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Methodological and Ideological Options

The art of long-term thinking: A bridge between sustainability science and politics

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ABSTRACT

Policy makers are dependent upon scientific knowledge. However, scientific results cannot be applied straightforwardly in practical decision making. We deploy Kant's term "power of judgment" – the human capacity to apply general insights to specific, contingent situations – to show that this problem is systematic rather than coincidental: decision making requires the power of judgment to make use of scientific knowledge. Power of judgment, in turns, can be supported by heuristics. Against this background, we focus on sustainability politics and outline a heuristic for framing and analyzing sustainability problems. Because time is a key factor in relation to sustainability we distinguish three distinct concepts of time and argue that the economic concepts of "stocks" and "institutions" can be used to foster power of judgment with respect to these time concepts. Based on these concepts, the heuristic serves to bridge the gap between scientific knowledge and practical decision making in sustainability politics.

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1. The Science-policy Gap Regarding Sustainability

In his 2009 "Science Memorandum" Barack Obama stated[1]:

> "Science and the scientific process must inform and guide decisions of my Administration on a wide range of issues, including improvement of public health, protection of the environment, increased efficiency in the use of energy and other resources, mitigation of the threat of climate change, and protection of national security."

Policy making is indeed increasingly dependent on scientific knowledge (Dilling and Lemos, 2011: 680). Clearly, though, applying scientific findings directly to practical decision and policy making is often a problematic task: while scientists frequently complain about politicians ignoring their research findings, politicians for their part bemoan the inability of science to come up with solutions to problems (Birkland, 2011; Böcher, 2008; Pielke, 2007; Stokes, 1997; Weingart, 1999). In fact, it would be more accurate to speak of a science-policy gap than of a science-policy interface (Hammond et al., 1983; Sebek, 1983; Roux et al., 2006; Faber, 2008: 5). Against this background, sustainability introduces two additional challenges:

1. The abstract norm of sustainability – inter- and intragenerational justice (WCED, 1987) – is very general and relates to the stability and thriving of intricately linked economic, social and natural systems. Thus sustainability issues are exceptionally *complex* (Klauer, 1999; Illge and Schwarze, 2009).
2. Sustainability is concerned with the *long-term* development of interlinked economic, social and natural systems (Baumgärtner and Quaas, 2010: 446). Dealing with long-term dynamics is an exceptionally difficult task, both in science and in practical decision making (Faber et al., 1995; Kates et al., 2001).

Both these challenges exacerbate the science-policy gap with regard to sustainability. They indicate a special need for concepts that are capable of informing policy relating to long-term dynamics (Faber, 2008).[2]

By exploring Kant's (2000) notion of the "power of judgment," we show that the science-policy gap is neither coincidental nor simply a matter of inadequate science. It points to an absence of adequate epistemological grounding of transdisciplinarity (Mittelstraß J., 2002; Spash, 2012). The power of judgment refers to the human capacity to apply general rules to specific situations, just as a judge applies general laws to individual cases. It is precisely this ability that the

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[1] White House, March 9, 2009, http://www.whitehouse.gov/the-press-office/memorandum-heads-executive-departments-and-agencies-3-9-09, (29.06.2012).

[2] A widely-used and related approach to address this need is scenario development and analysis, providing bundled information about possible future developments for research and policy-making. For a general overview concerning various techniques of environmental scenario building see e.g. Alcamo (2008), different qualitative methods are surveyed by Rounsevell and Metzger (2010), and Mahmouda et al. (2009) develop a formal framework for scenario development. The example of the IPCC (see Box in Section 5) illustrates that the concept developed in this paper can be used within a scenario approach.

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decision maker needs – alongside access to information – in order to arrive at well-balanced decisions.[3]

To address the issue of time in the politics of sustainability, we introduce three notions of time — "*chronos*," "*kairos*" and "*inherent time*." We will see that the latter two are particularly useful in policy making. To render "*kairos*" and "*inherent time*" theoretically and practically useful we utilize the notion of stocks originating from capital theory in economics (Georgescu-Roegen, 1971: Chap. IX). Stocks are durable objects (Faber et al., 2005). Looking at the variety of stocks that are relevant for the problem at hand provides decision makers with a direct and easy access to information about the future. We distinguish between material and immaterial stocks, and focus our analysis concerning immaterial stocks on durable institutions. Finally, we link these different concepts – the power of judgment, the three notions of time, and stocks – to build a heuristic framework for analyzing sustainability problems.

2. What is the "Power of Judgment"?

In democratic societies it seems entirely appropriate to use scientific knowledge to inform the policy decision making process, not least because such knowledge is considered to be reliable, verifiable, and readily accessible (Faber et al., 1996: Chap.12). As a result, politicians often seek to legitimize their decisions by referring to scientific knowledge (von Storch, 2009). With regard to almost any complex issue one cares to name, opposing scientific statements and recommendations abound. This occurs because scientific knowledge is abstract and general. Real-world situations, by contrast, are specific, contingent, complex, full of uncertainty, and subject to knowledge gaps (Faber et al., 1992; Sigel et al., 2010; Stirling, 2010).[4] This might lead us to conclude that political decisions and policy recommendations based on science are either arbitrary or else determined by narrow interests.

The discrepancy between theory and practice has led to a greater interest in transdisciplinary work, that is, problem-based research aimed at facilitating effective communication between different disciplines as well as between science and politics (Hirsch Hadorn et al., 2008; Mittelstraß J., 2002; Pohl and Hirsch Hadorn, 2007). In our view, the program of transdisciplinarity is promising but needs further epistemological underpinning. Such can be found in the works of Immanuel Kant, who addressed this very discrepancy in his essay "On the Common Saying: That May be Correct in Theory, but it is of No Use in Practice" (Kant, 1991: 61):

> "…theoreticians will be found who can never in all their lives become practical, since they lack judgment. There are, for example, doctors or lawyers who did well during their schooling but who do not know how to act when asked to give advice."

It is not scientific expertise alone that makes a doctor or a lawyer successful. "Good" decisions require something philosophy variously calls prudence, practical knowledge, or the "power of judgment."

A systematic in-depth analysis of this faculty can be found in Kant's "Critique of the Power of Judgment" (Kant, 2000): The power of judgment is the human capacity to apply general insights to specific, contingent situations. In its simplest form, we need the power of judgment to recognize, for example, an object consisting of a trunk and branches as "a tree." In a complex situation demanding practical action, we need to distinguish between relevant and irrelevant knowledge and to apply abstract scientific findings to concrete policy decisions. In Kant's conceptualization, the power of judgment works by starting out from something specific and reflecting on the general type(s) under which it can be subsumed. Doctors, for example, are often confronted with a set of individual symptoms which they then have to conceptualize in terms of phenomena associated with a (more or less) known disease. The power of judgment thus incorporates two complementary elements, namely, "heuristics" and "intuition":

- *Heuristics*: The power of judgment proceeds heuristically, i.e. it makes use of general rules of procedure. One example taken from the scientific process[5] is the principle *natura non facit saltus* ("nature does not make leaps") used by Newton when developing his infinitesimal calculus and by other classical natural scientists when searching for new laws of nature. This rule is not supposed to be a statement about the world; rather, it is a guideline for how to proceed in the search of new scientific hypotheses. Such guidelines are often generally accepted for a long time, but exceptions are permitted and may be fruitful in certain cases. Also, in the course of time such a rule may be modified, restricted in scope or even abandoned.[6] We call such guidelines "bridging principles." These establish a relationship between a specific situation and general conditions.[7] A system of bridging principles is called a "heuristic" (from Ancient Greek: *heuriskein* = to find). It is a methodology that assists in the search for solutions.
- *Intuition*: Heuristics alone are not enough — they need to be handled in a playful manner. According to Karl Popper (1959) formulating a scientific hypothesis in the research process requires that we make a guess, and to make a good guess we need some kind of "feeling" for the subject. Thus the power of judgment is based essentially on "intuition." Intuition is the ability to acquire knowledge without deductive, discursive reasoning. In part it is a gift, but it can also be acquired by experience. Due to the use of intuition, however, a decision made using the power of judgment can never be completely free of ambiguity. Arguments can be put forward in favor of the decision, but differing opinions are always possible as well.

Due to its intuitive aspect, the power of judgment is a capacity belonging to individuals: it is personal and subjective (Kant, 2000: 99, 100, §8; Oakeshott, 1991: 15). However, two key factors make the power of judgment an objective matter to a certain degree. With regard to the first, Kant argues as follows (2000: 173, 174, §40): the person who takes a decision knows that it is her own personal decision. In order to gain greater certainty, she seeks dialog with others in her community in the hope that they will endorse the decision. She can only expect their endorsement if she tries to anticipate their views and to view the matter from their (hypothetical) position. In this way intersubjectivity enters the decision-making process, as the decision maker has to abstract from her own personal bias. The second factor is that bridging principles are an important means of

[3] We will see in the remainder of the paper that power of judgment alone is not sufficient in any sense to guarantee "good" decisions with respect to a given normative goal, such as sustainability. It is, however, a prerequisite to take a multitude of different – in many situations even opposing – aspects into consideration.

[4] There might of course be additional reasons why differing scientific statements can occur, for instance "bad science" (methodical mistakes etc.), scientific misconduct such as bribery etc., and the influence of external pressure from vested interests, donors and the like.

[5] It is important to note that even the scientific process itself involves many stages at which "human action" is necessary in the sense that the procedure is not completely logically determined and power of judgment as well as creativity are required. So the researcher has to take many decisions in the research process about, e.g., in which direction to proceed, which aspects of the problem to look at, what basic assumptions to take etc. (Tucker, 1979; Jax, 2010: 134-137). Here we use the research process as the example for illustrating the components of power of judgment.

[6] In fact the above mentioned rule has influenced the progress of classical physics for a long time and became only misleading with the rise of quantum mechanics, where it is obviously not true. However, although not strictly true, it may still be applied for the generation of scientific hypotheses in macroscopic regimes. Kuhn (1962: Chap. IV) also observes that a change in the scientific paradigm may proceed along with a change in the guidelines for how to "solve scientific riddles."

[7] Kant (2000: 69) discusses them explicitly as "maxims of the power of judgement"; for the notion "bridging principle" see Albert (1985).

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