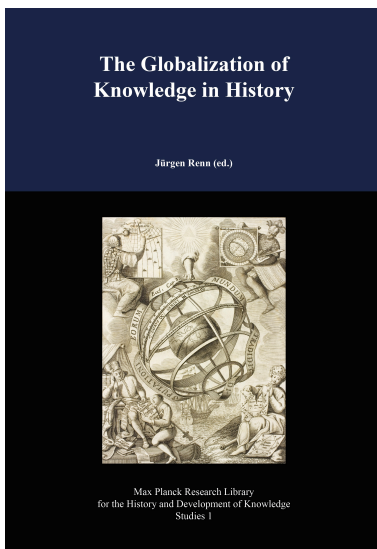


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Richard Rottenburg:

On Juridico-Political Foundations of Meta-Codes



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Chapter 21

On Juridico-Political Foundations of Meta-Codes

Richard Rottenburg

21.1 Introduction

This contribution *aims* to downscale the macroscopic focus on the encounter between culturally specific knowledge and globalized knowledge to a microscopic and ethnographic focus on *knowledge practices* of actual encounters and negotiations. The emphasis is on practical knowledge dealing with techno-scientific solutions that normally emerge as globalized knowledge. As is customary in microscopic analysis, this study follows the extended, theoretically guided case method and examines large issues in small places. The small places in this research are single planned interventions (mostly) situated in African countries and at the same time embedded in global organizational fields that generate various forms of globalized knowledge. The large issue in this research is the enunciation of rationality and standards of objectivity that are considered to be valid in different conceptual schemes and can therefore travel as models for doing things. I will argue that practitioners acting in epistemologically heterogeneous fields normally develop a specific form of meta-knowledge that enables them to move back and forth between two different forms of knowing that become labeled as culturally specific knowledge and globalized knowledge. I will examine and explicate these two forms as well as the reflexive competence to move back and forth between them; this competence I call *code-switching*.

In developing this argument, I rely on the basic assumption that the key form of knowledge diffusion is *translation* in the sense that without translation an idea loses its meaning on its travels from one conceptual scheme to the other and is essentially lost (Rottenburg 2003, 2009). In everyday modern English, *transfer* refers to an operation where a thing or token is moved from one context to the other without distortion, while *translation* refers to a similar operation where the thing or the token is changed in order to make sense and be useful in the new context. In classical Latin, though, *latum* is the perfect passive participle of *ferre*, and hence *translatio* is a nominal form derived from the perfect passive participle of *transferre*. The emerging field of a *sociology of translation*¹ uses translation as an aspect of transfer: transfer does not work without translation. In order to travel, ideas first have to be objectified into mobile objects, that is,

¹See (Callon 1986; Latour 1995; Heilbron 1999; Rottenburg 2009).

translated into immutable mobiles. These objects are primarily texts, numeric expressions, tales, pictures, musical patterns, models for doing things with their implied rationality and ontology, and technical artifacts. Going on a journey means that the objectified ideas, the immutable mobile objects, are removed from their context and thus disembedded. Sent or brought to new places, they become re-embedded into another context, that is, into another institutional order, another material set-up and perhaps another epistemic order. Not every diffusion is at the same time a translation; a translation has happened and can be identified if the transferred idea (inscribed into an object) connects to the new web of belief, institutional order and material set-up and is thus put into new actions with a new and specific dynamic that was not there before the translation. If these patterned actions are repeated often enough, they might stabilize into a routine practice, that is, an institution as a set of unquestioned rules that eventually appear *natural*. The institution, in turn, will sooner or later be described and summarized through abstract ideas, which might start a new translation chain—and so on for ever.

At the same time, in developing this argument, I critically follow an approach proposed by Mary Douglas and Aaron Wildavsky in their book *Risk and Culture. An Essay on the Selection of Technical and Environmental Dangers*. Their work is on risk and pursues the question of how people agree to ignore most of the potential dangers that surround them and interact in a way as to concentrate only on selected aspects (Douglas and Wildavsky 1982, 9). The basic assumption of their analysis is that no amount of additional, scientifically based knowledge can provide an unchallenged ranking of dangers or an undisputed definition of what an appropriate prevention would be. The situation is even more complicated if one considers the fact that normally it is different kinds of people who have to agree on specific risk prevention measures, and different people normally find different kinds of risks more or less acceptable. The clue is that knowledge—as denotative descriptions of what the world is like—is here inextricably interwoven with consent—as evaluative and moral statements about how to live. Risk therefore should be seen as a joint product of knowledge about the future and consent about the most desired prospects (Douglas and Wildavsky 1982, 5). According to Douglas and Wildavsky, an appropriate understanding of risk selection therefore implies what they call cultural analysis. They intend to demonstrate that each set of shared values and supporting social institutions is biased toward highlighting certain risks and downplaying others—this being one of several forms of cultural bias (Douglas and Wildavsky 1982, 14).

While I partly follow this approach, my argumentation deviates from the implied epistemological position in four important regards. It is helpful to enumerate these four points since they help to clarify my own approach.

1. Empirically speaking, I do not focus specifically on risk but more generally on what are considered environmental, medical, economic, social, and political problems and their solutions—solutions that in the end might turn out, or not, to be risky or straightforward harmful (Edelman 1988).

2. I do not concentrate on negotiations within ‘one society’—as Douglas and Wildavsky would have it—but on negotiations that take place in between cultures, or, as I would rather call it, in *heterogeneous trading zones*—to re-import an old anthropological metaphor back from Science and Technology Studies (Galison 1997, 781–844).
3. Within these intermediate fields I concentrate on how certain knowledge forms are turned into global knowledge by being attributed universal validity while other forms are turned into local knowledge. I hence do not start from a given distinction between local and global knowledge that would be founded in the range of validity of that knowledge. Instead I rather analyze how this distinction is made in one particular context.
4. I do not use culture (or society) as *explanans* of certain puzzling practices but rather as *explanandum*. Other than Douglas and Wildavsky—who present a fine piece of institutional sociology of knowledge—I follow a post-Mertonian microscopic, social constructivist approach to techno-scientific practices. In doing so, I examine the practices of defining and classifying problems and their solutions as a reality *sui generis*, that is, as a reality that cannot be conceived as a mere epiphenomenon completely determined by cultural or other patterns.

In more detail, this chapter focuses on an aspect of planned interventions that can be described as a particular form of *experimentation* performed in a particular form of laboratory known as pilot project. Like laboratories, pilot projects and urgent humanitarian interventions are demarcated extraterritorial sites where people experiment with prepared segments of reality and produce reconfigurations of the natural order in relation to the social order (Knorr-Cetina 1999). Pilot projects and humanitarian interventions have *ex ante* defined goals and *ex ante* defined criteria for verifying the achievement or failure of these goals; they rely on collective action normally characterized by an antecedent agreement that all parties involved participate out of their free will, and that all decisions are taken in consenting manner only. Normally there are three parties involved: a financier, a consultant, and a project agency that is the target of the intervention and at the same time in charge of it. In nearly all cases, the financier and the project agency do not deal in their own name but as representatives of larger units (like for instance a ministry or an international agency). By definition, development projects and humanitarian interventions operate with money that belongs to none of the parties involved, and usually it is grants or cheap money.

The individual and collective actors of pilot projects and humanitarian interventions typically come from different cultural and professional backgrounds yet at the same time—at least, if long enough in the business—they belong to a global community of professionals with a highly specialized corpus of expert knowledge. This community has evolved since the 1960s (the beginning of development policy) and its members are mostly engineers, agronomists, medical specialists, economists, lawyers, and social scientists. In the meantime it seems appropriate

to speak of an *epistemic community* (Haas 1992). Yet at the same time, projects and humanitarian interventions are archetypal cases exemplifying what is called *distributed agency* (Garud and Karnøe 2003). While the actors running a development project or a humanitarian intervention can be identified and also a number of liabilities are clearly defined, the agency is distributed far beyond the boundaries of the intervention.

21.2 The Case Study

The empirical focus of this chapter's argument is an ethnographic case study (conducted between 1992 and 1998) of the organizational and technological improvement of the waterworks of three cities in Tanzania (Arusha, Moshi and Tanga).² The project under scrutiny was financed by the German Development Bank (KfW) and one of the main areas the book covers is the relationship between the bank as a donor and manager of development aid and events as they unfold between various sites in Tanzania, Germany, and other countries as the water system is managed.

Development cooperation is about the transfer of resources from the rich countries of the North to the poor countries of the South according to political priorities. In order to be legitimate within the rich countries, this transfer has to be made in ways that can be accounted for and therefore must appear predictable. In order to secure this accountability and predictability, the resources—money, technology, and know-how—cannot simply be handed over as means to achieve any ends that are to be chosen freely by the recipients. The resources rather have to be invested according to criteria and protocols that are sound for all parties involved and thus have to follow principles that are internationally approved by legitimate bodies and carry the label of *state-of-the-art*.³

The conditionalities and prescriptions coming along with transferred resources are also due to another, more fundamental reason. The transferred means are unavoidably linked to certain ways of doing things and have certain ends built into them that necessarily become transferred with the means. The implied rationalities as relations between means and ends are based on basic assumptions about society, the individual, the natural world and the norms and values to be achieved. Development interventions therefore always aim at a more or less fundamental transformation of the institutional set-up of the context that is targeted. A short explanation of this point helps to introduce the case study. The larger part of development aid money goes into infrastructure projects that are conceived to be primarily technological affairs—mostly transport, communication, and power—with at most some minor socio-political and juridical implications. However, infrastructures are large technical systems with an inbuilt rationality

²Taken from (Rottenburg 2009).

³This is a complex argument highly relevant for the hypothesis supported here, yet it needs another full paper to be presented, cf. (Rottenburg 2000).

or, as one should rather say, an inbuilt cultural bias, that is, organizational and juridical dimensions with deep implications and far-reaching consequences.

In my case study, improving the water supply of urban centers in Tanzania was first seen as a matter of *pipes and pumps*. In the 1970s the population growth of Tanzanian towns “gave rise to” an increasingly serious water shortage. The logic applied by all parties concerned was this: if there is not enough drinking water, we must produce more. With the help of a German development project the city of Arusha was equipped with sufficient ground water pumps in order to supply the whole urban population with clean drinking water. It then turned out that the amount of water lost through leakages in the distribution system was so high that the effect of the investment was substantially reduced. In a second project phase realized in the 1980s most of the leakages were repaired. In the 1990s the city of Arusha approached the German Bank for Reconstruction and Development with a new project proposal based on the finding that the city still did not have enough water. In the meantime, though, development policy was geared around structural adjustment programs which put another question first, namely: who pays for this water? While the Tanzanian experts still argued with the rhetoric of “not enough water for the poor people,” their German counterparts had switched to the question of the economic viability of the waterworks. Further investments into hardware (like pumps and pipes and so forth) were made conditional on certain organizational improvements of which the key point was economic viability. The water utility of Arusha had to prove that it sold its services to its customers for an appropriate price, that it uses its income to maintain and improve its services and infrastructure, and that all this would be sustainable.

Lengthy negotiations resulted in another new project, this time explicitly restricted to organizational improvement. In the course of this project it turned out that changes in the organization depended on the Civil Servants Act, the Water Utilization Act, the River Basin Management Act agreed upon with the neighboring countries, the regulation of competences between central and regional government and municipality, the Citizens’ Registration Act, and on many more juristic regulations of governance. Like the famous airplane that cannot fly with just a pilot in it, a water production and distribution system does not provide water with just a chief mechanic operating the main valve.

There are, in other words, two main reasons why transformations caused by development interventions are heavily influenced by those who offer aid for this purpose, namely accountability and the cultural bias inscribed in technologies. While this is unavoidable, it runs head-on against one of the most important official political goals, namely to facilitate self-determined development on the side of the recipients of aid. Since there is no plain solution to this aporia between, on the one hand, accountability and predictability and, on the other hand, self-determination, the participants in this game have to circumvent it by all means in order to keep their business going. They proclaim that the means they transfer through development projects—like for instance technical infrastructure—are in-

dependent of any goals, are universally given, and based on objective facts. The goals admittedly depend on value decisions. Yet, as is officially stated, democracy, good-governance, human rights, market economy, and welfare for a maximum of people are general human goals independent of cultural variations. The role of so-called *cultural factors* in development is relegated to other and minor issues as long as they do not challenge the key assumptions of those general goals. The politically sensitive topic of true cultural heterogeneity⁴ among partners in development is avoided at all costs—like for instance anything that challenges the Western perception of the individual as an independent entity geared to choose between options and to take free, rational decisions for its own benefit (Hacking 1986). If true cultural heterogeneity occasionally surfaces due to imprudent behavior within the community of experts, the unlucky proponents are ostracized for ethnocentrism, Orientalism or “othering.”

As a result of the circumvention strategy around the aporia between predictability and self-determination and against the (since the 1980s) official rhetoric of a culturally sensitive development policy, development cooperation is essentially carried out as a *technical game*. This game is perceived to be independent of social and cultural frames of reference, and it is primarily about optimizing effectiveness and efficiency (and therefore less about truth, goodness, and beauty). This—most importantly—reinforces the initial assumption (see above) that technology and social techniques (like commercial accounting, incentive programs, etc.) are free of any cultural bias. The ends and the protocols inscribed into technologies—that is their cultural imprints—remain black-boxed.

With my research I try to show that the technical game normally assumed to be the lowest denominator for cooperation turns out to be at the same time the main cause of its failure. While the argument about the inbuilt failure is similarly made by others,⁵ I depart from the interpretation that in the end the failure is due to politics, power asymmetries, hegemony, or other reasons that could be avoided under fairer circumstances and other forms of domination. The technical game—this is my argument—is unavoidable for socio-epistemological reasons given in the nature of epistemologically heterogeneous zones and it inevitably has some iatrogenic effects. Accepting this might increase the level of reflexivity and shift the attention to questions of how to improve the technical game instead of denouncing and demonizing it while dreaming of an ideal world where social arrangements can be changed toward more equality and justice without any damage.

21.3 The Main Hypothesis

On a general and abstract level, the central concern of my argument is with the production of facts through technologies of representation and inscription. It helps to first mention the practical problem at hand in the field in order to get down

⁴That is alienity, see (Rottenburg 2006).

⁵Cf. (Ferguson 1990; Escobar 1995; Mosse 2005; Li 2007).

to a more concrete level of the concern. The day-to-day management of the water systems to be improved by the pilot project under scrutiny critically depends on technical tasks such as mapping and building databases. Without an adequate database (how many customers there are, how they are distributed over the territory covered, where the distribution endpoints are located, and so on) the system cannot be managed effectively. Without effective management it cannot generate the income needed to maintain it. Without system maintenance the development aid used to finance the technological system becomes meaningless as the system will not work. The work of territory mapping and database building involves the representation of an external reality by technologies of inscription. These sophisticated cultural techniques—i.e. mapping and systematic storage of data—turn out to be the essential challenges of an intervention that started undemandingly as the transfer of *pipes and pumps* and the implementation of a simple organizational model.

This argument implies that the question of which *technologies* are more or less appropriate for developing countries—a question at the heart of development aid debates for decades—cannot be separated from issues of *knowledge* and *representation*. The success of implementing a technology depends on its use, and use depends on how the participants know and represent the reality they are dealing with. The central issue raised by linking technology to knowledge and representation is about rationality and objectivity. In that sense the travel of techno-scientific models in development and humanitarian interventions is inextricably linked to questions of rationality (what means do we have and what goals do we want to achieve?), identity (who are we?), and the objective representation of the reality out there (in what situation are we?). The hardest and most important of these these implications is the third one. The universalist presupposition of the one reality—prevalent in the epistemic community of development experts—implies that this one reality can be grasped, represented, and used a second time for verification. This seems to entail the possibility of a meta-code in which that reality can be represented without distortion. Following this assumption, the development discourse distinguishes between the one meta-code and many cultural codes. Given this understanding of the meta-code, the different cultural codes can only be ‘wrong’ since they design different realities while it is assumed that there is only one.

Critics usually intervene here: it is the universalist presupposition of the one reality which is flawed. However, the first problem with this critique is that it cannot be valid unless it takes the same universalist position. Saying that the different realities designed by different cultural codes have the same status, unavoidably requires a meta-code in which this very observation can be formulated. This is the well-known and extensively belabored paradox that will forever wait for its solution. The second problem with this critique is that it underestimates its own basic assumption about the historical, social and cultural situatedness of all knowledge. The enunciation of a meta-code unavoidably has its own situated-

ness: where people of different convictions and interests want to or have to act in accordance, they cannot do so without enunciating the possibility of a meta-code. In the words of Douglas and Wildavsky referring to risk assessment:

Yet, act we must, not knowing what will happen to us along the path we choose to take. (Douglas and Wildavsky 1982, 4)

It is this “act we must” that is at the core of the epistemic community of development experts.

I suggest leaving aside the abstract debate about the possibility or impossibility of a meta-code founded in reality (assuming with Quine (1951) that all theories and the propositions derived from them are under-determined by empirical data). Instead, I propose to embark on an ethnographic description of social practices which need to *handle* the paradox without being able to resolve it. My main hypothesis is that the handling of the paradox is a form of *code-switching* between, on the one hand, acting and speaking in order to achieve something (e.g., making a water utility economically viable) and, on the other hand, reflecting about this acting and speaking in a different context with different rules, values, and reality assumptions, and with a different purpose (e.g., to impress an academic audience, or to find consolation among like-minded friends ‘after the battle’ in a private discourse). I should, perhaps, repeat that I do not consider this to be a cheap anthropological or sociological way around a fundamental philosophical question. I rather consider this to be an appropriate explanation of why meta-codes are unavoidable and why certain techno-scientific solutions become accepted as universal—at least for a while.

The general argument implied here is that good arguments do not necessarily travel better than poor arguments. This position follows a fundamental shift that is often attributed to David Bloor and his book *Knowledge and Social Imagery* (Bloor 1976). He convincingly argues that not only the perseverance of ‘false beliefs’ but also the perseverance and spread of ‘true beliefs’ requires sociological explanation because the truth of an idea does not seem to sufficiently explain its diffusion.⁶ In organizational sociology DiMaggio and Powell (1983) have shown with an analogous argumentation that the spread of rational models of organizing normally follows fashions and results in what they call *mimetic isomorphism*. My argument on code-switching is also inspired by Niklas Luhmann’s (1991) argument on *deparadoxification* meaning that the blind spot of observation and description cannot be eradicated but only exchanged with another blind spot—in my words: another code—that is less problematic for a purpose at hand.

To summarize the hypothesis: within the global organizational arena constructed around the ongoing concern of development there are numerous heterogeneous trading zones where the actors nevertheless have to and can agree on shared criteria of objectivity for their purpose at hand. Their emic assumption of universal objectivity with its corresponding meta-code is necessary for practical and

⁶Cf. also (Smith 1997).

diplomatic requirements of negotiations across epistemic differences. This implies that the emic assumption of universal objectivity does not need any other explanation—other than its pragmatic function in heterogeneous trading zones. This again means that a particular claim to universal objectivity is a provisionally valid assumption that is easily dropped outside the arena of negotiation and exchanged for another position that makes more sense in the arena one has moved to. This hypothesis also implies that the assumption of universal objectivity is misunderstood if reduced to a form of hegemony founded in power asymmetry. To the contrary, claims to universal objectivity can sometimes be used as a protective device against hegemonic encroachments like, for example, in all cases that can be understood as “speaking truth to power.”

21.4 The Meta-Code in Heterogeneous Trading Zones

I can now come back to the approach by Douglas and Wildavsky and critically apply it to my case study. Development cooperation, as mentioned in the introduction, is mainly carried out in projects. For my argument, the most important characteristic of development projects is the frequent occurrence of epistemic heterogeneity within the arenas of negotiation opened up by projects. The degree of heterogeneity and the chances of its occurrence increase when stake holders from outside the demarcated project domain and from outside the epistemic community of development experts are involved in negotiations. A negotiation technique called Goal-Oriented Project Planning (GOPP) has been developed for this field in an explicit recognition of the problem of heterogeneity.⁷ Four pictures from my case study and a four-field-scheme taken from Douglas and Wildavsky will help to examine the logic of this technique.

The first picture (Figure 21.1) shows a group of experts sitting in a hotel hall in Dar Es Salaam (Tanzania) in 1994 exploring over a beer what could be done in order to improve the water and sanitation related health situation in some Tanzanian towns. They do not yet know where they stand, who the stakeholders are, what the problem really is, and they have no clue what intervention they could envisage as a joint enterprise. They are fully aware, though, of the expectations and restrictions set by their principals for their activities. Additionally, they know these restrictive parameters to be in accordance with globally circulating notions of state devolution, deregulation, and privatization. Hence they know that they cannot come up with some etatist solution to the water related health situation in Tanzanian towns; but then *privatization* is still a very vague goal that allows for nearly endless variations.

The second picture (Figure 21.2), taken in 1995, documents the examination of one aspect of the water related health situation that was identified as a key factor, namely the administration of the water works and particularly of the customer files, in a town called Arusha. The project experts have to analyze the customer

⁷Cf. (Helming and Göbel 1997).



Figure 21.1: A group of experts in a hotel in Dar Es Salaam exploring ways of improving the water and sanitation related health situation in some Tanzanian towns.

files (on the shelves at the back of the office) and check their reliability since this has vast implications for the financial situation, and in turn determines the level of maintenance—at least under the assumption that the water works should be economically viable, independent units.

The third picture (Figure 21.3), taken in 1996, shows part of a group of administrators, engineers, managers, and financial experts GOPPING to define the relevant goals and means for the same development project, this time in a town called Moshi. In the background one can see the notes of the participants pasted on the wall. The actors shown in this picture already know their facts, yet they still have no consensus about where exactly they want to go with this project and, in particular, do not know exactly who has to do what in order to get there.

The fourth picture (Figure 21.4), taken in 1997, shows two hydro-engineers, a consultant and an anthropologist in an office of the waterworks of Moshi. A notebook computer is at the centre, with Microsoft Excel on the screen representing the plan of action for the project. They are clear about all the facts they need to know, about all the means and inputs they have at hand, and they have a more or less unambiguous aim: to bring the waterworks to economic viability. They are, in other words, calculating and optimizing the procedures.

The four pictures document a process that took place between 1994 and 1997 and they show a particular development. The same development can be visualized by the four-field-scheme taken from (Douglas and Wildavsky 1982, 5) that is built on two axes: the horizontal axis represents *knowledge* (about the problems to be tackled by the project) while the vertical axis represents *consensus* (about the



Figure 21.2: Examination of the water related health situation in Arusha.

means and the goals of the project). With the additional distinctions between certain or uncertain knowledge, and complete or contested consensus there are four fields:

		Knowledge	
		Certain	Uncertain
Consensus	Complete	Field 4 Problem: Technical Solution: Calculation	Field 2 Problem: Information Solution: Research
	Contested	Field 3 Problem: Disagreement Solution: Negotiation	Field 1 Problem: Knowledge Solution: move to Field 2

The four pictures can now easily be attributed to the four fields according to their sequential numbers from 1 to 4. The table and the pictures, however, do not depict a necessary order of operations; it is an endless iteration process in which any field can be used as the starting point. As soon as a problem emerges, a search process



Figure 21.3: A group of experts defining the goals and means for a project in Moshi.

is initiated, which can ideally be separated into these four steps that are taken repeatedly. Negotiations in fact rarely begin in Field 1; some negotiations might be drawn back into Field 1, though. And in reality iteration processes are not neatly divided in four steps; normally all four steps are negotiated more or less at the same time. This, however, does not reduce the value of this table as heuristic device.

In Field 1 (see Figure 21.1) it is uncertain in what kind of situation one actually is in and in which direction one could or should go within the broad horizon of state devolution, deregulation, and privatization. It is undecided who the affected parties are, who is legitimized to speak for whom, how different the affected parties see the situation, and what their interests really are. In fact, parties and their interest might not be something simply given in advance, but might be something resulting out of these kind of negotiations. It is even uncertain how to acquire the knowledge necessary for clarifying this vague situation. If the negotiations in Field 1 are to have any chance at all, the actors must move together to Field 2. In Douglas and Wildavsky's terms, this means that the actors simply need to improve and substantiate their knowledge about these elementary questions. In my terms, though, the consensus necessary for the move into Field 2 is, in the first



Figure 21.4: Two hydro-engineers, a consultant and an anthropologist in an office of the waterworks of Moshi.

place, achieved primarily by bracketing all those dimensions that would possibly challenge a common definition of what it is all about, that is, by agreeing on a provisional definition of a supposedly common ground. Since it would be disruptive to investigate at this stage how far the agreement is really based on true convictions, the process basically starts with a form of bluffing—and, as I argue, could hardly start otherwise. Already here, in this provisional agreement, power relations play a decisive role. Yet, even more decisive seems to be the power of certain models of rationality that are believed to stand behind the successful handling of similar situations elsewhere. The chosen model—in this case a particular form of privatization of public utilities—is attributed universal validity simply by being chosen again and again all over the globe and thus becomes global knowledge as a result of being chosen. It is in this way that the model becomes an actant in a field of distributed agency.

In Field 2, according to Douglas and Wildavsky, a consensus must be reached on aperspectival, objective facts, which may lead to making the right decisions later on in Field 3. This, as I like to add, is again mainly facilitated by choosing procedures and instruments that carry the weight of being worldwide the best available for the purpose at hand. One cannot get facts about a situation without a prior choice of appropriate procedures, and these procedures again are traveling technologies. In Figure 21.2 one can foresee what inevitably will happen: the information from the files on the shelf will be transferred into a software package. In fact, the process already started, and the big white sheets on the desk of the

accountant are computer printouts from one of those printers using endless paper. Like here, models and artifacts are utilized as *boundary objects* that are able to link heterogeneous fields because they are functional in several of them independently of the diverging basic assumptions in these fields (Star and Griesemer 1989; Fujimura 1992). After having achieved this, the actors must move on to Field 3 if they intend to realize a concrete cooperation. This is because the improved scientific knowledge of Field 2 does not imply evaluative and prescriptive propositions that would indicate what to do. In Field 3, therefore, the parties to the negotiation need to come to an agreement as to their preferential goals, and how these are best achieved based on the acquired knowledge. Once a prescriptive agreement has been reached through consensus—in this case via a GOPP procedure as shown in Fig. 21.3—the only remaining problem is to calculate the technical aspects of the cooperation in Field 4, as shown in Figure 21.4.

The four-field scheme, as mentioned above, is built on two axes: differentiation of knowledge on the horizontal axis and consensus on the vertical one. This distinction corresponds to the difference between facts and values, or between what is true and what is good. In more abstract terms, the key difference here is between a denotative language game and an evaluative or a prescriptive language game (Lyotard 2005). Yet the distinction between the two is a heuristic one, and the four-field scheme actually visualizes nicely how each field—or each step—of the iteration process is actually an intersection between knowledge (fact) and consensus (value). The work in Field 2 and Field 4 are no pure *technical* activities taking place outside of normative considerations. They are (like all technical activities and enabling devices) interwoven with values and interpretations that depend on a frame of reference including epistemic, normative, material and also aesthetic dimensions. The use of traveling technologies—with their black-boxed cultural bias—is an important instance illustrating this point. The same is true the other way around: the disagreements on goals and means in Fields 1 and 3 cannot be reduced to evaluative and prescriptive factors since these fundamentally depend on techno-scientific positions.

The four-field scheme also helps to see how and why the parties to a negotiation under conditions of heterogeneity need to pragmatically restrict themselves to a limited number of questions and to agree on standardized procedures recognized elsewhere. At the same time they are aware of operating within an endless iteration process that they can bring to a stop only by avoiding fundamental questions drawing them back to Field 1. A persistent revisiting of Field 1 would result in an infinite loop in which the actors remain unable—at least for a time—to come to a denotative solution in Field 2, and an evaluative solution in Field 3. Without the determinations in Fields 2 and 3, arriving at Field 4 would never occur, and hence the intended cooperation would not materialize.

During the iteration process all information that is not absolutely necessary has to be excluded heedfully or else the process is again and again set back to square one. In addition to this limitation, the information that forms the basis of

the negotiations is presented in standardized forms that have been agreed upon in advance and are valid outside the immediate context. Ultimate justifications for the truth of statements (*Letztbegründungen*) are replaced by *formalized procedures of evidence*.⁸ This procedure shifts attention from the question of correspondence between individual statements to outer reality, to the question of connectivity of the statements to one another (*Anschlussfähigkeit*). The problem of *external reference* is pushed into the background in favor of the *coherence criterion*⁹ and hence the question of *transversal or circulating reference* (Latour 1995). In other words, the *procedure* receives priority over the *matter* being discussed (Luhmann 1993). This is the only possible way to achieve concrete co-operation under conditions of heterogeneity.

While this is the case, and for the duration of the negotiations, the actors need to avoid making the priority of the transversal or circulating reference over the external reference an open issue. The negotiation can only proceed under the as-if-assumption that the meta-code was valid because it was *naturally* anchored in external reality and *therefore* transcended all particular frames of reference. Otherwise, one would have to conclude that the debated matters can be seen differently from each point of view. Any decision taken under this relativistic assumption would look arbitrary and illegitimate and in some situations absolutely intolerable. Court procedures are a particularly obvious example of this discursive rule. One argues in court about the truth, but the rules by which one argues are agreed upon before and are strictly codified. If the indictment cannot be formulated in these codified rules and legal terms, the prosecution will draw attention away from the actual facts—often in stark violation of common sense—to other facts which can be translated into the legal procedure. The same pattern is at work when the immediate veracity of evidence given at court (like the result of a DNA analysis) is not as important as the formal criteria of its validity as evidence (e.g., when the specimen for the DNA analysis was taken without consent from the person concerned).

In the perspective chosen here, the enunciation of a single and attainable reality with its respective meta-code of representation is thus a political and juristic necessity. A standardized set of rules—the elementary rule being the key differentiation between denotative and evaluative language games—is necessary to remove from negotiation processes any sense of arbitrariness. It is here that technology and the technical game come in as salvation. Even if it is a very doubtful salvation with serious iatrogenic effects—that is unintended negative consequences—there is no better salvation in sight.

If we cannot get rid of them, it appears reasonable to keep the enunciation of objective, globalized knowledge and technical games to what they initially were: provisional agreements used to enable a specific cooperation under conditions of heterogeneity. The uncertainty that results from such a paradox assumption is

⁸Cf. (Porter 1992, 1995); this point was already made by Heidegger in 1938 (2003, 84).

⁹Cf. (Davidson 1986).

insurmountable and simply has to be endured. The epistemic community of development experts has developed a deep understanding of the impossibility to go beyond code-switching when it is about co-operation across epistemic differences. This practical knowledge can be improved by making it explicit and turning it into a strong reflexive competence to shift back and forth between the position of a true believer in the meta-code enunciated during the negotiations and the position of a true skeptic of the same thing outside the negotiations.

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