1. Radical break in industrial modernity: is it happening?

The topic suits you if you:

• are interested in technology-society interactions
• are somewhat worried about the long-term sustainability of industrial societies
• are willing to become proficient in the quantitative analysis of textual data
• have a broad mind, tolerance for risks and ambiguity, and willingness to engage in cross-disciplinary research

Theory: the framework of Deep Transitions (Schot and Kanger, 2016) proposes that the contemporary industrial societies have run to their limits and are unable to overcome the double challenge of environmental degradation and social inequality. This challenge at least partly results from the specific ways in which the socio-technical systems (e.g. energy production, mobility, housing, healthcare, food etc.), constituting the backbone of industrial societies, have been operating for the past 200-250 years: a process called the First Deep Transition. This transition has gradually led to the consolidation of a set of rules, resources and practices characteristic to virtually all industrial societies – an industrial modernity – that presently shapes the direction of innovative activities all over the world. Some examples of the features of industrial modernity include:

• Instrumental view of nature, including humans, as a resource to be harnessed, controlled and manipulated through the application of science and technology with relatively little concerns about the ensuing environmental effects
• Belief in the possibility of endless technology-fuelled growth assuming limitless supply of resources and/or endless possibilities for resource substitution and/or limitless capacities to absorb waste
• “Mineral economy”: heavy reliance on non-organic materials as inputs for socio-technical systems
• Pervasive rebound effects: various improvements in productivity and efficiency frequently tend to be offset by rises in demand stimulated by these improvements
• Pervasive techno-fixes: attempts to solve the problems created by existing technologies and infrastructures through the introduction of ever new technological solutions

To break out from the lock-in a major transformation in the underlying features of industrial modernity – a Second Deep Transition – is required. The question is whether any signs of this break can already be detected?

Task: to assemble a series of indicators that would either support or undermine the claim that over the past 50 years there has been a substantive break in the basic operating logic of industrial modernity

Methodology:

• Literature review (possibly combined with expert interviews) to assemble a list of characteristic features of industrial modernity (building on Schot and Kanger, 2016)
• Determining one or more indicators related to each feature of industrial modernity
• Search in existing databases and secondary literature in order to find data related to various indicators
• If necessary: conducting primary research in order to measure some features of industrial modernity (e.g. tracking the changing ideas of technological progress in various newspapers throughout the 19th and the 20th century)

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2. The structure and dynamics of European world-culture

The topic suits you if you:
- are interested in the history of arts
- have pondered on issues such as how did 19th century Russia as an economically and industrially relatively under-developed country nevertheless manage to make major contributions to world music and literature
- wish to think about the relations between economic, political and cultural dynamics

Theory: world-systems theory (Wallerstein 1974, 1980, 1989, 2011) presents an analysis of how Europe managed to gain global economic and political dominance over the past 500 years or so. A world-system consists of competing core states, poor periphery and semiperipheral countries that are economically connected (e.g. trade, international division of labour). Throughout the history of the European world-system no state has managed to conquer all other countries and become a world-empire. However, for a couple of decades three countries – Netherlands, Great Britain, USA – have managed to become economic hegemons. What has not been studied so far is how the world-economy matches with world-culture, that is, various centres of artistic excellence in the European world-system since the Renaissance.

Tasks
1. Mapping the cultural structure and dynamics of the European world-system (e.g. in terms of arts, literature, music etc.)
2. Comparing the resulting mapping of the world-culture to the structure of the world-economy as established in the world-systems literature
3. Finding possible explanations for overlaps and divergence between 1 and 2

Methodology
1. Determining the artistic fields to be covered (e.g. literature, painting, music)
2. Compiling a list of various secondary sources related to the histories of these fields (involving either a use of existing databases or a creation of a new one)
3. Using these materials to create maps of European world-culture (might differ according to each field)
4. Using economic data and information from the world-systems literature on the operationalization of core-semiperiphery-periphery distinction to create a map of European world-economy
5. Comparing the findings in points 4 and 5 (e.g. in terms of possible time-lags when it comes to cultural and economic shifts)

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3. Cumulative culture in the evolution of technology, arts, culture

This topic suits you if you:

- wonder about the psychological mechanisms responsible for our common culture
- are interested in broad generalizations on human activities
- want to apply a theory to a dataset
- may be interested in precise modelling of cultural dynamics

Theory: Cumulative cultural evolution has been argued to be one of the main driving forces in human cultural traditions. Accordingly, specifically in humans, cultural innovations that are beneficial to some tasks accumulate gradually over time leading to „more effective“ and more complex cultures (Caldwell 2016). This can be observed in a variety of domains, such as technology (Kline & Boyd 2010), language (Sterelny 2016), or cooking (Lindenfors et al. 2015).

How cumulative cultural traditions are, depend on the particular contexts in which they develop. Particularly, it has been found that large and densely interconnected populations are often able to better support creation and maintenance of useful innovations (Henrich 2004). Thus how complex or useful cultures are can be explained partly by the historical trajectory that led up to it.

This perspective allows cultural processes to be thought about as guided by various constraints and pressures. The observations on cumulative culture in other domains lead to several research topics:

1. If unconstrained, human social learning should gradually over generations lead to an unlimited growth in complexity and usefulness of cultures. For a particular field, the evolutionary processes can be looked at for trends in the growth or constraints on the processes.
2. Development of cumulative culture should be connected to population sizes and structures of the society in which it is placed. This can be tested on datasets on various domains.
3. Cultural practices that can nowadays be seen as common sense and unitary may have been originally produced through a gradual incremental addition of beneficial innovations. Particular phenomena can thus be reinterpreted through a collection and close observation of materials their historical background.

Task: Your task would be to apply the cultural evolution framework to understand some recorded cultural traditions in terms of cumulative culture. The potential progress will depend on the available data and you will work with the supervisors to find a dataset that fits your interests.

Methodology:

- Through work with the literature on cultural evolutions, based on your interests and in consultations with the supervisors, find an appropriate dataset to test cumulative culture or various selective pressures in a domain you are interested in (e.g. technology, texts, communities). This database may be available or can be manually annotated.
- Characterize the accumulation of innovations or complexity within the dataset. Some simple quantitative techniques need to be learnt.
- Analyse the particular case in terms of what is already known in the literature about how cumulative culture comes about.

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4. Psychological biases as drivers of artistic evolution

The topic suits you if you:

• are interested in the history of arts
• have at least preliminary knowledge of cognitive science
• would like to study culture in a “scientific” manner
• think that art history may have regularities and patterns hidden inside

Theory. The cultural attraction hypothesis (Sperber 1996) suggests that cultural representations, such as folklore or the arts, adapt to the pre-existing cognitive biases of our brains. These cognitive biases have originally evolved for solving separate, very practical issues: for example, we experience a quick automatic response of fear when hearing loud sounds – because they are usually related to potentially dangerous things: rocks rolling down the hill, or an approaching elephant. However, these cognitive mechanisms are often “misused” by the arts. For example, in music: an unexpected loud melodic transition may result in shivers down the spine – a fearful response in the absence of any danger (Huron 2006). Such cognitive illusions are claimed to be the drivers of cultural evolution: subtle but steady psychological forces that give direction to the flow of history.

Tasks and methods:

• Figuring out a potential cognitive bias that can influence the evolution of a particular art form (e.g., horror movies, cartoons, or poetry)
• Creating a database of specific traits of a chosen art form (e.g., several parameters of horror movies in 1920-2010)
• Looking for the predicted patterns of increased/decreased use of these traits

Anti-stress disclaimer: Most probably, this study will not involve any hardcore statistics or sophisticated programming. Those would be good, but certainly not necessary. For a starter, you just need to have an interest in some art form and the readiness to discover the laws of its evolution.

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