

Crafting Sustainability: On weaving as mode of (re-)production

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Introduction

In this issue of KIOES Opinions, three voices carry three perspectives of looking at weaving into the discussion of the seventeen goals for sustainable development (at least this is how I think the term Sustainable Development Goals is to be understood, actually indicating that they are about development less than about sustainability). One voice (Verena Winiwarter) is looking for a better way to represent the complexity of the task ahead, a better way to handle the series of goals that are supposed to lead to a sustainable society. A second voice (Charlotte Holzer) tries to make accessible the rationale of tablet weaving as a means to practice (the representation of) complexity, trying to translate it into a how-to, step-by-step introduction to gain insight into the trade-offs and mutual dependencies of the SDGs. Now comes a third voice (Ellen Harlitzius-Klück), claiming that weaving is a sustainable mode of existence (at least in its so-called pre-industrial form), however incommensurable for someone using the yardstick of a knowledge that achieves goals directly and with a measurable trajectory of success. This claim results from the investigations carried out in the 5-year research project „PENELOPE: A Study of Weaving as Technical Mode of Existence“, funded by an ERC-Consolidator Grant of the European Commission.¹ This project will be introduced in the following paragraph. The aim pursued by the three of us from our respective starting points was to test the feasibility of Verena Winiwarter's idea to teach stakeholders and politicians concerned with SDG goals

some of the principles of weaving as a sustainable production mode.

The PENELOPE Project

The PENELOPE project builds upon the hypothesis that there was a significant but tacit contribution of textile technology to the advent of science in ancient Greece. However, this contribution was overshadowed by (1) a concept of rationalism that favoured a hylemorphic view on production and reproduction (Aristotle, *Metaphysics* Book 6), and (2) a distinction of proper and metaphorical meaning (Aristotle, *Poetics* 1457b.7, *Rhetorics* 1410b.13) as well as (3) a number concept that builds upon a unit progressing into the infinite (and not on forms and shapes of numbers like in the Pythagorean approach, cf. Aristotle *Metaphysics* M6 1080b16, M8 1083b8). The aim of the PENELOPE project is to explicate ancient Greek weaving and other traditional ways to weave as a paradigm for social and natural order: Woven fabrics were a materialized cosmology, not only in its state of being, but also in its process of becoming.

The results from the investigation of weaving in archaic Greece, but also from handloom weaving in India or the highly complex weaving in the Andes show that, although weavers do not talk about the underlying principles of their work, this order still transfers into other domains in their respective society. It is not simply the manner of ups and downs of threads that is transferred, but the whole idea of weaving complexity: the balance, the patterned or-

1. The PENELOPE project receives funding within the HORIZON 2020 EU Research and Innovation programme under Grant No. 682711.

der, the rhythm, the idea of bonding, the mixture without mixture (*poikilos*: a patterned cosmic order to which each element contributes without giving up or losing its properties). This is what the PENELOPE team addresses as (technical) mode of existence of weaving. It is a technical mode in the ancient sense where *techné* is an art, a craft, a knowledge of genesis – not only of human-made things but also of natural growth.

Weaving as technical mode

The narrative of the development of textile technology nowadays is strongly intertwined with the narrative of industrialization, so strongly, that it takes an enormous effort to raise even the slightest interest of looking into that question again: What is weaving? What does the weaver know when s/he knows how to weave? The common assumption is that this knowledge is materialized in our machines, formalized in our drafts. Is that all a master weaver needs to know? How then is it possible that weaving could once (and still does in some communities) describe the order of the cosmos? That it helped to understand and sustain societies? In a dialogue much less famous than the *Republic*, Plato presents the *Statesman* as weaver (Plato, *Statesman*). In an investigation ceaselessly searching for the type of knowledge that makes up a good ruler, weaving knowledge becomes the subject of a conversation that starts as if it were about rationalizing the statesman's knowledge as a type of arithmetic, but then turns to the art of intertwining warp and weft. This turn from „pure“ to „applied“ knowledge has been explained as due to Plato coming of age. Moreover, so is Socrates, he is not even speaking in the dialogue but only listening to a conversation in which a young namesake, Socrates, is answering to the questions that will in the end determine the knowledge of the *Statesman*. Age, as this seems to imply, does not make us wiser, but lets us abandon the straight path of rationality in favor of the myths and metaphors of weaving.

Explanations and rationalizations like this are what the PENELOPE project tries to make visible as violation of the principle of epistemic justice. The example of the reception of the Platonic dialogue is not important because it blames age for abandoning reason, but because it blames weaving for being something unreasonable, irrational – this is what establishes the

judgement of insaneness in the first place. Moreover, Plato seems to confirm: „Of course no man of sense would wish to pursue the discussion of weaving for its own sake“ (*Statesman* 285d). „No one in his right mind would ever consider weaving for its own sake.“ (*Statesman* 285d) But beware Platonic irony!

Trying to speak well about weaving

In the PENELOPE project, we frequently discuss the issue of epistemic justice, formulated by Bruno Latour as „speaking well“ about values that are important to people. Studying the literature in combination with a deep involvement into the practice of weaving allowed us to gain insights that enable us to speak well about what concerns the weaver. Three such insights merit particular mention.

- As soon as concepts of science, such as number, or measure, or code, or representation are employed (to make weaving understandable to scientists), a series of misunderstandings is set on track. These are (1) that one only needs to apply the code or draft, (2) that weaving is just about crossing warp and weft, (3) that weaving is just matrix multiplication, (4) that patterning a fabric is about employing geometrical symmetries, and (5) that you can determine mathematically if a fabric does or does not hang together.
- As long as we do not use concepts established by science no one will take our talk serious (see Plato's dialogue on the weaving statesman). We sidestep such an approach consciously, in order to avoid applying measurement that would be incommensurable to the weaver's way to know and speak. Unfortunately, this silences us.
- As soon as we give a moment, an instance of practice, albeit sketchy or diagrammatical, to the reader, we face the difficulty that this is taken for the whole of weaving.

Finding a way to speak well of weavers to non-weavers is fraught with difficulty. In the following I nevertheless try to find a way to speak of the process of weaving as it might be beneficial for the context of the sustainable development goals.

The Binary Micro-Decisions

Weaving is a technology of stunning simplicity. All the weaver needs to do is to cross the weft along the warp by either going over or under it. Where then, is the knowledge?

All the computer needs to do is to run through a series of instances of storage units that either have currency (1) or not (0). Is what computers do thus of stunning simplicity? Oh no, one would say. This is only the most basic definition. You will never understand what a computer is able to do when you take this idea of a „bit“ as the whole of digital technology. It can become extremely complex by following a series of combinations and even reach human intelligence at ever-increasing levels.

Well, the same goes for weaving. You will never be able to understand what a weaver is able to do when you take the idea of crossing two threads as the whole of weaving technology. Still, this is exactly what people usually do.

In a contribution to a collection of papers on Microperformativity, we, the PENELOPE team, began to replace the problematic terms „tacit“ knowledge, „practical“ knowledge, or „embodied“ knowledge by describing it as micro-performative. Although this does not solve the difficulty of achieving a clear explanation of the specificity of weaving, it draws the attention to a different category, namely to making decisions by habits that go mainly unawares, but sometimes pop up to awareness (in the right moment or *kairos*). It is a rhythm similar to music or dance, which helps to smoothen the decisions and makes weaving fast. This part looks like a mechanical movement from the outside. However, it is not just rhythmic but rather algorithmic and thus includes bifurcations, case-sensitive decisions of a higher level at certain points in time and process.

Micro-decisions with long term and wide-ranging macro-consequences, this seems to be what the weaver is aware of without being able to follow the whole course from the single fibers twisted to a thread, along the filiation of beings and the networks of societies, up to the web of stars and planets, in steps that a non-weaver could not easily follow. Still some philosophers and poets took that path and expressed it in their work. As detailed above, Plato explains the true knowledge of the Statesman with the para-

digm of weaving (*Politikos* 311c). In addition, Philo of Alexandria calls the universe a wonderful weave and therefore the inventor of weaving a scientist (*Peri tou oneirous* I, §§ 203ff). Pherecydes of Syros, one of the first prose writers in history, describes in detail the preparation, performance, and ritual completion of the marriage of Zas and Chthoniè, two deities pre-existing the world as we know it. At the third day of the wedding, „Zas makes a robe, great and beautiful, and in it he patterns (*poikillei*) Earth, Ogènos, and the dwellings of Ogènos“, the last indicating the signs of the Zodiac. (Clemens of Alexandria *Stromata* VI 9.4.) Other sources, although from second hand, also know about this cosmic garment.

The Chain of Micro-decisions

But what in the process of weaving makes it able to serve as a paradigm for cosmic order? And what makes it able to serve as a best practice example for sustainable behavior? Both results are never established as a goal of that process.

The weaver does not apply a pre-established design to a specified material by means of tools such as loom and shuttle. Still, this might be a short description of what an automatic loom is doing, although this description leaves out all technical details. Instead, the master weaver establishes a complex and well balanced fabric by making a series of binary micro-decisions that shift up to an overall design, texture, and form. Weavers, after years of practice, are able to oversee what follows from such micro-decisions for the whole of the fabric. Such decisions are not only constrained by and to the point where a weft thread needs to cross a warp thread either over- or underneath.

Similar chains of decisions, albeit not visible in the working process, concern the choice of yarn, its twist with regard to strength, as well as direction, its type, its thickness, its color and the fastness of the color, thus the question of proper dyeing, of proper use of mordant, of the choice of raw material, of the crops that deliver such material, where they need to be planted, under which climatic conditions, etc.

A third chain of references concerns the social relations involved in the work of the weaver, the question who spins the yarn, who pays for the product, the question if the outcome (not necessarily money) will

be sufficient to allow him to take care of his children and the parents when they come of age. All weaver collectives developed a sustainable way not only of living and caring for their raw material and the environment it requires, but also for the people along the chain of production (I dislike the term *chaîne opératoire*) and reproduction of that whole system including humans, plants, animals, food, clothing etc.

Following the reasoning of modernization, the idea that clothes should be cheap and not take long to produce, the idea that the more we produce, the higher the demand and the cheaper the product; on top of paying people just for their time of work and not covering the expenses for reproduction (food and education for children, money for life after work), weavers who leave their rural communities in India and work in the textile factories of the crowded towns not only lose their family contacts. They dry out the fertile system that they will need when they come of age, or need to fall back upon in times of crisis. The millions of workers heading back to their villages when the factories closed down due to the spread of COVID-19² are a case in point. Their arguably backward weaver colleagues in the rural areas, due to their domestic type of production, could simply go on almost as usual in their perfectly equipped home-office.³ I see this as a strong indication that pre-industrial modes of work could well become post-industrial ones.

The technicians and weaving company owners, along with a large part of the public of the Global North believe that they copied the weavers' knowledge into their machines. Thus, we infer with respect to the weavers that there is only manual labor left to do. However, all the precious knowledge and skills that weaving provides for understanding complex structures, limits and supply of resources, organizing communities, balancing relations, is still to uncover and in danger to get lost.

Following the reasoning of industrialization, Global Northerners lost the understanding of micro-decisions and their consequences. The industrialized world thinks in causalities and wants to speak straight. We, grown up in such a society, make plans to solve pro-

blems. We set goals and measure how close we get to them. We hate digressions and detours. Especially as we have no time. When we think it is a good idea to consume less meat in order to change the food industry, we become vegan fundamentalists, buying vegan shoes and handbags – heading into the next malign inversion, as vegan leather is still mainly made from polyurethane or polyester. A path to a sustainable development might not be of the kind imagined in the SDG squares. It might be a long and winding thread used in chains of micro-decisions by people who have learned the craft of sustainable development. But how could such a craft-based approach work? The following chapter outlines that there might not be a shortcut, but that a crafts-based approach needs another kind of learning altogether.

A weaving workshop?

It seems all-too-evident that to teach the sustainability lesson that can be gained from weaving, one needs to teach weaving to those in charge of sustainable development, e.g. politicians. However, there is a danger of devaluing skilled weavers' knowledge by launching short workshops pretending to teach weaving when they only present well-prepared examples excluding all the tedious preparatory tasks where sustainable conduct is actually crucial. The examples of the Andean or Indian communities are striking, but especially as weaving is bound to the landscape and its people, as the materials are taken from the plants that grow there because of the best conditions, why should that approach be transformable to the situation of the typical cosmopolitan way of life of the Global Northerners today? A way of life wearing clothes from plants grown in Kazakhstan, woven in Bangladesh, sewn in India, and consumed in Europe by people eating meat from Argentina, drinking water from France and driving cars from Germany? Are we not cherry-picking when we take weaving out of the limiting context which makes up its character in the respective communities? Is it not preposterous

² <https://penelope.hypotheses.org/2100>

³ Indian handloom weavers are well equipped with mobile phones and sometimes computers. They know how to use digital technology for testing designs or calculating them anew when they want to make changes that were not yet transformed, by habit or practice, into a part of their tacit repertoire. See Mamidipudi and Bijker 2018.

claiming to be able to take part in their knowledge by weaving some ribbons in SDG colors?

One cannot take weaving apart into elements that can be recombined and still yield the same knowledge as before. For a short-term workshop to actually be true to the essence of weaving, we would need to prepare items that do not suggest a simplicity contradictory to the complexity of weaving, and therefore would support the wrong idea.

We would need to de-familiarize the thinking first – and then it is possible to see the concept of weaving. The level where I begin to understand the weaving way of composition and construction is not comfortable to the brain as it has to deal with a huge complexity of information and conditions to respect and relate. This state is a necessary threshold for weavers to pass, and probably the bifurcation after which some leave weaving and others feel challenged to dig deeper into the technique. However, it is not possible to achieve this transforming phase in a well-prepared weaving session of one day or two. The „change of mind“ arguably connected to weaving (or other crafts) seems indeed to be what silences weavers, what makes their knowledge tacit. It is not the practical status as such, it is the development of a complex way of thinking that defies language.

As Charlotte Holzer's experiment shows, a successful procedure like that is not easy to achieve. She is a trained textile conservator and our idea provided her with a new instrument of thinking through her data. In fact, her work is a wonderful demonstration that Verena Winiwarter's idea can work. However, this is not transferrable into a tablet-weaving course for politicians.

A workshop with Weavers?

Would it be possible to keep up such a way of speaking well about weaving during a short-term workshop introducing weaving practices to politicians or other stakeholders of SDGs? We had our doubts. True, it is possible to set up a warp in advance, to prepare the colors and cards in order to spare the workshop participant the frustration of that tedious work. However, then we deprive the process of a huge

amount of decisions crucial to the result and the knowledge we would like to convey.

Would it help to do that experiment with weavers? Shall our team present the idea to them and see if they can make sense of it? This will indeed be our next step: to establish a kind of laboratory entitled „looms-in-motion“ where we invite weavers from China, Laos, India, Germany and Austria to bring their looms and practice side by side. The looms will be very different in construction, the practices will also be very different and the weavers might not share a common language. Our team is currently investigating way of including SDG concerns into this laboratory.

Conclusion

Weaving is a complex bidirectional craft. The production process of inserting a weft thread goes from right to left and back again repeatedly. The work progresses in form of a zigzag movement, establishing designs indirectly by adding up thread by thread in interfering arrangements. In the case of tablet-weaving, the weft is even invisible (see Charlotte Holzer's explanations in this issue), so what does it contribute to the design at all? Weaving rejects our aim for fast or at least comprehensible progress, establishing a form following a preconceived outline. By looking longer at the movements of tablet weaving, we might at some point be able to understand that the design comes from the entanglement of the warp threads of different colors that sometimes hide behind and sometimes come to the fore, arrested by that invisible weft to which we, mistakenly, fixed our eyes in the beginning. In weaving, almost everything is indirect, deflected. It consists of micro-movements, changes, decisions that do not yield results immediately. Decisions on tablet-turns only show their consequence some turns later, which also applies to errors. It is this fact that can drive beginners mad. But is this not exactly the situation we have to face in pursuing a sustainable society? To understand entanglements? To be prepared for zigzag movements? And to value micro-decisions which might show their effects only later? Will our society be able to weave the seventeen goals together despite such discouraging circumstances?

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