”, “accurate”, “scientific” or “truth”, but no more and no less than making sense of a complex situation, which allows drawing conclusions about what can, or should, be done about it.

Also, the term “communication” may need an explanation. In the past, “communication” was an euphemism for “teaching”, “informing”, “explaining” to less-knowledgeable people, for a one-way communication. Here we refer to *exchanging knowledge* between scientists, who have a complex, often abstract but in most cases specific and often narrow understanding of elements of a multifaceted system, and practitioners, who tend to an equally specific understanding of problems based on the circumstances that govern public discourse of the day, on the contingencies of everyday life and the various interests that govern the life-world. Exchanging ideas and knowledge claims requires a dialogue, as opposed to providing a portal which provides numbers and Q&A sections.

Power: Societal utility of superior knowledge

The assertion of being able to derive practical and effective “solutions” to social, political and economic problems from superior, unquestionable and immediately performative knowledge is quite old. The authority of such knowledge as being superior, of being without legitimate alternative, is constructed from the origin of the knowledge (in case of religions) or from the wisdom and methodology of the analyst - in particular the scientific method, combined with an ethical set similar to that of Robert Merton’s norms of science (1973).

Historical examples demonstrate how scientifically constructed knowledge claims are directly used in support for policy decisions, which we now – many decades of years later - see as convenient for implementing political goals in those times. The race policies of the Nazi regime referred to research done by the Kaiser Wilhelm Gesellschaft (MPG, 2000; Grundmann and Stehr, 2013), European colonialism employed climatic determinism as legitimation (e.g., Gunn, 2003, p34: “it can be said that geography emerged in the mid nineteenth century all too often as a handmaiden of imperialist expansion”), or US Immigration Restriction Act of 1924 was motivated by eugenics (Lindzen, 1996). Another less dramatic case is the Swiss Forest Law, which restricted forestry in the Alps in an effort in the late 19th century to limit widespread flooding of the lower parts of Switzerland (Pfister and Brändli, 1999).

We would suggest that the political logic in these cases was similar. Some culturally constructed views, based on perceptions and values of the time and the socio-historical circumstances that dominated public discourse would result in certain preferences of how to deal with a problem or a perceived problem. Instead of acknowledging the political character of a value choice, science appealed to the agenda of public discourse that it could be “science” which would point to the need, supposedly without alternatives, of pursuing the preferred course of socio-political action. Because of the superior knowledge offered by science, the issue would no longer be a contested matter; science reduced political choice. It is a matter of being “factually” right or “factually” wrong.

While the transformation of a societal problem from a political to a scientific may assist in reducing the complexity of political decision-making, decisions move out of the political, democratic realm or the public market to the closed discussions in universities and research establishment (Pielke, 2007). However, while open and constructive discussions of scientific details take place within the scientific community, it fails to ensure such an open discourse in society. Paradoxically, in short-circuiting public discourse scientific openness also suffers, and the scientific norms (as formulated by Robert Merton) obviously are even less respected. The polarization, which is typical for an antagonistic policy decision process, is moved into the scientific arena, with science becoming a kind of auxiliary troop for a preferred political agenda.

Self: Truth and scientific understanding

Climate science has established that processes of human origin are influencing the climate—that human beings are changing the global climate. Climate is the statistics of the weather. In almost all localities, at present and in the foreseeable future, the frequency distributions of the temperature continue to shift to higher values; sea level is rising; amounts of rainfall are changing. Some extremes such as heavy rainfall events will change. The driving force behind these alterations is above all the emission of greenhouse gases, in particular carbon dioxide and methane, into the atmosphere, where they interfere with the radiative balance of the Earth system. Ongoing or intensified emissions of greenhouse gases will lead to more change in the coming decades.

This is the scientific construct of human-made climate change (von Storch, 2009), which enjoys broad agreement in the scientific community (Bray 2010; Fig. 1). It is widely supported within the relevant scientific communities, and has been comprehensively formulated particularly thanks to the collective and consensual efforts of the UNO climate council, the “IPCC”.

Most of the “consensus” refers to the geophysical dynamics; assertions about impacts become more controversial, and assessments about economic or political implications are for most scientists beyond their disciplinary competence. The link between emissions and climate change is accepted by most (80% and more; Bray and von Storch, 2014); thus the option of limiting or even ending man-made climate change by reducing or ending emissions of greenhouses gases is very well understood. Indeed, in the 2008 survey by Bray and von Storch (2010), about 80% of the responding scientists agreed to “There is a great need for immediate policy decisions for immediate action to mitigate climate change.”[1]

On the other hand, climate scientists know that their models are not perfect (Bray and von Storch, 2011), which are primary tools for describing possible future conditions in some detail (scenarios); they know that perspectives about sea level rise are still an issue of ongoing research as are the details of the “sensitivity” of the climate system to changing greenhouse gas levels; and that changes of tropical storms and other impact relevant questions need more time to be resolved.

However, it is a long way for arriving from this scientific insight to the political claim that a massive rebuilding of the energy system is unavoidably needed. Nevertheless in the 2008 survey, more than 80% responded in favor of “scientific expertise” when asked “In making policy decisions about *adaptation* to climate change, priority should be given to political opinion or scientific expertise”.

[1] Scales 5-7 on a scale of 1 to 7, with 1 = political opinion”, and 7 = ”scientific expertise”.

Similarly, 80% were supportive, when the question was on mitigation instead of adaptation. Obviously, many in the scientific community consider themselves an avant-garde: “Scientists almost unanimously agree that science occupies an extraordinary, perhaps the pole position within modern society.” (Stehr, 2012b).

Many climate scientists believe that they know better and have a responsibility for guiding ordinary people, who know less good: “… a growing chorus of critical voices -- within the scientific community and the media -- certain that democratic societies are unable to effectively and timely attack global environmental problems. These observers thereby … claim … that if those who disagree or are voiceless were more enlightened – that is, taking on board the ”objective” framing of options – they would pursue the same course of action. As Isaiah Berlin ([1958] 1969:134) stresses, such state of affairs “*renders it easy for me to conceive of myself as coercing other for their own sake, in their, not my, interest. I am then claiming that I know what they truly need better than they know it themselves.*” (Stehr, 2012b)

Climate scientists find themselves in a post-normal situation, in which stakes are high, decision urgent, uncertainty inherent and societal values involved (Funtovicz and Ravetz, 1985; Krauss and von Storch, 2012a,b). In such a situation, many feel compelled to choose “sides” – with claims that from “the” science the needed (“without alternative”) policy would follow, as described above. A small group claims that the ongoing emissions would cause no or only insignificant changes (skeptics), while a larger one insists on future catastrophes if emissions are not massively limited (alarmists). This choice goes along with presenting scientific understanding as “truth”, in contradiction to basic philosophy of science, according to which scientifically constructed knowledge is always temporary, valid only until proven invalid (Fleck, 1980). The cementation of representing present best explanations as “truth” makes the scientific process inflexible and inhibits the normal progress by the never ending cycles of falsification and building new hypotheses.

Other: Alternative knowledge claims

After we have tried to sketch “us”, the climate scientists, who want to communicate our knowledge to “them”, we need to think about the challenge of attempting to do so.

Some have the idea that “they” simply lack knowledge (the empty vessel notion; e.g., Leiserowitz et al., 2010) and thus need training or education, and “they” will act “rationally” (i.e., as we want) after a successful teaching of the facts. But as Kahan et al. (2012) discovered for the US: “Members of the public with the highest degrees of science literacy and technical reasoning capacity were not the most concerned about climate change. Rather, they were the ones among whom cultural polarization was greatest. This result suggests that public divisions over climate change stem not from the public’s incomprehension of science but from a distinctive conflict of interest. It is not a lack of understanding of what science is claiming when many people do not “believe” in man-made climate change.” “What you "believe" about climate change doesn't reflect what you know; it expresses *who you are*“ (Kahan, 2014).[2]

[2] Dan Kahan (2014) explains this by “No mistake that individual makes about the science on climate change, then, is going to affect the risk posed by global warming for him or her or for anyone else

Also, the lack of scientific understanding, or the lack of recognition of the significance of such knowledge for policy decisions is no proof for lack of understanding in terms of other knowledge systems. Plausibly most people know about the issue – given the intense media coverage of the issue (e.g., Weingart et al., 2000; Schäfer et al., 2014; Giffford et al., 2014) – and have their own understanding about the dynamics, causes, and options to deal with it. However this understanding is based on a variety of knowledge systems, among which the scientific knowledge is merely one.

Indeed, it is hardly the case that scientists speak directly to the public and stakeholders,they mainly do so through the media (c.f., Bray and Krück, 2000; Martinez and Bray, 2011). During this process, the original scientific understanding is blended, re-worked and translated into other concepts , ideas and concerns about climate change. Not to mention that scientists, when speaking to media and public, often feel a "responsibility" for "persuading" the public to draw the "right" conclusions from their professional knowledge.

What other knowledge systems are there? – The answer depends on which segments of the population, which cultural understanding of the "world". In China there are other understandings than in Iran, in the US or in Sweden. In the following we are offering an ad-hoc list, which certainly is incomplete and which would need much more detailed research.

Changing climate and adverse weather events have always been described as the response of superior powers to sinful human behavior (e.g., Behringer, 2009). Thus, religions provide sense-making, often as direct argument for a specific policy (e.g., Guardian, 2014). Nowadays, the higher powers are often "nature" (e.g., Karlsson, 2002), even if in religious circles claims that "god speaks through disasters" seems to be an argument still in use.

Another group refers to outdated scientific understanding, related to deforestation (Grove, 1975, Brückner, 1890) and to climatic determinism (Livingstone, 1991; Stehr and von Storch, 1999, 2000). Also the concept of man-made climate change is by no means new (von Storch and Stehr, 2000), albeit mostly forgotten.

Widely adopted seem to be alarmist descriptions, according to which the failure to reach the 2-degree goal would lead to unavoidable catastrophe, so that the only option for dealing with man-made climate change is mitigation, possibly even geo-engineering. For a large, mostly silent minority climate change is either natural or insignificant in its consequences. Both positions seem to have the advantage that they support a specific policy, namely either a massive transformation of society and economy or a laissez-faire policy with the assumption that the problem either does not exist or will just go away.

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that person cares about. But if he or she takes the "wrong" position in relation to his or her cultural group, the result could be devastating for her, given what climate change now signifies about one's membership in and loyalty to opposing cultural groups It could drive a wedge—material, emotional, and psychological—between individual the people whose support are indispensable to his or her well-being. In these circumstances, we should expect a rational person to engage information in a manner geared to forming and persisting in positions that are dominant within their cultural groups. And the better they are at making sense of complex information—the more science comprehending they are –the better they'll do at that."

Confirmation and orientation: Knowledge needs

In the first years of climate change attaining prominence in public discourse, the dominant concern was with the link of emissions and change – i.e., on detecting climate change and attributing most plausible causes – and on the possibility, or need, to limit the emissions and thereby limiting or arresting the development of anthropogenic climate change. The debate was narrowed down to the antagonistic debate of the two extremes – alarmist claims of impending catastrophe or skeptical assertions that nothing serious was in the coming. Already in those days it should have been clear that even a very successful mitigation policy would go hand-in-hand with climate change, serious enough to require significant adaptation measures (e.g., von Storch, 2003; Stehr and von Storch 2008). However "adaptation—coping with climate change, rather than stopping it — was a bit like putting out a fire on the Titanic: desirable, no doubt, but the main thing was to change course." (Economist, 2008).

This focus on one option without an alternative, which enjoyed very broad support in the western industrialized part of the world, needed no dialogue on climate and climate change, but merely a declaration of the seriousness of the situation. "Communication" served almost only for a mere confirmation of antagonistic standpoints, either of the impending catastrophe, the urgent need for regulating the energy system, the urgent need for everybody to reduce ones carbon footprint, or the fight against a serious attack on personal freedom on our way of life and our economic system.

In the meantime, however, first "climate service" efforts were launched in the US (Changnon et al., 1990; Vaughan and Dessai, 2014): "An N[ational]C[limate]S[ervice] identifies, produces, and delivers authoritative and timely information about climate variations and trends and their impacts on built and natural systems on regional, national, and global space scales. This information informs and is informed by decision-making, risk management, and resource management concerns for a variety of public and private users acting on regional, national, and international scales. The stakeholders (and the constituency for an NCS) include public and private individuals and organizations at federal, state, and local levels … with sensitivity to and need for climate-related information." (Miles et al., 2006).

Main elements of such a climate service are (Miles et al., 2006)

1. "Serve as a clearinghouse and technical access point to stakeholders for regionally and nationally relevant information on climate, climate impacts, and adaptation; developing comprehensive databases of information relevant to specific regional and national stakeholder needs.
2. Provide education on climate impacts, vulnerabilities, and application of climate information in decision-making
3. Design decision-support tools that facilitate use of climate information in stakeholders' near-term operations and long-term planning
4. Provide user access to climate and climate impacts experts for technical assistance in use of climate information and to inform the climate forecast community of their information needs
5. Provide researcher, modeler, and observations experts access to users to help guide direction of research, modeling, and observation activities
6. Propose and evaluate adaptation strategies for climate variability and change."

Here, the focus is changing. It is no longer the rhetoric of scare, of enlightening stupid lay people, of the future of mankind, of saving the world or the western civilization, of truth or hoax. The rhetoric is slowly moving away from “informing”, “teaching” and “educating” to “establishing dialogues” and exchange of knowledge (von Storch, 2009; Vaughan and Dessai, 2014).

Climate service has something to do with specific problems, which play out in specific regions at specific times, for specific stakeholders. The issue is “knowledge for adaptation” and “knowledge about vulnerability”. The problems are recognized of having various facets, one of them about the climatic linkages, and others related to the social, political and economic conditions and practices, which are really or allegedly affected by climatic factors. Obviously, different types of knowledge meet here. Ideally, “solutions” for avoiding unwanted consequences of man-made climate change are sought, which are consistent with different knowledge claims, among them scientifically constructed knowledge claims. A “good” solution will be meaningful according to all significant knowledge claims, because it will likely not only be efficient but also be carried by a social consensus on the decision (but not necessarily on the argument).

Need: Building knowledge exchange fora

Regional climate services (von Storch and Meinke, 2008) contribute to such processes. Climate science joins the round table of local and regional social decision making as one but not dominant partner (von Storch and Krauss, 2013). For being able to bring in scientific understanding about the climatic efficiency of possible decisions, the regional climate service must provide knowledge about the geophysical linkage, the unavoidable uncertainty of future developments, plausible scenarios of change (ranges) for different time horizons, scenarios of growing certainty and knowledge for different time horizons. It must also address known sources of misunderstanding, such as the meaning and utility of scenarios, that accurate predictions are not possible, the tendency to attribute all changes to man-made climate change, while disregarding possible other causes of change (different human modifications, but also natural climate variability). It must also be aware of competing knowledge claims: 知己知彼,百战不殆.

Conclusion

Effective climate communication will help improving societal decision-making, avoid autocratic forms of governing the consequences of climate change and ensure that large segments of the public are participating. Effective climate communication of course needs to incorporate findings and expectations about ongoing and future climate change and impact, but it will also help to understand within the climate science community which scientific knowledge is useful in the context, and which is not (see also Grundmann and Stehr, 2013). Useful Climate communication changes the perception of all involved: of stakeholders, the public and of scientists. Mutual understanding of the different roles, motivations and cultural conditioning is a precondition for a successful exchange of these groups of social actors.

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