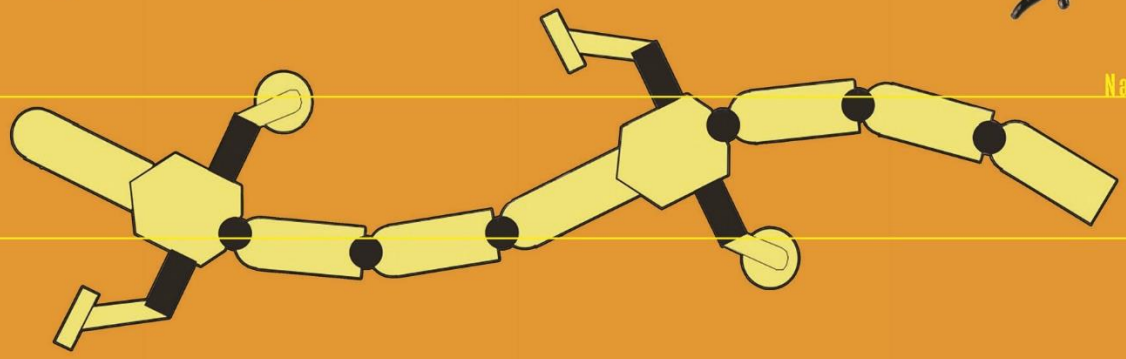
# Technology and Language

Fabio Grigenti and Natascha Adamowsky



Natascha Adamowsky

Benedetta Milani

Federico Monaro

Mareike Smolka

Daria Bylieva and Anton Zamorev

Sven Thomas

Irina Oznobikhina

Elizaveta Redko and Maria Bogatyrenko

Marco Tamborini

Astrid Schwarz

Alfred Nordmann , Astrid Schwarz , Marco Tamborini

# Mimesis and Composition

3:4

Свидетельство о государственной регистрации:
Эл № ФС 77 – 77604 от 31 декабря 2019, выдано Роскомнадзором
ISSN 2712-9934

**Учредитель и издатель:**
Санкт-Петербургский политехнический университет Петра Великого

**Адрес редакции:**
195251, СПб, ул. Политехническая, д. 29.



**Дизайн обложки**
Морин Беласки (maureen@belaski.de),
с использованием изображений, любезно предоставленных А. Эйспеертом и К. Каракасилиотисом, Лаборатория биороботов, EPFL, Лозанна, см. Tamborini, M. (2022). Philosophy of Biorobotics: Translating and Composing Bio-hybrid Forms. *Technology and Language*, *3*(4), 143-159. https://doi.org/10.48417/technolang.2022.04.10

**Contacts:**
E-mail: soctech@spbstu.ru
Web: https://soctech.spbstu.ru/en/

ISSN 2712-9934

**Publisher:**
Peter the Great St. Petersburg Polytechnic University

**Corresponding address:**
29 Polytechnicheskaya st., Saint-Petersburg, 195251, Russia



**Cover design by**
Maureen Belaski (maureen@belaski.de)
utilizing images courtesy of A. Ijspeert and K. Karakasiliotis, Biorobotics Laboratory, EPFL, Lausanne, see Tamborini, M. (2022). Philosophy of Biorobotics: Translating and Composing Bio-hybrid Forms. *Technology and Language*, *3*(4), 143-159. https://doi.org/10.48417/technolang.2022.04.10

# Contents

Special Topic:
## Mimesis and Composition

# Special Topic:
# **Mimesis and Composition**
## Guest Editors
**Natascha Adamowsky and Fabio Grigenti**

https://doi.org/10.48417/technolang.2022.04.01
Editorial introduction

# Mimesis and Composition: Introduction

Natascha Adamowsky[1] and Fabio Grigenti[2] (✉)
[1]Universität Passau, Innstraße 41, D-94032 Passau, Germany
[2]University of Padua, Via 8 Febbraio, 2, 35122 Padua, Italy
fabio.grigenti@unipd.it

## Abstract

A brief overview is offered of a special issue of papers associated with the Padova Summer School on Philosophy and Cultural Studies of Technology. The two key concepts of mimesis and composition are presented in relation to the various themes in the collection. It is shown how mimetic protocols of repetition and reproduction are linked to the inexhaustible multiplicity of compositional patterns in all domains of human activity. There are two thematic poles investigated by the different contributions: science and technology on the one hand, and on the other hand enchantment and magic. These two domains, for a long time opposed, appear as different imitative ways of composing the world within a horizon of meaning. In this perspective, phenomena such as play or experiences such as sound or smell, take on a driving theoretical role. Viewed as a whole, they constitute the lemmata of a new and more comprehensive fundamental anthropology.

**Keywords:** Cultural Studies of Technology; Play; Mimesis and Composition; Technology and Magic; Experiment and Enchantment; Sound and Smell; Form and Function

**Citation:** Adamowsky, N. and Grigenti, F. (2022). Mimesis and Composition: Introduction. *Technology and Language*, *3*(4), 1-7. https://doi.org/10.48417/technolang.2022.04.01

УДК 130.2:62
https://doi.org/10.48417/technolang.2022.04.01
Редакторская заметка

# Мимесис и композиция: Введение

Наташа Адамовски[1] и Фабио Гриджентиа[2] (✉)
[1]Университет Пассау, Инштрассе 41, D-94032 Пассау, Германия
[2]Университет Падуи, Виа 8 Фебрайо, 2, 35122 Падуя, Италия
fabio.grigenti@unipd.it

**Аннотация**
Предлагается краткий обзор специального выпуска статей, связанных с Летней школой по философии и культурологии в Падуе. Две ключевые концепции мимесиса и композиции представлены в связи с различными темами выпуска. Показано, как миметические приемы повторения и воспроизведения связаны с неисчерпаемым разнообразием композиционных схем во всех областях человеческой деятельности. Есть два тематических полюса, исследуемых в разных статьях: наука и техника, с одной стороны, и колдовство и магия, с другой стороны. Эти две давно противопоставленные области предстают как разные подражательные способы компоновки мира в пределах смыслового горизонта. С этой точки зрения такие явления, как игра, или такой опыт, как звук или запах, приобретают ведущую теоретическую роль. В целом они составляют леммы новой и более всеобъемлющей фундаментальной антропологии.

**Ключевые слова:** Культурологические исследования технологии; Игра; Мимесис и композиция; Технологии и магия; Эксперимент и очарование; Звук и запах; Форма и функция

**Для цитирования:** Adamowsky, N. and Grigenti, F. Mimesis and Composition: Introduction // Technology and Language. 2022. № 3(4). P. 1-7. https://doi.org/10.48417/technolang.2022.04.01

This special issue brings together the results of an intensive research effort undertaken from 2019 to 2022 in Germany, Italy and Russia.[1] In addition to frequent meetings and exchanges between researchers involved in seminars, conferences, and workshops, an important part of the debate was conducted at two summer schools collaboratively organized at the University of Padova, one in September 2019 (Playgrounds – Technology, Art and the Socialization of People and Things ), the other - after a "pandemic-induced pause" - in September 2022 (*Technology and Magic*). Aside from the Padova Summer Schools on Philosophy and Cultural Studies of Technology, there was a workshop in April 2022 on *Mimesis and Composition – Anthropological Perspectives on Technology and Art*.[2]

A small selection of contributions that emerged from these activities are here collected under the heading *Mimesis and Composition*. This title was chosen not merely to capture attention, but because the group of researchers felt that these two lemmata indicate a whole array of topics, all tied to the view of human "technicism" as a core issue in an anthropology envisaged as a fundamental philosophical discipline. Movements and repetitions, games and manipulations, cognitive practices and systems of rules are just a few of the ways in which *homo faber* has adapted himself and the things around him with a view to shaping living worlds that are never "natural", but always manufactured to suit multiple needs. Mimesis and composition form part of a constellation of attitudes and dispositions that our species has always possessed.

It is always worth stressing that "mimesis" does not merely mean "imitation", nor should it ever be confused with the image or representation of something. An act of mimesis always involves "repeating" and "reshaping" something out of another material: what counts is not a capacity to adapt to a model, but a potential for difference that is released during the mimetic transposition process. If this were not the case, it would have been hard for the concept of mimesis to be applied to such diverse practices as social behavior, theatre, the plastic and pictorial arts, the novel, and latest technological and scientific advances. In actual fact, if we look at all these aspects, mimesis may no longer even exist as an idea. It seems to take action like a machine capable of producing new orders of sense starting from any kind of material, a machine capable of making structures fixed, and habits and action protocols stable.

Mimesis also works by means of a compositional effect, which explains the choice of the second term. "Composition" has two closely-linked meanings: the act, operation, or work of composing, i.e. of combining things together in an orderly and organic manner; and also the result of this process. It is impossible to circumscribe the vast number of settings to which the logic of composition applies: from our use of language, for a start, to the ways in which different figurative elements are distributed, organized and emphasized in the figurative arts and photography, especially for the purposes of stylistic unity; or in architecture, in the methods and criteria used to arrange and organize various parts of a building or sets of living units. But compositional rules also affect every domain

[1] To date, the core group of discussants included Natascha Adamowsky, Fabio Grigenti, Natalia Nikiforova, Alfred Nordmann, Oliver Schlaudt, Astrid Schwarz, and Cheryce von Xylander, with contributions also by Pelle Ehn, Tim Ingold, and Maria Muhle.

[2] The series continues with a September 2023 summer-school on *Animal Technologies*.

in which there is a question of the relationship between a part and the whole, or of combinations of elements based on their qualities or differences. The structure of digital multiverses is compositional too, and the succession of rules that apply in games has more or less clearly defined purposes in every actions circuit.

Mimesis and Composition ultimately reveal a technicism that questions every dualism, and especially the one between nature and culture. Things belonging to the natural and behavioral worlds of the living become less foreign when seen from the mimetic and compositional standpoint because they are permeated by the same logic. As we shall see later, this logic can be transposed, as is, to the human world without posing the problem of making us think of some unassailable principle of otherness. We will find the above-outlined aspects explained, in different settings and different ways, in the contributions that follow.

Natascha's Adamowsky (2022) study *Productive Indeterminacy: On the Relationship between Play and Science*, undertakes a fundamental theoretical task: to give a unified vision of play, understanding it as a constitutive factor of culture, both in the formation of the culture itself and in the results that the practice of playing produces. Adamowsky's approach - seeing play as a special combination of movement and encounter and the player as someone who participates in his surroundings in a mode of productive indeterminacy - is very promising because it leads to seeing play phenomena in a plural perspective, but at the same time as unifying fields (art, language, science) that otherwise would be separate. The question Benedetta Milani (2022) starts from in her is *On the Mythical Atmosphere of the Digital World*: Can the digital world be put in analogy to the mythical world? In the contribution, an affirmative answer is given on the basis of the mimetic/constructive characteristics of the digital: the absence of contingency (determinism) and the immersive character of digital practices. Based on these elements, Milani goes so far as to argue that the process of digitization of our contemporary form of life brings with it the assumption of a new paradigm of rationality that is no longer centered on the notion of the subject as this is thought of by modernity. In his contribution, *The Pledge, the Turn, the Prestige:The Border Between Magic and Technology as Practice*, Federico Monaro addresses the classic topic of the relationship between magic and technology. In particular, he seeks to show how - in the most recent era - technology tends to invade the field of "magic" creating a new form of relationship between the two orders. Relevant are the ethical consequences that Monaro draws from this new epistemic situation.

In her study, *Enchanting Narratives: A Historical Ethnography of Contemplative Science*, Mareike Smolka (2022) deals with so-called “contemplative science”. This term refers to an interdisciplinary field of research that primarily uses neuroscientific, psychological, and clinical approaches to study the biochemical, psychophysiological, behavioral, and subjective changes that occur during and as a result of contemplative practices. The problem that guides Smolka in her essay is the following: how does the contemplative science community tell the story by operating a kind of re-enchantment on the epistemic set-up of the brain sciences? Combining quasi-anthropological observations and document analysis, Smolka examines how scientists and scholars involved in contemplative science narrate the history of their field as a project of re-enchantment. An

unexpected but convincing picture emerges: the re-enchantment is the effect of the narrative composition of incommensurable world narratives, encompassing Eastern contemplation and Western science, ethical meaning and materialist brain research, charismatic and rational authority.

Especially intriguing is the paper of Daria Bylieva and Anton Zamorev, *Father Christmas: Magic and Technology*, dedicated to Santa Claus. As the authors describe, Santa Claus is today the last figure who bears witness to the belief in miracles. He collects wishes and delivers his gifts using tricks and technologies, certainly outdated today. The study examines hundreds of examples (postcards, films, stories, toys, games, etc.) demonstrating the use of new technologies by Santa Claus and clearly identifies a new tendency to attribute the magical powers of Santa Claus to the use of ultra-complex technologies, a tendency that perhaps also in this case indicates the emergence of a "post-logical" thought incapable of drawing meaning from a magical story (Bylieva and Zamorev, 2022).

In his contribution, *Language in the Age of Mechanical Reproduction*, Sven Thomas (2022) leads us to reflect on the case of machine translation. He wants to explore the effects that language composition processing systems might have on our languages. Building on the authority of Walter Benjamin, Sven Thomas argues in favor of the thesis that machine translation can be seen as a technology that reproduces the language itself. This sort of strange conservative mimesis of the words would produce important effects: especially as regards the interactive function of speech.

In *Magic Materialism: From Atmospheric Technologies to Sonic Possible worlds. Towards Architecture of Affect*, Irina Oznobikhina (2022) focuses on the philosophical concept of the atmosphere. Her focus is on the spatial arts, especially the use of sound and light, and asks about the connection between material and affective qualities. Particularly significant in this contribution is the idea of an atmospheric ontology, whose magical composition appears to depend on multiple factors: sound imagination, a certain modality of belief and state of mind *(Stimmung*). Equally relevant is the non-rational and non-invasively masculine meaning attributed to the experience of atmosphere. In *The Composition of Saint Petersburg Scents: Smellwalks for Urban Exploration*, Elizaveta Solomatova and Maria Bogatryrenko focus on the sense of smell and reconstruct an unexpected image of the city of St. Petersburg through the composition of smells. Starting from the testimonies of people engaged in an olfactory tour of the city, they build a series of different compositions of smells - which, based on facts such as the smells themselves, emotions and places - return as many olfactory maps of the city. Evident appears here the power of composition, which by using the same elements, but varying them as a whole, always produces new horizons of meaning and alternative images of the world.

Particularly focused on mimesis is the contribution of Marco Tamborini (2022): *Philosophy of Biorobotics: Translating and Composing Bio-hybrid forms*. The thesis advanced by the author is the following: the combinatorial practice of bionics, biomimetics, biorobotics and all the design strategies inspired by nature is not based on a biomimetic inspiration (that is, on a sort of imitation of nature) but on a translation practice. The case examined to develop this hypothesis is the practice of contemporary bio-robotics. Three theoretical elements should be highlighted around this paper: the

reference to the "constructive/copositive" value of mimesis, the notion of "form" that emerges from this and the reflection on the role played by philosophy. *In Composing and combining: Opposing constructive principles?* Astrid Schwarz deals directly with the theme of composition starting from the relevant problem of whether it is possible to distinguish between principles of composition and principles of combination. In a provocative but theoretically convincing way, Schwarz demonstrates that - starting from the case of the gardenworks – composition and combination can be characterized by a complementary heuristic of collecting and connecting things, and also that different practices are used in the creation of the work. This approach appears particularly relevant for its consequences: on the one hand it indicates a scene of thought where art and technology are no longer opposite domains on the other hand it allows us to glimpse the possibility of a renewed techno-politics not based on the domination of nature. Finally, the reader will find the discussion between Marco Tamborini and Astrid Schwarz on their respective visions of mimetic and compositional processes. Thanks also to the commentary by Alfred Nordmann, the two figures of the *homo translator* and *homo hortensis* emerge as a heuristically valuable conclusion of this special issue.

## REFERENCES

Adamowsky, N. (2022). Productive Indeterminacy: On the Relationship between Play and Science. *Technology and Language*, *3*(4), 8-20. https://doi.org/10.48417/technolang.2021.04.02

Bylieva, D. & Zamorev, A. (2022). Father Christmas: Magic and Technology. *Technology and Language*, *3*(4), 76-89. https://doi.org/10.48417/technolang.2022.04.06

Milani, B. (2022). On the Mythical Atmosphere of the Digital World. *Technology and Language*, *3*(4), 21-29. https://doi.org/10.48417/technolang.2022.04.03

Monaro, F. (2022). The Pledge, the Turn, the Prestige: The Border Between Magic and Technology as Practices. *Technology and Language*, *3*(4), 30-41. https://doi.org/10.48417/technolang.2022.04.04

Nordmann, A., Schwarz, A., & Tamborini, M. (2022). Knowing and Controlling the World through Gardenworks and Biorobots: Discussion of Tamborini and Schwarz. *Technology and Language*, *3*(4), 175-185. https://doi.org/10.48417/technolang.2022.04.12

Oznobikhina, I. (2022). Magic Materialism: From Atmospheric Technologies to Architectures of Affect. *Technology and Language*, *3*(4), 101-124. https://doi.org/10.48417/technolang.2022.04.08

Redko, E., & Bogatyrenko, M. (2022). The Composition of Saint Petersburg Scents: Smellwalks for Urban Exploration. *Technology and Language*, *3*(4), 125-142. https://doi.org/10.48417/technolang.2022.04.09

Schwarz, A. (2022). Composing and Combining: Opposing Constructive Principles? *Technology and Language*, *3*(4), 160-174. https://doi.org/10.48417/technolang.2022.04.11

Smolka, M. (2022). Enchanting Narratives: A Historical Ethnography of Contemplative Science. *Technology and Language*, *3*(4), 42-75. https://doi.org/10.48417/technolang.2022.04.05

Tamborini, M. (2022). Philosophy of Biorobotics: Translating and Composing Bio-hybrid Forms. *Technology and Language*, *3*(4), 143-159. https://doi.org/10.48417/technolang.2022.04.10

Thomas, S. (2022). Language in the Age of Mechanical Reproduction. *Technology and Language*, *3*(4), 90-100. https://doi.org/10.48417/technolang.2022.04.07

СВЕДЕНИЯ ОБ АВТОРАХ / THE AUTHORS

Наташа Адамовски
natascha.adamowsky@uni-passau.de

Фабио Гриджанти, fabio.grigenti@unipd.it
ORCID 0000-0002-2554-064X

Natascha Adamowsky
natascha.adamowsky@uni-passau.de

Fabio Grigenti, fabio.grigenti@unipd.it
ORCID 0000-0002-2554-064X

Статья поступила 12 декабря 2022
одобрена после рецензирования 20 декабря 2022
принята к публикации 20 декабря 2022

Received: 12 December 2022
Revised: 20 December 2022
Accepted 20 декабря 2022

https://doi.org/10.48417/technolang.2022.04.02
Research article

# Productive Indeterminacy: On the Relationship between Play and Science

Natascha Adamowsky (✉)
University of Passau, Innstraße 41, Passau, 94032, Germany
Natascha.Adamowsky@uni-passau.de

## Abstract

Over the course of the last two hundred years theories and discourses on play have differentiated in many ways. They are confronted with a multifaceted field of play phenomena and playful activities as well as with a history of manifold play objects, play materials and playgrounds. Both sides – theories and historical phenomena – have not yet found a convincing correspondence, especially since in research, efforts predominate to view regulated and contingent activities as games, or to interpret a play or a game as a symbol, metaphor, function, etc. of something else. In most cases, this 'something else' refers to what is called 'the real thing' in everyday life. But if playing is not the real thing, we cannot experience anything real, fundamental or true in it. It never gets beyond the stage of preparation, simulation or distraction with the result that relations of play to science, knowledge and technology are completely left out. The following contribution takes a completely different approach and sees play as a factor constitutive of culture, that is both as a productive dynamic and as well as a result of culture. The approach is to see play as a special combination of movement and encounter and the player as someone who participates in his surroundings in a mode of productive indeterminacy. The thesis is that the latter is a prerequisite for every form of getting to know as well as of insight.

**Keywords:** Play theory; History of play culture; Anthropology and phenomenology of play; Epistemology of participation

**Citation:** Adamowsky, N. (2022). Productive Indeterminacy: On the Relationship between Play and Science. *Technology and Language*, *3*(4), 8-20. https://doi.org/10.48417/technolang.2022.04.02

УДК 130.2:62
https://doi.org/10.48417/technolang.2022.04.02
Научная статья

# Продуктивная неопределенность: О связи игры и науки

Наташа Адамовски (✉)
Университет Пассау, Инштрассе 41, Пассау, 94032, Германия
Natascha.Adamowsky@uni-passau.de

**Аннотация**
За последние двести лет теории и дискурсы об игре во многом изменились. Они сталкиваются с многогранным полем игровых явлений и игровой деятельности, а также с историей разнообразных игровых объектов, игровых материалов и игровых площадок. Обе стороны – теории и исторические явления – еще не нашли убедительного соответствия, тем более что в исследованиях преобладают усилия рассматривать регламентированную и случайную деятельность как игру, или интерпретировать пьесу или игру как символ, метафору, функцию и т. д. чего-то другого. В большинстве случаев это “что-то другое” относится к тому, что в повседневной жизни называется “настоящей вещью”. Но если игра не является реальной вещью, мы не можем испытать в ней ничего реального, фундаментального или истинного. Он никогда не выходит за пределы стадии подготовки, симуляции или отвлечения внимания, в результате чего связь игры с наукой, знанием и технологией полностью исключается. Данная статья использует совершенно иной подход и рассматривает игру как фактор, составляющий культуру, одновременно как продуктивную динамику и как результат культуры. Подход состоит в том, чтобы рассматривать игру как особое сочетание движения и сопротивления, а игрока – как человека, который участвует в своем окружении в режиме продуктивной неопределенности. Тезис состоит в том, что последнее является предпосылкой для любой формы познания, а также инсайта.

**Ключевые слова:** Теория игры; История игровой культуры; Антропология и феноменология игры; Эпистемология участия

**Для цитирования**: Adamowsky, N. Productive Indeterminacy: On the Relationship between Play and Science // Technology and Language. 2022. № 3(4). P. 8-20. https://doi.org/10.48417/technolang.2022.04.02

At first glance, the investigation of the relationship between play and scientific culture may seem an absurd endeavour. Science is generally regarded as a process that aims at gaining knowledge. Play, on the other hand, is regarded as very important for the psychomotoric development of children and teenagers, but as a nice-to-have in the lives of the rest of humankind. In no way, it is thought, does playing lead to insights into the theory of relativity or the rules that govern evolution. On the other hand: Humans are fully human only where they play, or so we have assured ourselves for a good 200 years, ever since Friedrich Schiller wrote these lines about aesthetic education to Prince Friedrich Christian of Augustenburg (Schiller, 1794/2016). But what could that actually mean?

A warning beforehand: game theories are often like the emperor's new clothes, they consist of a lot of hot air. Of course, people can also be fully human when they are not playing. We can do many other fabulous, crazy, loving and admirable things, such as dreaming, kissing, telling jokes, singing or conjuring up a perfect Schnitzel. But who would deny that? And yet, of course, we must agree with Schiller that play is an indispensable part of our humanity, because, as the Dutch historian Johan Huizinga (1938) wrote, we are *homo ludi*, and the origin of our culture is based on play.

Huizinga’s idea that culture emerges from play has often been met with sympathy. However, disagreements quickly surface when it comes to the concrete nature of the relationship of play to knowledge and cognition, science and technology, to politics and economics. Even though play is predominantly held to be something 'good', it is widely felt to be an inappropriate component to all areas where important decisions, hard facts, or noble art are at stake. It's an unusual scholarly situation: on the one hand, play is a very commonplace phenomenon, on the other hand, scientific access makes it become elusive. Yet it should be quite simple as, after all, one thing has not changed over the millennia: people play and everyone who plays *knows* that they are playing. But what are we actually doing when we play? And, firstly: where do ludic ideas, objects and practices of play come from? Over the centuries this question has led to the most diverse answers and irritations.

As is well known, theories and discourses on play have differed vastly over the last two hundred years. In most compendia and encyclopedias, the prehistory of theories of play begins with John Locke's (1690) *Essay Concerning Human Understanding* and *Some Thoughts Concerning Education* published three years later. Locke's strategic ideas on the efficient shaping of character with the help of play are usually juxtaposed with Jean Jacques Rousseau's (1762) major pedagogical work *Émile*, in which the author defends unconstrained natural play as the child's very own right. Finally, Immanuel Kant's *Critique of the Power of Judgement* elevates play to a philosophical principle that establishes the aesthetic state of mind as the “inexponible representation of the imagination (in its free play)” (Kant, 2000, p. 219).

Three years later, in 1793, Friedrich Schiller answered the question of how freedom could be created without radical upheavals and terror in the manner of the French Revolution with an idea of play at the centre of a philosophy of freedom. In his aforementioned letters *On the Aesthetic Education of Man*, the concept of play took on a systematic meaning for the first time in Western history:

> In the midst of the formidable realm of forces, and of the sacred empire of laws, the aesthetic impulse of form creates by degrees a third and a joyous realm, that of play and of the appearance, where she emancipates man from fetters, in all his relations, an from all that is named constraint, whether physical or moral. (Schiller, 1999, p. 54, 27. letter)

The aesthetic ideal of playful productivity is now supposed to lead people from the division of labour to their natural, harmoniously active being. Schiller's philosophical revaluation of purpose-free play, however, implies a harsh devaluation of his contemporary play culture and culminates in the slogan: “For, to speak out once for all, man only plays when in the full meaning of the word he is a man, and he is only completely a man when he plays” (Schiller, 1999, p. 29, 15. letter).

With the connection between education and freedom in play, Schiller's idea of play becomes the starting point of modern efforts to integrate playful activities into the model of life and set of values of the emerging bourgeois society. For on the one hand, his concept is attractive for pedagogical interest, already formulated by Locke, to functionalise play and to prove that the apparently purposeless activity of play has an underlying use and value. In addition to recreation, compensation and variety, it was above all motivational moments, the secret trickery to practice and learning through play, that played a role in this. The result was the considerable regimentation, functionalisation and foreshortening of the concept of play and of children's play activities.

On the other hand, and quite controversely, Schiller’s concept promoted far-reaching moments of universalisation and idealisation that equated play with beauty, happiness and a golden kingdom of the free. For the success of Schiller's idea of play consisted essentially in hermetically sealing off the realm of play and appearance as an aesthetic realm of ideas from profane reality. From then on, a conception of play developed as an exceptional region and haven of the imagination, as a compensatory movement with thoroughly utopian-alternative potential, which, however, also had its price.

The emphasis on the imaginative side of play as an expression of an elementary human talent went hand in hand with its exclusion from all serious contexts of life. As a result, poets such as Jean Paul, Novalis, or Heinrich von Kleist and educators and philosophers such as Friedrich Fröbel, Friedrich Schleiermacher, or Friedrich Schlegel declared play to be the central moment of the artistic-poetic creative process. The concept of play thus joined up with a development that was also to change the social status of the fine arts: “Life is serious, art is serene,” says Schiller's Wallenstein (Schiller, 2017, Prologue). Games and works of art that did not correspond to this sereneness were perceived as aberrations and cultural decay. Since then, the talk of right and wrong games has haunted scientific treatises and cultural critique.

In summary, I would like to state that around 1800, a modern understanding of play asserted itself, oscillating between idealisation on the one hand and disciplining on the other. This was followed by theoretical concepts that accompanied the development of new subjects: sociology discovered play for itself, psychoanalysis, psychology, enthnology, anthropology, cybernetics, business studies, etc. – the list is not exhaustive. In retrospect, however, we can see a development from the Enlightenment to the present

in the course of which theories of play and games became *en vogue* at times in all academic disciplines. All of this is well known, and it would take a book to trace this history of theory in all its interconnections, contradictions, and variety of models.

Surprisingly, the majority of these theories of play are peculiarly distant from actual phenomena. This does not imply a judgement on their epistemological value, nor does it deny that they may offer some important insights. It is merely a finding that they hardly deal with concrete acts of playing. Rather, the playful activity is decoupled from its sensual moments of enjoyment and pleasure and is only used as a model for the analysis of sets of rules, conflict structures and states of equilibrium. With the end of the 17th century, playing was increasingly understood as following rules. The game was regarded as a system of rules, in the sense of an effectuation model. The concept of play was used extensively as a metaphor, for example for the activity of the imagination or as an example of the mathematical formalisation of chance, for philosophical reverie and as a medium of thought. The central objects of study were the play of the child and the adolescent, whose development had to be understood and whose formation and education had to be planned and realised. Questions of teaching and learning were central, with both idealising and disciplining intentions, and occasionally one encounters puzzling things, such as John von Neumann's choice to call two people who have to make a decision player 1 and player 2 and then to christen the mathematical modelling of this decision-making situation 'game theory.'

From a historical distance, this development raises a host of questions. One would like to know which factors promoted the virulence of the concept of play and shaped its specific career. In which cultural-historical context or in which play culture did certain approaches emerge? One of the most striking developments in the history of play is the disintegration of a uniform culture of play described by Philip Aries(1960) in his *History of Childhood*, which begins in the 17th century and gradually leads to a separation of two completely different worlds of children's and adult games. Also significant and well researched is the gradual division of the everyday world into the predominant sphere of work and the subordinate sphere of leisure, the latter leading to the establishment of sport and mass culture in the second half of the 19th century. By contrast, there are large gaps in historical research concerning everyday pleasures and amusements. Play as 'pleasure,' it seems, is no longer capable of theory since 1800 and accordingly finds no place in modern discussions of play.

What one encounters instead are disciplinarily quite scattered studies on selected types of games. One reads about rituals and customs in 'exotic' societies, finds surrealist ideas on art and play, theories of performance and theatre metaphors, cultural critique of gambling addiction, folkloristic collections of children's toys and sociological interpretations of role-playing in everyday life. The extensive literature on sport is separated out as an independent discipline and is not usually addressed as a part of game studies. Only the success story of the computer and its games has changed this lately; these so-called game studies have formed an independent research direction in the last 10 years and established international discourse.

This observation, however, also confirms my thesis that despite a boom in game theory and the great interest in digital games, phenomena of playing and play are still not

a recognised research subject. If play does come into the focus of academic attention, then as a regulated event, be it on the court, on the gambling table, or as a computer game.

The problem with this selection is that these artefacts and architectures represent only a section of the culturally sanctioned forms in which play is permitted. But the question of when someone is playing or whether this or that action is meant to be play is not decided by exercise instructors, educators, philosophers, or entertainment companies. It is solely up to the players; it exclusively lies in their experience. The 'epistemology of play' like that of aesthetics demands a participatory perspective.

In this context, the distinction in English between play and game is very useful. It indicates that there are many playful activities or incidents of playing which are not games. Whereas play refers to the intensity and expressiveness of ludic behaviour, its wit, if you will, and its inclination to folly, games simply denote an institutionalised structure in which play can but does not have to unfold. The fact that games and not play are the most frequent object of study in modern research is due to the general dominance of the 'objective' observer perspective in science, because in contrast to play, games can be investigated without reference to the players, their perceptions, experiences, passions. From a participant's perspective, on the other hand, it is evident that games only allow play to a certain extent and that too much play can ruin a game. The fact that this is hardly ever discussed may be due to the fact that games, in contrast to play, can be ideally operationalised as a scientific-bureaucratic principle: difference and function; field and rule; on and off. The quintessence of games is the fact that they regulate ambiguity, spontaneity and flexibility, which is precisely what play thrives on, out of a situation, which is why the American anthroplogist Helen Schwartzman suspects that games are possibly the last place where one could find out what play actually is (Schwartzman, 1978, p. 327).

Nevertheless, nothing is gained from an antithetical juxtaposition of play and game. Rather, we are dealing with a relationship of cultural transformations in which play proves to be an agency of cultural self-reference, as both a component and a generating instance of culture. Its various concrete historical forms result from cultural efforts to bring play into attractive forms and thereby *invite* people to play. These *invitations to play* are cultural arrangements or media configurations that, in the words of K. Ludwig Pfeiffer (1999), enable "heightened experience." They motivate both relieving, de-differentiating events, e.g. in the form of wild dances and dissolute liveliness which promote an ecstatic experience. But they also motivate the experience of media that offer increasing complexity and intellectualisation.

Games are not the only artefacts that a culture devises to create situations of and for. Invitations to play can vary greatly at different times and places. Comparatively clear examples include pleasure palaces, gardens, dance palaces and playhouses, and one could also look at fairs and sports grounds as well as stages of all kinds. We are dealing with a process in which the invention, design and development of play takes place as a culturalisation of play in cultural objects and practices, e.g. in games, but also in elaborate architectures, sophisticated stagings and complicated toys, in practices such as dressing up, throwing dice, and seesaws. But there are always grey areas involved. For, of course,

play can occur at any time outside culturally sanctioned fields, while, conversely, not everything that happens on designated playing fields is performed or experienced as play.

The modern examination of the phenomena of play is essentially shaped by the rationalising efforts just described. The idea is widespread that play can be defined by the concepts of boundary and rule. The conviction that all forms of play should have fixed boundaries, fixed times and fixed rules, however, stems from a bourgeois-capitalist ideology of play that prescribes the forms in which modern society allows for play to happen, but is blind when it comes to actual incidents where playful activities unfold. Most notable is the modern horror of the possibility that play could occur anytime or anywhere.

However, this ambivalent or fearful attitude towards playing is not necessarily a sign of modernity. Many cultures are concerned about ludic performances; prohibitions against games are probably as old as games themselves. But the modern aversion to play has a unique scope as it essentially claims play as a concept of difference from what it is not: There is play and then there is non-play, namely the seriousness of life. At first, this sounds like quite a reasonable view, and no doubt it also hits on a fact: Not only can play happen anytime and anywhere, it can also stay away. Thank God, not everything is play! On the other hand, so what? Undeniably, play is different from many other things we do in our lives. But that applies to almost everything we don't do all the time: High diving, eating cake, painting a flower, thinking sharply, talking, waging war, driving a car… – but no one would think of describing all these things in terms of the difference to their not-occurring, to not-jumping, not-eating, not-driving a car, and so on. Take the example of eating: The fact that we have to eat permeates our whole lives. Our entire culture with its daily routines, rituals, economies, etc. is determined by the need to eat. However, it would seem completely absurd to describe culinary culture on the basis of the difference between eating and not eating in the sense of an epistemological guiding distinction. Nevertheless, it is clear to everyone that eating is something different from dancing, kissing or sleeping. Modern society, however, does not seem to trust the player with such a capacity for differentiation: Our whole life is interwoven with play, and everyone has to play. There is hardly anything, however, with which modernity has such a problem as with this interweaving of the playful into the entire spectrum of culturally coded life processes. This is remarkable insofar as, anthropologically speaking, clarity and certainty of distinction is only important for hostile aggressive communities, but not for friendly groups – it is vital for wolves, for example, but hardly so for young beagles. The differentiation between play and non-play thus leads back to the logic of a friend-foe distinction that hides the actual essence of play, which is to be a movement-in-between, an encounter.

For some two centuries the culturally constitutive status of play has been reduced to a purely oppositional role. This is a unique strategy of discrimination which not only determines where play has no place, namely among serious things, in work or anything that is called 'reality.' With this juxtaposition it is also decided – and this is the decisive point – that play cannot be understood by itself. According to this view, play is not only different from other things, as such a categorical exception and principled otherness that

does not fundamentally belong with what really constitutes life. It can only appear in the cosmos of cultural truths by way of what it is not.

Here it is important to avoid misunderstandings. Of course, play is different from many things. But it is not obligatory for the knowledge of a phenomenon to describe its peculiarities as opposition to something else. No one would think of describing Plato as non-Aristotle, Goethe as non-Shakespeare, Boris Johnson as non-Thatcher. In the best case, such oppositions are barely beyond trivial. But strangely, hardly anyone seems to notice this. So it seems to be a special epistemological insight for game researchers that in games one always just pretends 'as if.' I have often written this myself, glad to have at all some descriptive thread in respect to the protean phenomenon of play. But the longer one studies play, the more the question arises as to whether this actually says something decisive that no one would have noticed before. Who would deny that you can fly only in play and, of course, not outside play? In the same way, however, you can only fly in an airplane and not outside it, and of course the aeroplane flies and not you. Whom does one want to reassure of what with such ‚insights'?

It is not easy to say goodbye to these and other oppositions. Let's take the example of mimesis in play, the just mentioned acting-as-if. The idea of play as mimesis assumes a clear separation between a world of play in which things are imitated and a real world to which the imitation refers. The problem with this understanding of play is that it reduces play to the status of a proxy; it becomes a dietary medium, a risk-free zone, a salmon impersonator. Such a view necessarily requires making a sharp distinction between salmon and salmon impersonator and treating play as a 'sign-for-something-else.' The first problem with this interpretation is that it is supposed to apply to all manifestations of play. From now on, every kind of playing can only be viewed through something-else-is-actually-meant-here glasses. So a girl who plays with building blocks actually wants to be an architect, a first-person shooter would prefer to kill other people, and every American football match is basically an extended symbolic victory celebration of the American land grab.

Secondly, this interpretation overlooks the fact that someone impersonating a salmon, say a Chinookan fisherman at a first-salmon ritual, bears no resemblance to a salmon at all. Of course, there must be salmon in order to play salmon. But this is trivial. What is not trivial is that with the performance, that is, the appearance of the salmon impersonator who is 'playing salmon' a new aesthetic phenomenon has arrived that has a meaning in itself. Neither is the performer a salmon nor does he look like one, but he shows us a salmon. He produces it, manufactures it, constructs what constitutes being a salmon for him, its ‘salmonly’ essence. In play we experience what a salmon is for us.

And once again phrased differently: without doubt, games are excellently suited for learning, as forms of therapy and simulation models. However, it would be wrong to see the point of play in reference to or in the logic of a system of signs that reduces play to the role of a signifier, a representative, the inauthentic, a second-order reality. Above all, from this vantage-point one misses two decisive characteristics: on the one hand, play’s extraordinary productivity, on the other hand, its culturally indispensable ability to create models of and for something.

In the following, two variants of an understanding of play will be outlined, which conceive of play as a cultural form of generating presence, encounter and participation.

The first variant is of a more abstract nature. It aims to describe the connection that is established between people and their environment in play. This togetherness is thought of as a dynamic which continually offers new possibilities of encountering the form and fullness of the surrounding reality. The idea of thinking of play as an ‘ecological’ cultural form goes back to the work of the Dutch anthropologist Johannes Buytendijk. He states: “[The] possibility of doing some justice to the form and fullness of reality [...] applies to a process such as play, where the organism and its environment, in being together, produce the unified dynamics of life, where dark reasons, opposing tensions, ambivalent behaviour, the ability of the senses to see (Klages), vital imagination, possibility and actualisation, past, present and future combine” (Buytendijk, 1933, p. 138). In its ability to make connections, play is tremendously productive, not to say excessively so. Play is therefore one of the central expressive phenomena of cultural history because it gives form and expression to this „togetherness“ of human and environment – “it gives shape as well as expression to individual and societal affective and cognitive systems,” as the American anthropologist Helen Schwartzman writes (Schwartzman, 1978, p. 330). I am convinced that the attraction of play lies precisely in this coincidence, in the convergence of heightened experience and aesthetic production. Throughout history, people have ceaselessly produced new aesthetic forms in play, new rules and procedures, choreographies and architectures, gaining important insights and developing techniques. An enormous repertoire has emerged that constantly multiplies the world into infinity. For every game is an attempt, a trial or probe, an experiment. It may or may not succeed, but in any case it creates connections between the player and the object of the game, between subject and object, the human being and the world around them. This coming together is an essential prerequisite of human cognition. It does not mean that every playful incident leads to cognition, but it does mean that cognitive effects can be achieved in play. The space of play has a fundamentally cognitive quality, and this is based on the feature of play that it organises abstract things in a way that makes them manageable for the human imagination.

The human brain is quite capable of abstract thinking. Our great weakness, however, is that we emotionally occupy the abstract by way of concretising it, making it sensible. As the social anthropologist Dieter Claessens (1980) writes, play was an important hinge in human evolution because it offered human communities a way to precisely confront this problem. Play, after all, is always something dynamic. To play is to make connections between intellect and sensuality; to play is to build speculative bridges between spirit and matter. What we encounter in play is recognised in a vital way. So we can assume that it was indeed the playing human being who first succeeded in finding a form of mediation between the archaic concrete-sensual and the space of possibility for abstract-distanced thinking – and thus the origin of culture.

The question that naturally arises now concerns the special character of this mediation process. If one asks oneself what people actually do when they design games, one realises that they primarily make available spaces for experimentation, in which cultural tensions can be enacted. The aesthetic form production offers not only pleasure

and enjoyment, but also techniques of visualisation, strategies of expression, methods of setting things in motion or in relation. These techniques, strategies, and methods represent, in a highly changeable way, a common thread in the history of European ideas and knowledge. Of particular importance is the strange potential of play to choreograph tension and conflict and thereby arrive at models of balance and connection.

As far as we can see today, play is part of the constitution of every culture. It has a remarkable capacity to offer itself as a container for processes of meaning-making or as surface for recording and inscription. Disparate things can be brought into reconcilable forms, nameless things can find performative processes from which nameable figures emerge. Play provides a method of enabling interplay, and it is, as it were, the attempt to make something appear in its movement in time and space and thus to create a connection between oneself and this something. In this connection, play proves to be a way of vital recognition.

So I would like to suggest that designing invitations to play is a prototypical process of developing models. These models organise spaces to describe, embody and make descriptive the things that are around us. It is a special ability of play-making to condense a situation out of the abundance of disorder, in which conflicts, dispositions, passions, moods can be brought to the point, to their principle, into an interplay.

Forms of play are among the oldest cultural testimonies that have accompanied human history universally from the very beginning. Interestingly, despite all their occasional exuberance, they do so in relatively stable forms. This gives rise to the assumption that forms of play do not only perpetuate themselves with great success, but also the cultural practice of play-design. The fabrication of play situations – toys, boards, parcours, stages, props…. –, however, is not external to the spirit of play. The ‘play inventors’ are always negotiating with themselves as players; the players, on the other hand, are looking for their designs to succeed or work out as play unfolds. But what do we – asked again – actually do when we play? What happens in these spaces of play so that epistemological effects can occur in them? What do we have in mind when we study people playing?

Working backwards through these questions, it must first be stated that one is undoubtedly dealing with decidedly ambivalent cultural phenomena. The problem is that one can rarely deal with the process of playing itself; often, especially in historical research, one is left with culturally sanctioned forms in which games are meant to take place. However, in order to understand people playing, it is indispensable to enter into the event and participate.

The question remains: what do we do while playing? There is no exhaustive answer to this question. Helmut Plessner (1941) would have said that we keep ourselves in between, Victor Turner (1983) that we are betwixt-and-between in a no-man's land, Richard Schechner (1981; 1988) spoke of a threshold area between two and uncountable options. All these formulations characterize play as a certain kind of movement into the non-identical and thus as the basis for our being able to unfold as individuals.

This takes me to my final point – not only the claim that play is essential to human culture, but also that it provides the basis for us to develop as individuals. The central question we have to face is not who am I, but who do I want to be? The above mentioned

American theatre anthropologist Richard Schechner therefore once described play as a way “to act in-between identities” (Schechner, 1981, p. 88). What he meant is a so-called intermediary position, a being-in-between, which is characterised by a double negativity. It holds someone who plays a king in the suspended lightness of between not-me, because playing king, and not-not-me, because not being king. Players are thus always in a threshold zone, in the movement mode of the non-identical. If it does not want to be merely tautological and just repeat itself, any form of self-knowledge can be gained only from such an eccentric position.

With the “in-between” or the intermediary position of the player, Schechner associates a rejection of all attempts to define play as a framed event and thus implement a division according to 'inside the phenomenon' and 'outside the phenomenon.' What he rejects here Schechner considers a rationalist approach to identifying play and locating it safely between definitive boundaries, using the metaphor of the ‚frame’: “[I]t's too stiff, too impermeable, too 'on/off', 'inside/ outside'. 'Net' is better: a porous, flexible, gatherer; a three-dimensional, dynamic flow-through container” (Schechner, 1988, p. 16).

With the net metaphor, play itself moves into the centre of attention. It becomes manifest as the actualisation of a multiply interwoven web of “both intrinsic and extrinsic relations,” (cf. Sutton-Smith, 1978, p. 97), as a simultaneous engagement of inner and outer dimensions. Play becomes recognisable in its character as a polymorphous point of intersection of the most diverse oppositions, some of these fundamentally antithetical such as I and the other, order and disorder, freedom and submission, paidia and ludus. Also intersecting in play are culturally and historically staged tensions between the 'sacred' and the 'profane' (see Turner 1989), between the 'raw' and the 'cooked' (cf. Lévi-Strauss, 1976), between 'human' and 'animal' (cf. Geertz, 1983), as well as the most elementary ontic experience, “namely the experience that something happens and that something is 'there' – in contrast to nothing” (Jean-Luc Nancy, cited in Gumbrecht, 1998, p. 219).

Describing the atmosphere of in-between from the position of the player offers a way to approach the experience or creation of presence in play. The concept of presence refers primarily to the dimension of space. “Derived from the Latin verb 'producere' equal to 'to present', 'to produce presence' means to bring things within reach so that they can be touched” (Gumbrecht, 1998, p. 208). This touch is roughly comparable to what Jerzy Grotowski describes as “[…] confrontation with the spectators […] in their presence” (Grotowski, 1981, p. 182) and Hugo von Hofmannsthal (1952) as the boundlessly soulful sensuousness of the encounter: “At no moment is the sensual so close to the spiritual, the spiritual so sensual, as in the encounter. At this moment everything is possible, everything in flux, everything diffused. […] Here is the deerlike, the birdlike, the animal-dumb, the angel-pure, the divine. In a greeting there are infinite possibilities” (p. 163).

Where touch implies an embodied form in space, the encounter is an event, a phenomenon of time. Taken togeher, embodiment and temporalisation lead to the concept of performance. It is thus that something absent or in principle inaccessible is made available in play by undermining the non-identity of something and its representation in certain situations. In this sense, players are first and foremost performers.

Thus, the search for the reasons of play lead us by the very simple insight that one has to play in order to be able to talk about play. Descriptions of play are particularly convincing when gained through a participatory perspective. In this way we can say goodbye to an understanding of play that establishes it as the counterpart of rationality and divides the world according to ordering schemes such as: here is play, there the seriousness of life, here is hard reality there the free arts of appearance and illusion, here objective science and there the speculative forces of fantasy. In order to find out how concepts, designs, ideas, metaphors and procedures are used in play in order to create epistemic spaces and dynamics, one must enter into intellectual *as well as* sensual realms of play in which new ways of thinking and viewing can be tried out.

This is how one arrives at the core of play: the fact that the phenomena of play not only belong to the preconditions of reason, but are inextricably bound up within it.

## REFERENCES


Aries, P. (1960). *L´enfant et la vie familiale sous l´ancien régime* [The Child and Family Life under the Old Regime]. Plon.

Buytendijk, F. J. J. (1933). *Wesen und Sinn des Spiels. Das Spielen des Menschen und der Tiere als Erscheinungsform der Lebenstriebe* [Nature and Purpose of the Game. The play of Humans and Animals as a Manifestation of the Life Instincts]. Kurt Wolf.

Claessens, D. (1980). *Das Konkrete und das Abstrakte. Soziologische Skizzen zur Anthropologie* [The Concrete and the Abstract. Sociological Sketches on Anthropology]. Suhrkamp.

Geertz, C. (1983). *Dichte Beschreibung. Beiträge zur Beschreibung kultureller Systeme* [Dense description. Contributions to the Description of Cultural Systems]. Suhrkamp.

Grotowski, J. (1981). *Towards a Poor Theatre*. Methuen.

Gumbrecht, H. U. (1998). Die Schönheit des Mannschaftssports: American Football – im Stadion und im Fernsehen [The Beauty of Team Sport: American Football – in the Stadium and on TV]. In G. Vattimo, & W. Welsch (Eds.), *Medien-Welten-Wirklichkeiten* (pp. 201-228). Wilhelm Fink.

Hofmannsthal, H. von (1952). Encounters. *Yale French Studies. Symbol and Symbolism 9*, 162-165.

Huizinga, J. (1938). *Homo Ludens. Versuch einer Bestimmung des Spielelementes der Kultur* [Homo Ludens: A Study of the Play-Element in Culture]. Akademische Verlagsanstalt Pantheon.

Kant, I. (2000). First Section, First Book: Analytic of the Beautiful. In P. Guyer (Ed.) & E. Matthews (Trans.), *Critique of the Power of Judgment* (pp. 89-127). Cambridge University Press. https://doi.org/10.1017/CBO9780511804656.007

Lévi-Strauss, C. (1973). *Das wilde Denken* [The Wild Thought]. Suhrkamp.

Locke, J. (1690). *An Essay Concerning Humane Understanding.* Awnsham and John Churchil... and Samuel Manship.

Pfeiffer, K. L. (1999). *Das Mediale und das Imaginäre. Dimensionen kulturanthropologischer Medientheorie* [The medial and the imaginary. Dimensions of cultural-anthropological media theory]. Suhrkamp.

Plessner, H. (1941). *Lachen und Weinen. Eine Untersuchung nach den Grenzen menschlichen Verhaltens* [Laugh and Cry. An Investigation into the Limits of Human Behavior]. Leo Lehnen.

Rousseaus, J. J. (1762). *Émile ou De l´éducation* [Emile or Education]. Jean Néaumle.

Schechner, R. (1981). Performers and Spectators – Transported and Transformed. *Kenyon Review, 3*(4), 83-113.

Schechner, R. (1988). Playing. *Play & Culture 1*(1), 3-19.

Schiller, F. (1999). *Letters upon the Aesthetic Education of Man.* Generic NL Freebook Publisher.

Schiller, F. (2016). *On the Aesthetic Education of Man*. Penguin. (Original work published 1794)

Schiller, F. (2017). *Wallenstein’s Camp*. Hansebooks. (Original work published 1798)

Schwartzman, H. B. (1978). *Transformations. The Anthropology of Children’s Play.* Plenum Press.

Sutton-Smith, B. (1997). *The Ambiguity of Play*. Harvard University Press.

Turner, V. (1983). Play and Drama: The Horns of a Dilemma. In F. E. Manning (Ed.), *The World of Play. Proceedings of the 7th Annual Meeting of The Association of the Anthropological Study of Play* (pp. 217-224). Leisure Press.

Turner, V. (1989). *Vom Ritual zum Theater. Der Ernst des menschlichen Spiels* [From Ritual to Theatre. The Seriousness of the Human Game]. Campus.

**СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR**

Наташа Адомовски
Natascha.Adamowsky@uni-passau.de

Natascha Adamowsky
Natascha.Adamowsky@uni-passau.de

Статья поступила 15 октября 2022
одобрена после рецензирования 16 ноября 2022
принята к публикации 15 декабря 2022

Received: 15 October 2022
Revised: 16 November 2022
Accepted 15 декабря 2022

https://doi.org/10.48417/technolang.2022.04.03
Research article

# On the Mythical Atmosphere of the Digital World

Benedetta Milani (✉)
Leuphana Universität Lüneburg, Universitätsallee 1, Lüneburg, 21335 Germany
benedetta.milani@stud.leuphana.de

## Abstract

Can the digital world – a world considered to be emerging and depending on the most sophisticated and modern technologies – be compared with the mythical world? And would this comparison be productive for an analysis of the forms of the digital world? In the article an affirmative answer will be given to those questions and the comparison between the mythical and the digital will be developed around two key points: the absence of contingency and the immersive character of those worlds. The exclusion of contingency resolves in a deterministic way to be in the world and is strongly connected with the social necessity – present in the mythical as in the digital world – to perform predictions and preempt the future; the immersive dimension contributes to the collapsing of the distance between the subject and her objects, taking away from the human subject the privileged role that modern thought had given it. These features, which inform the digital world, determine its mythical atmosphere and also the different positioning of the human subject within this world. Given this theoretical horizon, the article will argue that in the digital world another form of rationality is involved than the logical-scientific thinking of modernity. This digital rationality, close to mythical rationality, constitutes and thinks the subject differently from the modern perspective and shows other possibilities for constructing and understanding the real.

**Keywords:** Digital World; Symbolic Form; Mythical World; Contingency; Immersivity

**Citation:** Milani, B. (2022). On the Mythical Atmosphere of the Digital World. *Technology and Language*, *3*(4), 21-29. https://doi.org/10.48417/technolang.2022.04.03

УДК 130.2:62
https://doi.org/10.48417/technolang.2022.04.03
Научная статья

# Обещание, Поворот, Престиж: Граница между магией и технологией как практиками

Бенедетта Милани (✉)
Лёйфана университет Люнебурга, Университетская аллея 1, Люнебург, 21335 Германия
benedetta.milani@stud.leuphana.de

**Аннотация**
Может ли цифровой мир – мир, считаемый развивающимся и опирающимся на самые искусные современные технологии быть сравним с миром мифов? И будет ли это сравнение плодотворным для анализа форм цифрового мира? На эти вопросы в статье будет дан утвердительный ответ, а сравнение мифического и цифрового мира будет рассмотрено с точки зрения двух ключевых моментов: отсутствия случайности и иммерсивного характера этих миров. Исключение случайности представляется решаемым с помощью детерминистического подхода и тесно связано с социальной потребностью, присутствующей как в мифическом, так и в цифровом мире, – прогнозировать и предвосхищать будущее; иммерсивное измерение в свою очередь сужает дистанцию между субъектом и его объектами, отнимая у человека привилегию, данную ему современной мыслью. Эти черты, присущие цифровому миру, определяют его мифическую атмосферу, а также различное положение человека субъекта в этом мире. На теоретической почве в статье будет представлена мысль, что в противопоставление логико-научного мышления современности цифровой мир использует и другую форму рациональности. Эта цифровая рациональность, близкая к мифической, представляет и осмысливает субъект отлично от современной перспективы, показывает совершенно новые возможности построения и понимания реальности.

**Ключевые слова:** Цифровой мир; Символическая форма; Мифический мир; Случайность; Иммерсивность

**Для цитирования**: Milani, B. On the Mythical Atmosphere of the Digital World // Technology and Language. 2022. № 3(1). P. 21-29. https://doi.org/10.48417/technolang.2022.04.03

## INTRODUCTION

Can the digital world – a world considered to be emerging and depending on the most sophisticated and modern technologies – be compared with the mythical world? And would this comparison be productive for an analysis of the forms of the digital world? In the article an affirmative answer will be given to those questions and the comparison between the mythical and the digital will be developed around the concepts of contingency (or the lack of it) and immersivity: two main features of the present form of the digital world that defines its mythical atmosphere.

To begin with, it is necessary to lay out the theoretical frame within which the thesis is aimed to be developed: in referring to myth and the mythical in the present article one does not mean a primitive and irrational form of thinking, but rather a pre-modern form of logic and rationality, which is primitive neither in a chronological nor in a cognitive sense but is actually a way of constituting and organising the world, which is different – and which one tends to consider opposite – to the logic-scientific way of understanding reality typical of the (western) modern world. Central and connected to this perspective is the notion of symbolic form developed by the German philosopher Ernst Cassirer (1874-1945) in his *Philosophy of Symbolic Forms* (1923, 1925, 1929). In particular, during Cassirer's so called America's years, the philosopher engaged in a renegotiation of his own perspective on the relationship that different symbolic forms can entangle with one another, passing from a latent teleological perspective to a non linear idea on how symbolic forms – like myth, technology and logic-scientific thought – can coexist with each-other in a non irenic way. In his text *Form und Technik* (1930), Cassirer refers to *Technik* as the symbolic form by which the human conscious managed to break through the 'mythical darkness' (Cassirer, 2012, p. 33) and to come into the objective world and thus lay the condition for the possible rise of the logic-scientific rationality. This clearly teleological horizon can be summarised in the passage – proposed by Cassirer – from *homo divinans* to *homo faber* due to technical progress (Cassirer, 2012, p. 25), thus also the progress from a mythical subjectivity to a objectivised subjectivity. It is with his book *The Myth of the State* (1946) that Cassirer shifted to a non teleological perspective. In the chapter „The Technique of the Modern Political Myths" the philosopher clearly stated that the possibility of overcoming the mythical forever is itself a myth and a dangerous one, as his social and political reality of exiled jew violently proved. The myth is neither primitive nor a concluded phase of the human, but a permanent feature of it and it tends to re-emerge once a society loses the sense of epistemic control of its own reality (Cassirer, 1946, p. 279). Cassirer underlined how myth can find a loyal ally in *Technik* itself giving form to rationalised myths in which new technologies and pseudo-scientific language endorse propaganda and political myth (Cassirer, 1946, p. 282).

In the perspective adopted in this article, the myth is thus a recurring form of constituting and understanding human reality and at the same time represents a different way to organise and think this reality. The mythical world defines a form of rationality, which is not primitive or naive, but rather concurrent with modern rationality. Mythical rationality is non linear, non binary, non logos-centred and non anthropocentric (at least

not in the humanistic sense of this term), and therefore the mythical world also defines a mythical subject, who entertains a peculiar relationship with reality.

Given this theoretical frame, the digital world is also going to be described as a symbolic form, which means it is a form of epistemic organisation of the real. The digital therefore is not to be reduced to its mediality and technological processes and – as it will be shown – it is not guided by a modern scientific rationality, which is logos-centred and subject-centred. The digital is then a way of thinking and organising the human reality, which has a longer history than its current form and is not just the virtual space opened by the technology, but far more the atmosphere in which we live in a very concrete way since the digital has become the dominant symbolic form of our time.

The comparison of the mythical with the digital shows a path to define which kind of rationality and thinking is at stake in the digital world. To prove this point one will focus on two features present in both worlds, and that are crucially entangled with one another: the absence of contingency and the immersive character of those worlds. Features that position and think the subject differently from the modern, Eurocentric perspective and show other possibilities for constructing and understanding the real.

## CONTINGENCY

One of the crucial traits of mythical thinking is its determinism, thus the belief that nothing happens without a cause. In the mythical world there is no contingency but only causality – not in the scientific mode of causes and effects but causality seen as necessity: there is a necessary link between the phenomena of the world, thus there is a correlation between the events of the world, which takes the mode of the analogy (Esposito, 2013, p. 130). The mythical thinking searches for meaningful correlations that can explain the events of the social or personal sphere, this determinate an apophenic way of being in the world, in which the phenomena are not accidental but are always signs for something else: for example the flight of the birds is related or stays in a relationship of symmetry with the outcome of a war (Esposito, 2013, p. 130). The radical causality of the mythical world is not linear, in the sense of a linear logical movement from causes to effects, but it is rather a network of links between different actors and those actors cannot be explained nor exhausted in the dualistic relationship of subject and object.

In the deterministic world of the mythical – where contingency can simply not be thought – the future is not a space of indetermination, but is also already included in the necessity and causality of the present. The mythical society therefore believes, not only that the future is predictable, but that this very possibility has a crucial role for the well-being of the community. So that the possibility of predicting the future turns into a social necessity. The *ars divinatoria*, the divinatory art, is the refined expression of the logic and rationality active in the mythical world, a rationality that looks for correlations, analogies and signs in a different order of meaning – an order that reward the interpretation of signs and not the search of the ‘objective’ causes of the events. The work of prediction can not be performed by everyone, but this divinatory art is an exclusive art controlled by specific members of the community like a wizard, a priestess, an oracle or a shaman. This person has a central role in the community, but stays outside of it. For a

mythical society the ways in which the signs of the world are read is surrounded by an aura of mystery and opacity, and related with the strict performance of rites. The *pharmakeus* – the one who performs the art of divination – is the exclusive holder of knowledge and understanding of the complex and multiple relations between the different layers of reality. The mythical subject can only move on the 'surface' of the real, immersed in the network she lived in without the claim of wanting to explain the deeper or objective causes of the events. The deeper layers of the real are out of the human reach and can only be grasped by special members of the community: the oracle, the wizard, the priest, the shaman can perform a mediation with this deeper level of the world. They can interpret and translate the unreadable amount of phenomena (data) into signs with a sense and therefore also give a direction to the life of a community or an individual: for example beginning a war or not, or engaging in a ritual in order to preempt a personal disgrace. For the future is predictable because it is determinate, already 'written' or implicated by the order of things, and therefore not open to virtuality.

We should keep this point in mind, as we move to the analysis of how contingency is implied in the digital world. In this world contingency is artificially inserted into the computation system as probability, is then functional and operational, because it is needed to the system in order to perform well (Hui, 2019, p. 25). Contingency in this world is not the chaos or the irrational and doesn't carry the unknown, but is necessary in order to predict and preempt potentially dangerous events for the system. As in the mythical world, also in the digital world prediction became a necessity, if not a duty. Forward-looking is a crucial ability of our time, for business and for politics, because the prediction of events on a small and large scale means the possibility of reducing the risks of an unknown future and uncontrolled behaviours. In the digital world the crucial art of divination is not given to a human member of the society, but to the algorithm – for the most an abstract word with a foggy meaning – which perform a refined and complex work of foreseeing, which we still tend to believe to be objective in a way that the human can not be: exactly like a God, the algorithm stays above the human partial perspective. Even if scientific literatures and academic debate stress the bias present in those technologies, we are still far away to engage critically with the myth of the 'neutral and objective' technology and in private as well as in social situations we are more and more willing to blindly trust the decisions taken by the predictive machine that the computer has became. As in the mythical world, the web-intelligence (Esposito, 2013, p. 127) of the digital world doesn't reward the karstic work of modern reason, looking for causes and digging deeper into the appearances, but rather the quick movement of the mouse on the surface of a screen. Out of the metaphor, digitality endorses a thinking that can quickly find correlations and can adapt without showing any interest in understanding how the system functions in its deeper architecture. The screen – in its manifold forms – became the surface where the user moves and also the only layer of the system accessible to her. On this surface interfaces appear, where an objectified and settled world of digital objects (Hui, 2016) is presented to the user and is made for the user. On a deeper level, software programmes and algorithms process gigantic amounts of data and correlate them into patterns and create information, but the user stays outside of this machinic process and does not interrogate it. The algorithm, as the oracle, can predict and create a constellation

of meanings, without being interrogated or questioned. In both worlds – as Elena Esposito pointed out in Digital Prophecies and Web Intelligence – the meaning appears a posteriori: is not a premise but a possible interpretation that can, but doesn't have to, come after (Esposito, 2013, p. 126). As with the mythical rationality, the digital-machinic rationality is precluded to the human understanding, thus there is in both worlds a cognitive opacity: the mythical subject and the user are not interpellated by those "higher" rationalities and they do not ask for a deeper understanding of them: they act within the network settled for them. The cognitive opacity interwoven with the absence of contingency settle in the digital world the condition for a paradoxical shutting down of the virtual space that is to say the ability of the human to think the potential, which is to think beyond the actual, concrete form of the present (and of the past). The virtuality of the world, which exceeds every representation made of it, collapses in an actual reality in which nothing else is thinkable (and therefore possible) outside of what is already represented.

The described context bears with it a consequence: in the mythical as in the digital world the praised form of intelligence is not the individual one, but a collective form of network intelligence which is trans-species and where the human subject doesn't occupy a privileged place anymore. This allows us to move to the second point of this article: the immersive character of the mythical and the digital worlds.

## IMMERSIVENESS

The mythical world is immersive because there is no distance between the subject and the object: the internal world overflows in the external one and reality is coloured by the impulses and desires of the human. The mythical subject knows that she doesn't carry a privileged point of view in the world and she is a part of a whole, but this whole speaks always directly to the human and stays in a relationship of analogy or kinship with it. The immersive dimension of the digital world is even more radical, because the digital technological milieu continuously shapes itself on the desires and behaviour of the user, in order to create more desires and influence her future behaviour. The user is entangled in the digital world not as a subject put in a distance with her object, but as a data subject, or even a data object, connected and linked to other data objects. Humans are nodes of a network so that the point of view on reality changes: from the subject put in front of the object as a privileged observer to a data object between other data objects, a central point of view is lost and a diffused and networked point of view is gained. Also the agency changes: it is not the prerogative of the subject anymore, but it is radically distributed and has become global (Hansen, 2015, p. 2) . This change of perspective brings with it a change of 'posture' of the human in relation to its reality and also a radical different way to engage with it. The invention of perspective during the Italian Renaissance represented the emergence of a new way of looking at and thinking about reality (Panofsky, 1991). The humanistic idea of Man and the Universal Subject is related with this new way of seeing, where a subject – with a privileged point of view – is put at distance in front of an object, which can then be understood and studied. The reality as conceived by Humanism and by way of perspective is a reality that confronts us as subjects and can stand against

us (as the German world for object – *Gegenstand* – reminds us), but at the same time the modern subject (and her rationality) had the absolute conviction and belief that this reality could be understood and therefore controlled. The visual regime of the western history of art is dominated by the window: a visual *dispositif* that frames the gaze and shows a portion of the world, which becomes a reality that can be interpreted and dominated. The gaze of the subject on the object is mathematised and creates a hierarchy: how and who are represented as subjects, what is shown and what is not shown and so on…

As already mentioned, the digital world does not confront us as a subject but actually shapes itself on the behaviour of millions of users and on 'decisions' made by machine learning and deep learning technologies in order to optimise itself. This immersivity means actually a lack of perspective and a relinquishment of the "dualistic posture" of the subject in front of an object, because in the network everything is reduced to nodes and links. The human subject has to give up her privileged position and the ambition of gaining the perspective of God's eye – the dream of the Modern – which is now becoming the eye of the machine – the dream of the contemporary. The visual regime of the digital era is dominated by the screen, a black mirror – as the popular TV series suggests – that doesn't ask us to look through a frame to see a reality, but actually blocks our gaze on a opaque surface where something is shown and something else is hidden or even close up our gaze and explicit ask us to immerse in a constructed reality. This lack of distance and this desire to submerge in other realities could resolve in a hedonistic desire for entertainment and escape from a complex reality, but could maybe also represent a first step in the opposite direction, that is to say to learn "to stay in the troubles" – as Donna Haraway famously argued – and in the multiple and interspecies relationships in which the human is entangled. This lack of distance could result in an increase of empathy, but we need to engage actively for this possibility.

## CONCLUSION

Coming back to the questions posed at the beginning of the article, one should be explicit why the comparison between the mythical and the digital can be productive. Starting from the risks that attend the adoption of a mythical posture in the digital world:

1 The lack of distance – as here thematised – in the present form of the digital milieu is resolving in a lack of critique or even in the relinquishment of its possibility (Hansen, 2021; Rouvroy, 2013). The collapsing of the world – and its virtuality – within reality – and its actuality – takes away the space of critique, which is not only the radical questioning of the present and actual forms of the real, but also the possibility for a new inquiry of the condition of possibility of a digital rationality.

2 *Data-Behaviourism*[1] (Rouvroy, 2013) and the resulting pressure for prediction and preemption are pushing our understanding of the world again in a direction of a strict

[1] "I will call 'data behaviourism' this new way of producing knowledge about future preferences attitudes, behaviours or events without considering the subject's psychological motivations, speeches or narratives, but rather relying on *data*. The 'real time operationality' of devices functioning on such algorithmic logic spares human actors the burden and responsibility of transcribing, interpreting and evaluating the events of

determinism, in which the future is not free to be collectively determined and discussed but already contained in the possibilities that the collected data can find. We assign an agency to the algorithms and their work of prediction has a performative character to the extent that when we believe in the predictions made by the algorithms, we start to act conformably to those predictions, thus stopping looking or imaging for other possibilities and futures.

3 The notion of rationalised myth proposed by Cassirer can be of great interest in the analysis of contemporary rationalised myth as the one conveyed by such techno-religious philosophies as transhumanism. Those techno-myths (as singularity or immortality due technical enhancement) do not engage critically with the complexity of the co-evolution of human and the machine, but resolve themselves in techno-utopian (or techno-distopian) sceneries in which long lasting religious and transcendent thematic are mixed up with sci-fi and up coming technological possibility. An example is the messianic promise made by transhumanism of a – so called – super-S future: Super-Wellbeing, Super-Intelligence and Super-Longevity[2]. A mythical scenery that predicts the eschatological coming of the definitive machine without engaging with the concrete social and environmental costs of such a perspective.

The criticality listed should make us aware of the risks but also of the possibilities at stake here. Engaging with the emerging form of a digital rationality – radically new and radically old at the same time – is the challenge of our troubled time. This rationality, this thinking, is beyond anthropocentrism because it entangles the machine and the human, and we as humans should learn how to take account of this relationship without losing the responsibility for our choices and for the future, which has to stay open, virtual and worth living in.

## REFERENCES

Cassirer, E. (1946). *The Myth of the State*. Yale University Press.

Cassirer, E. (2012). Form and Technology. In A. S. Hoel and I. Folkvord (Eds.), *Ernst Cassirer on Form and Technology: Contemporary Readings* (pp. 15-53). Palgrave and Macmillan.

Esposito, E. (2013). Digital Prophecies and Web Intelligence. In M. Hildebrandt & K. de Vries (Eds.), *Privacy, Due Process and the Computational Turn* (pp. 121-142). Routledge.

Hansen, M. B. (2021). The Critique of Data, or Towards a Phenomenotechnics of Algorithmic Culture. In E. Hörl & N. Y. Pinkrah & L. Warnsholdt (Eds.), *Critique and the Digital*. Diaphanes.

Hansen, M. B. (2015). *Feed-Forward. On the Future of Twenty-First Century Media*. University of Chicago Press.

Hui, Y. (2016). *On the Existence of Digital Objects*. University of Minnesota Press.

Hui, Y. (2019). *Recursivity and Contingency*. Rowman & Littlefield.

world. It spares them the meaning-making processes of transcription or representation, institutionalisation, convention and symbolisation." (Rouvroy, 2013, p.143)

[2] https://www.transhumanist.com/

Panofsky, E. (1991). *Perspective as Symbolic Form*. Zone Books.
Rouvroy, A. (2013). The End(s) of Critique: Data Behaviourism Versus Due Process. In M. Hildebrandt & K. de Vries (Eds.), *Privacy, Due Process and the Computational Turn* (pp. 143-167). Routledge.

**СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR**

Бенедетта Милани,
benedetta.milani@stud.leuphana.de,
ORCID 0000-0002-7774-8549

Benedetta Milani,
benedetta.milani@stud.leuphana.de,
ORCID 0000-0002-7774-8549

Статья поступила 9 ноября 2022
одобрена после рецензирования 7 декабря 2022
принята к публикации 15 декабря 2022

Received: 9 November 2022
Revised: 7 December 2022
Accepted 15 December 2022

https://doi.org/10.48417/technolang.2022.04.04
Research article

# The Pledge, the Turn, the Prestige: The Border Between Magic and Technology as Practices

Federico Monaro (✉)
Università degli Studi di Padova, Via 8 Febbraio, 2, 35122 Padova, Italy
federico.monaro@studenti.unipd.it

## Abstract

In this paper I will try to show how magic and technology might be associated taking both into account as a cultural expression of contemporary society. I will argue that technology penetrates magic, creating a specific dynamic which raises ethical dilemmas. The underlying idea, following a long tradition of thought, is that technology represents a kind of "second human nature." As Arnold Gehlen claims, the technical attitude (Technik) compensates for the structural deficiency of humans, allowing them a gradual opening to the world. But magic is also an expression of this attitude, insofar as it tends to mimic natural mechanisms. Magic expresses itself with instructions, rules, and purposes, as much as technology does. Precisely for this reason magic also involves the same rationality typical of the developmental mode of technology, sharing the same objective. I will argue that Christopher Nolan's movie *The Prestige* (2006) shows an example of technological integration inside magic itself, highlighting two orders of problems: one ethical and the other intrinsic to the magical act and its nature.

**Keywords:** Magic; Technology; Anthropology; Prestige; Performance art

**Acknowledgment:** I would like to thank Andrea Gentili for his editorial support.

**Citation:** Monaro, F. (2022). The Pledge, the Turn, the Prestige: The Border Between Magic and Technology as Practices. *Technology and Language*, *3*(4), 30-41. https://doi.org/10.48417/technolang.2022.04.04

УДК 130.2:62
https://doi.org/10.48417/technolang.2022.04.04
Научная статья

# Обещание, поворот, престиж: Граница между магией и технологией как практиками

Федерико Монаро (✉)
Университет Падуи, Виа 8 Фебрайо, 2, 35122 Падуя, Италия
federico.monaro@studenti.unipd.it

**Аннотация**

В данной статье я попытаюсь показать, как могут быть связаны магия и технология, как культурное выражение современного общества. Я утверждаю, что технология проникает в магию, создавая особую динамику, которая ставит этические дилеммы. Основная идея, следуя давней традиции мысли, заключается в том, что технология представляет собой своего рода "вторую природу" человека. Как утверждает Арнольд Гелен, техническое отношение (Technik) компенсирует структурный недостаток человека, позволяя ему постепенно открываться миру. Но магия также является выражением этого отношения, поскольку она имеет тенденцию имитировать естественные механизмы. Магия выражает себя инструкциями, правилами и целями так же, как и технология. Именно по этой причине магия также включает в себя ту же рациональность, типичную для способа развития технологии, разделяя ту же цель. Я утверждаю, что фильм Кристофера Нолана "Престиж" (2006) показывает пример технологической интеграции внутри самой магии, выдвигая на первый план два порядка проблем: одни этические, а другие свойственные самому магическому акту и его природе.

**Ключевые слова:** Магия; Технологии; Антропология; престиж; Исполнительское искусство

**Благодарность:** Я хотел бы поблагодарить Андреа Джентили за его редакторскую поддержку.

**Для цитирования**: Monaro, F. The Pledge, the Turn, the Prestige: The Border Between Magic and Technology as Practices // Technology and Language. 2022. № 3(4). P. 30-41. https://doi.org/10.48417/technolang.2022.04.04

## INTRODUCTION

In 2021, Elon Musk published a tweet, stating that: "any sufficiently advanced magic is indistinguishable from technology." This sentence has an extraordinary significance and, indeed, it sounds familiar to us. In fact, Musk overturned Arthur C. Clarke's third law, which claims, as is well-known, that: "any sufficiently advanced technology is indistinguishable from magic." (Clarke, 1999). This reversal of subject in Musk's version uncovers new landscapes for the consideration of technology.

If it was magic that used to excel on the applicative side, by making the impossible and unrepresentable (Grigenti, 2018, p. 78)[1] tangible for us, it now appears that that primacy is fully in the hands of technology. Magic, in Clarke's sentence, represents the highest expression of human capacity faced with the natural world. Technology, through its development, becomes indistinguishable from magic in virtue of its techno-scientific progress. Musk, modifying the sentence, brings to light the idea that technological advancement has become so unbelievable that magic itself must also evolve to compete with technological wonder.

If we now turn to the second law of Clarke, we find that the: "the only way of discovering the limits of the possible is to venture a little way past them into the impossible." Regarding technology, the impossible is dissolved in an exponential eidetical advancement of technical design. What is impossible in technology remains impossible just momentarily, where in magic the impossible comes up each time as the same and it is its overcoming that, from time to time, happens only momentary. We need only to look at the technological progress made over the past 30 years, in which inventions have followed one after another, always surpassing the features of the previous technology.

Raymond Kurzweil, emblematically, claims to have replaced his passion for magic by devoting himself to technological projects (Kurzweil, 2005, p. 23). For Kurzweil, magic allows us to experiment with the impossible transformations of reality, but in a different way from technology. The fact that the trick can be revealed makes its impact on the audience feel more attenuated. On the other side, technology keeps the entirety of its power even if the scientific procedure and the physical laws are disclosed.

Before I get to the reason for the title I have given this paper, a more in-depth discussion of the relationship between technology and magic is required.

## TECHNICAL ATTITUDE AS SECOND NATURE

Magic and technology would seem to have this in common: they are both cultural constructions derived from the human ability to manipulate nature.

[1] "Ultimately in magic we have to see the realization of the eidetical-virtual side of the technology, or we can say in a better way the ideal technology, which is the one that works producing the maximum transformation of the world with the lower energy consumption." ("Nella magia, in definitiva, dobbiamo vedere il realizzarsi del lato eidetico-virtuale della tecnologia, o meglio, la *tecnologia ideale*, quella che opera producendo la massima trasformazione del mondo col minimo consumo di energia".)

An example of this thought can be found in Gehlen's anthropology. Gehlen argues that humans, as such, stand in a condition of absolute inferiority when compared to the rest of the natural world. Humans lack those physical characteristics that would enable them to excel, while the animal is from birth specialized for its vital area. The defining characteristic of humans is actually deficiency itself, they are *Mängelwesen,* "deficient beings." (Gehlen, 1980, pp. 13, 109). This sword of Damocles, this constitutive imperfection, forces humans to seek a remedy. Placed before the dangers of the natural world, for which they have no adequate endowment, they are therefore forced to replenish that deficiency.

The turning point in Gehlen's theory is represented by a sentence that remained unobserved, or at least not emphasized enough, by scholars. The central point of Gehlen's (1961) theory is not so much the constitutive deficiency, but what is introduced to make up for it: the capacity for self-observation and self-reference (pp. 44-54). This capacity of self-observation allows humans to find, retroactively, their own rationality as the real characterizing capacity.

Only at this point humans are able to confront the natural world. Reason enables them to adapt to circumstances, opens a world to them, and, through the integration of technology, enables them to inhabit nature (Gehlen, 1988, pp. 27-28).[2] Without technical integration, humans could not live in the natural world, and that is why it is configured as "second nature."

There is thus a transition between the natural and the artificial in humans that is not so clear-cut. The need to adapt is inherent in their initial characteristics. If, for example, they had been born with the tusks of the lion, they would have no need to create spears. But here's the thing, that deficiency is original. Thus, the need for technology is equally original. In this way, we might say, human nature is, already from the very beginning, culture. Technical progress can then be seen as something that culturally expresses an underlying natural necessity. Gunther Anders (2009) reminds us how humans live as strangers in the world, lacking an a priori endowment that, for this very reason, they have to realize (pp. 279-280).

In this sense, the expression "new Prometheus" referring to humans, is significant in that it identifies the human need to have to resort to their own reason to plan their

[2] "Man's ‚world,' in which the perceivable is clearly not limited to what is necessary for basic survival, may at first seem to be a disadvantage. To say that man is ‚world-open' means that he foregoes an animal adaptation to a specific environment. Man's unusual receptivity to perceptions that do not have an innate function as signals definitely constitutes a great burden to him which he must overcome in special ways. The lack of physical specialization, his vulnerability, as well as his astonishing lack of true instincts together form a coherent whole which is manifested in his ‚world-openness' (Scheler) or, what amounts to the same thing, in his lack of ties to a specific environment. In animals, organ specialization, the repertory of instincts, and the ties of the environment correspond to each other. This is an important point. We have now formulated a structural definition of man, which does not rely solely on the characteristic of reason or the mind. We can move beyond the alternatives mentioned above of assuming a gradual differentiation of man from the higher animals or of arguing that the basic difference lies with the mind. We have proposed that man is organically a deficient being and is for this reason world-open; in other words, his survival is not strictly dependent upon a specific environment. It is now clear in what sense man is ‚undetermined' and a ‚challenge' to himself. The survival of such a being is highly questionable; simply getting by poses great problems which he must face alone and solve through his own efforts. He is therefore an acting being."

existence in the natural world. Maria Teresa Pansera, following Herder, says that: "man is able to compensate his biological lack exploiting his rational capacity" ("l'uomo è in grado di compensare la sua carenza biologica per mezzo della sua capacità razionale") (Pansera, 2001, p. 60). Therefore, culture becomes the *compensation* for natural deficiency. But if culture means producing technological objects, capable of enabling what nature, by birthright, would not have afforded humans, is not magic also something like that?

## MAGIC AS A TECHNOLOGICAL ACTIVITY

Magic has often been seen as an archaic, sometimes naive, form of expression. Frazer defines magic as a pre-scientific stage of humanity: *an aborted art*. Claudio Tarditi points out that this this consideration is part of a tradition that tends to consider non-modern, non-Western manifestations of rationality using a Western, modern point of view - that of the European anthropologist (see Tarditi, 2009, p. 29).

Magic needs to be contextualized and analyzed in the various societies which have been able to use it to meet their needs (Tarditi, 2009, p. 43).[3] What emerges from the studies on magic is the complexity of its relationship with the other arts. Depending on the relationship one chooses to analyze, it is possible to find common characteristics that refer to the magical phenomenon.

For Malinowski (1948) there is no doubt that magic constitutes a character of human rationality: "magic is always found in the possession of man and through the knowledge of man" (p. 56). This definition almost seems to apply equally well to technical activities. Malinowski continues:

> It is literally and actually enshrined in man and can be handed on only from man to man, according to very strict rules of magical filiation, initiation, and instruction. (Malinowski, 1948, p. 57)

Here we observe that the concept of magic is not at all naïve, but it appears as the results of reflection and adaptation of very specific rules, instructions, and procedures, all required for its application.

But then how do we distinguish magic from technology? A point of dissonance, as I have already mentioned, is the belief in its effectiveness, not only by outside spectators, but by the sorcerers themselves (Comba, 2019, p. 90). So, we can say that magic implies a kind of faith. But if we look at its external performance, at the techniques of the sorcerer, tracing a distinction appears much more complex. The sorcerer, as Grigenti notes, implements something like a technical procedure of gestures for the realization of magic (Grigenti, 2019, p. 73). If we add the statement mentioned just above from Malinowski, that magic is organized according to principles and norms as much as other disciplines, it will be undeniable that the dimension of rationality seems to be part of both technology and magic.

[3] Tarditi: "Magic is functional to the human answer to times of crisis, during which science is impotent." ("La magia è funzionale alla risposta umana di fronte a momenti di crisi, durante i quali nulla può la scienza.")

> Like the other arts and crafts, it is also governed by a theory, by a system of principles which dictate the manner in which the act has to be performed in order to be effective. (Malinowski, 1948, p. 66)

Malinowski was not the only anthropologist that associated technology and magic. Durkheim (1968) too speaks of a close relationship between the magical art and the technical attitude, adding utility as a characteristic as well. Under this dimension there seems to be greater affinity between technology and magic, rather than between religion and magic. Religion is concerned with faith alone, not with a result-oriented practice. But the idea that magic and technology belong to the same practical horizon, and even that magic is somehow part of natural science, we can already find in the *Conclusiones* of Giovanni Pico della Mirandola. Because of this, it gains value and dignity. (Busi & Ebgi, 2014, Intr. XXXIV, p.102)

It is curious to note that the relationship between magic and religion over the centuries was much more turbulent than that with technology. Those who tried to denigrate it could do nothing but to call magic a superstition, denying it the status of art, and associate it with a mere ignorant belief.

Canon Francesco Cattani defines it as a superstition of the *più vile plebe, et ignorante vulgo* ("the lowest and most ignorant people"). Prosperi notes that "from the bishop to the witch, the religious field of the age of the counter-reform appears as an integrated field, where the inner rivalry does not hide the filiation and the similitude" ("dal vescovo alla strega, il campo religioso dell'età della Controriforma appare come un campo integrato, dove le rivalità interne non nascondono filiazioni e somiglianze" (Prosperi, 2012, p. 373). So, this integrated field (*campo integrato*) ends up overlapping with the consideration of magic. Like religion, it is regarded by its opponents as superstition and ignorance. And, also like religion, magic must first and foremost attribute meaning to the natural world that can be ascribed to the sphere of human understanding. But as technology, it develops starting from an imitation of nature, not worship. As Malinowski had clearly seen:

> the phonetic effects, imitations of natural sounds, such as the whistling of the wind, the growling of thunder, the roar of the sea, the voices of various animals. These sounds symbolize certain phenomena and thus are believed to produce them magically. Or else they express certain emotional states associated with the desire which is to be realized by means of the magic. (Malinowski, 1948, p. 54)

Secondly, he added:

> Magic is not only human in its embodiment, but also in its subject-matter: it refers principally to human activities and states, hunting, gardening, fishing, trading, love-making, disease, and death. It is not directed so much to nature as to man's relation to nature and to the human activities which affect it. (Malinowski, 1948, p. 56)

So, magic does not work by giving a purpose to nature itself, but rather by giving it to our practical relationship with it. The resort to magic has meaning when it is possible

to make his purpose coincide with the technical-instrumental purpose according to which humans conduct their activity. Magic’s practical nature shows a radical difference with religion. As every human activity that aspires to the realization of an end, magic can also fail due to lack of sufficient knowledge or skill. This tendency toward purpose, the conception of an image that must be realized, and that can also not succeed, the planning, that is what the two practices, that of the magician and that of the technician, have in common: their effectiveness is not based on belief, but on *execution*.

## THE EXECUTION OF MAGIC: THE PRESTIGE

An example that can clarify this interpolation between magic and technology, I believe can be found in Nolan's movie, *The Prestige* (2006), based on the homonymous novel written by Christopher Priest in 1995. I will argue that Nolan's work also shows us something else, that this relationship reaches a problematic peak at the point where it is necessary to introduce an entirely different kind of consideration into the purely performative dimension.

> Every great magic trick consists of three parts or acts. The first part is called “the Pledge.” The magician shows you something ordinary: a deck of cards, a bird or a man. He shows you this object. Perhaps he asks you to inspect it to see if it is indeed real, unaltered, normal. But of course... it probably isn't. The second act is called “the Turn.” The magician takes the ordinary something and makes it do something extraordinary. Now you're looking for the secret... but you won't find it, because of course you're not really looking. You don't really want to know. You want to be fooled. But you wouldn't clap yet. Because making something disappear isn't enough; you have to bring it back. That's why every magic trick has a third act, the hardest part, the part we call “the Prestige.” (Nolan, 2006)

In this introductory dialogue, we learn that there are essentially three moments in a well-executed magic trick*: the pledge, the turn, and the prestige*. Those are the part that form a magic trick.

*The pledge* is the starting point, the moment in which the audience is prepared to assist to something extraordinary and unexpected. The audience is there exactly with this anticipation, they want to see the impossible, as a temporary escape from the limits of everyday possibility. In the same way as technology, we can see that the deficiency, the lack of something and the desire for a fulfilling addition, is the premise that renders both appealing. They both promise that, once again, nature will be submitted and its boundaries will be crossed.

*The turn* is the moment in which this overcoming happens, the ordinary becomes extraordinary. The expectations of daily life are exceeded. The audience sees the preparation for the magic trick and gets excited as it unfolds, ready to be transported towards what it was believed to be impossible. Then, the unthinkable happens and the amazement is generated. This phase of planning has the same evocative function as in technological development. An idea of something not yet possible comes to mind, it then

becomes a project, the image of something that must be realized. If the execution of the plan succeeds, once again the impossible will be brought into existence. That is what creates astonishment.

And then we have the last of the pieces, *the prestige* is the apex of the technical development, the landing point of the initial promise. What was just foretold is now achieved, the impossible has generated its own possibility inside reality. It is only this last part, the successful one, that gives meaning to the previous ones. Here there is a danger of failure, and the purpose of the whole preceding procedure is at stake. A failure means that the imaginative potential of the initial project would instead remain unexpressed, confirming the boundary already settled before.

The juxtaposition of magic and technology, both as cultural form of practice, allows us to understand the next passage. Of course, the two do differ in a lot of aspects, many of which did not find their space in this paper, but it is this rational background that touches both, this procedure of anticipation, planning and realizing that they share. It is this collision point where technology, in modern Western society, interpenetrates magic, and the movie shows this intersection in a masterful way

It tells the story of a hatred rivalry between Alfred Borden (Christian Bale) and Robert Angier (Hugh Jackman), both illusionists in London at the end of the 19$^{th}$ century. The two begin working together but are soon separated by the death of Julia (Piper Perabo), Angier's wife, a tragedy that happens right on stage, during the performance. Borden is held responsible by Angier, and so begins a no-holds-barred competition between the two. Each one begins to perform alone, and that rivalry slowly grows into an obsession, leading to criminal acts.

During a bullet-catching number, Angier (stage name: The Great Danton) manages to sabotage the trick of Borden (The Professor), causing him to lose two fingers. This is the first example of technology applied to magic. The sabotaged gun, normally loaded with blanks, is instead loaded with real bullets. This intromission of reality makes the magic vanish, it becomes dominated by the reality of the plain technical tool.

The turning point of the movie happens when The Professor brings a new routine to the stage: human teletransportation. In the eyes of the spectator, what happens during the act is that the magician is teleported from one side of the scene to the other. This is a complete novelty. The Great Danton is almost driven insane while trying to understand the workings of that act, its procedure of repeatability. Here we enter, from a movie about illusionism into genuine science fiction, because Danton, looking for an answer, turns to an unexpected Nikola Tesla (David Bowie). We discover that Tesla himself had developed a prototype to accomplish this impossible form of human transport. But what Tesla actually manages to do is quite different (and has nothing to do with the professor's trick): it is not teleportation, but cloning or duplication.

In the eyes of the scientist, this is a failure and a danger. To avoid the duplication, his advice would be to destroy his own invention. But not only does Danton refuse to do so, instead he uses the cloning machine for his human transport act. Uncannily, what happens behind the scenes of the trick is that Danton disappears from the stage through a trapdoor, while his duplicate, a second Danton, appears moments later on the balcony of the theater, accomplishing the impossible before the eyes of the audience. But in a

macabre twist, the disappearing Danton drops into a large tank of water in order to be drowned (significantly, it is the same cause of death as his wife's). At the end of the number, it is only one of the Dantons who remains alive. The Professor, also frenzied in trying to discover his rival's make-up, is set up by Danton. Having managed to infiltrate backstage, the professor is left alone before a drowning Danton. The police, alerted by Danton himself, arrive moments later and arrest him.

But where was the trick really? The kind of magic we are used to disappears in face of the technological inventions. But in this case, is magic that becomes technology or, as one can also say the reverse, technology that becomes magic. The prestige shows in a clear way how magic is no longer enough. The professor could stage such an act for a “natural” reason, as we find out only at the end. He had an identical twin. Without this condition, his act is unfeasible, and unlike the others, it is not repeatable while Danton's is. It appears that magic, too, needs to be compensated for the shortcomings of its constitution. In fact, it is technology that must be involved in the improvement needed to amaze the audience once again. The movie allows us to understand the huge gap created between the effective human capacity of realization and the will of ideation and realization.

It is interesting to note that the ethical dimension of the film emerges only at this point. The viewer does not question himself before, but only when Danton kills his other self. Ethic appears to manifest only in the moment in which magic becomes technology, as if there is no ethical problem in magic alone. Nikola Tesla clearly represents the voice of science. He is the personified symbol of the modern progress of technical capacity. “Nothing is impossible,” he says while talking to Danton, “what you want is simply expensive.*”* Magic is clearly extraneous to certain social dynamics such as money. The ethical doubts at the end of the movie are innumerable (which is the real Danton? The one who falls or the one who resurfaces?). It is clear, however, that in the rivalry between the two illusionists there is an obsession with the overcoming of limits, and with magic alone this possibility is no longer that powerful. Instead, it is now technology that is able to implant the impossible within the real.

If we follow a bit more the dialogue between Danton and Tesla, we hear that the former argues, in fact, that no one really believes in the magic performed on stage, no one asks ethical questions: nobody is truly convinced that a man is trapped in a box, or that he really disappeared, or that a woman has just been cut in half. But Danton still thinks in a magical perspective, he does not understand the change that will occur when magic and technology are mixed. The cloning machine assumes a different symbolic meaning, despite its use for on-stage purposes:

> Tesla: Mr. Angier, have you considered the cost of such a machine?
> Danton: Price is not an object.
> Tesla: Perhaps not, but have you considered the *cost*?
> Danton: I'm not sure I follow.
> Tesla: Go home. Forget this thing. I can recognize an obsession, no good will come of it.

It is important to not forget what the cost of introducing technology into magic really is. Magic is being drowned in ethical issues and social implications that did not belong to it before. Furthermore, now it is technology that may even amaze more than magic itself. One may nowadays wonder what the real difference between magic and technology is if magic has become exclusively technology.

David Copperfield, in one of his most famous tricks, "flies" above stage through rings, demonstrating the absence of wires or tricks that lift him off the ground ("The Magic of David Copperfield XIV: F·L·Y·I·N·G - Live the Dream"). The number is made possible with the use of sophisticated machineries, previously tested, and researched in-depth (US Patent No. 5.354.238A Levitation apparatus). This sophisticated technology needs lots of patents involving theories that have been applied and studied by NASA. So, at this point, does magic becomes merely ignorance of how the technology works behind the magical trick?

By revealing the technology, the mystery disappears. But we still have to consider that it is not so simply to apply such a reductionism to magic, because there are other components that needs to be evaluated. One of them is the wonder of the magical. We do not have the same astonishment in the face of a simple magic act and in the use of our smartphone, a much more sophisticated and incredible object, which is nevertheless so embedded in our daily lives that it is incapable of surprising us.

## CONCLUSION

Technology in the current state of things seems to be in a privileged social position, it progresses continuously, it does not struggle, on the contrary it builds new social horizons. Magic, on the other hand, seems to find itself at a cultural impasse. The integration of technology in other disciplines and mundane activities extends in an all-encompassing way, and now it seems impossible to avoid this trend. And yet, something seems to be missing. The developments of new technologies such as augmented reality and artificial intelligence may open a horizon of greater social and emotional turmoil. But the exponential evolution of technology has anesthetized mankind in front of novelties that up to 50 years ago would have been perceived as extraordinary. Let us think about how the order of magnitude of data storage has changed over the last 15 years. Measured in bytes and kilobytes, when they appeared on the market, there were already extraordinary data containers (being able to contain dozens of books and texts on just a simple floppy disk). Today, this order of magnitude of data storage is considered so small that these measures are barely mentioned. We have hard disks that contain terabytes of data available for a relatively cheap price in a common supermarket. It becomes essential, then, that magic, if it is to survive in such a world, continues to employ technological progress creatively, harnessing it to recover that dimension of wonder that technology, in itself, struggles to maintain.

In the 21st century, magic can still survive as a form of artistic expression. The graphic novel writer and occultist Alan Moore has stated that art is magic with the contemporary artist acting as a replacement for the shaman (see Benjamin, 2020). The artist becomes a shaman precisely because magic is considered an expression of a

technical attitude. The way of making art using the experience of altered perception, illusionism, and similar practices, is inextricably linked to that technological knowledge that also started to permeate magic. After all, it is already possible to use AI and algorithms to produce elaborate illustrations in place of the human hand. Creativity will be left with the task of employing them effectively to generate wonder.

> The practices of artists can therefore be associated with those of the magician, clearly staging acts of concealing in order to reveal, providing a method of analyzing specific artists' work in using altered perception to create new experiences of knowledge with technology. (Benjamin, 2020, p. 511)

Ultimately, I would like to conclude by leaving an extraordinary and meaningful quote from the British writer C.S. Lewis. Questioning should never be self-referential. On the contrary, only when the disciplines interpenetrate one another, there will be something to reflect on.

> It is like the famous Irishman who found that a certain kind of stove reduced his fuel bill by half and thence concluded that two stoves of the same kind would enable him to warm his house with no fuel at all. It is the magician's bargain: give up our soul, get power in return. But once our souls, that is, ourselves, have been given up, the power thus conferred will not belong to us. (Lewis, 1979, p. 36)

## REFERENCES

Anders G. (2009). The Pathology of Freedom: An Essay on Non-Identification, (K. Wolfe, trans.). *Deleuze studies*, *3*(2), 278-310. https://doi.org/10.3366/e1750224109000658

Benjamin, G. (2020). Indistinguishable from Magic: Perception, Knowledge, Technology, Art., *Leonardo, 53*(5), 510-514. https://doi.org/10.1162/leon_a_01739

Busi G., & Ebgi R. (2014). *Giovanni Pico della Mirandola. Mito, Magia, Qabbalah* [John Pico della Mirandola. Myth, Magic, Qabbalah]. Einaudi.

Clarke, A. C. (1999). *Profiles of the Future: An Inquiry into the Limits of the Possible*.Victor Gollancz.

Comba, E. (2019). Tradizione collettiva e invenzione individuale: Lévi-Strauss e lo studio dello sciamanismo [Collective tradition and individual invention: Lévi-Strauss and the study of shamanism]. *Antropologia E Teatro Rivista di Studi*, *10*(11), 84-108. https://doi.org/10.6092/issn.2039-2281/10096

Durkheim, E. (1968). *Les formes élémentaires de la vie religieuse* [The Elementary Forms of Religious Life]. Le presses universitaires de France.

Gehlen, A. (1961). *Anthropologische forschung, Zur Selbstbegegnung und Selbstentdeckung des Menschen* [Anthropological Research, On self-Encountering and Self-discovery of Human]. Rowohlt.

Gehlen, A. (1980). *Man in the Age of Technology*, (P. Lipscomb, trans.). Columbia University Press.

Gehlen, A. (1988). *Man, his Nature and Place in the World* (McMillan & K. Pillemer, trans.). Columbia University Press.
Grigenti, F. (2019). Magia e tecnologia [Magic and Technology]. *Orbis Idearum*, *7*(1), 63-79. http://dx.doi.org/10.26106/9F8G-5V71
Grigenti, F. (2018). Superpower and Imitation. Body and machine. *Orbis Idearum*, *6*(1), 13-38. http://dx.doi.org/10.26106/DG3W-4756
Kurzweil, R. (2005). *The Singularity is Near*. Viking Penguin.
Lewis C. S. (2014). *The Abolition of Man*. Samizdat University Press.
Malinowski, B. (1948). *Magic, Science and Religion and Other Essays*, The Free Press.
Nolan, C J. J. (Director) (2006). *The Prestige* [Film]. Touchstone Pictures.
Pansera, M.T. (2001). *Antropologia filosofica. Le peculiarità dell'umano in Scheler, Gehlen e Plessner* [Philosophical Anthropology. The Peculiarities of the Human in Scheler, Gehlen and Plessner]. Mondadori.
Prosperi A. (2012). *Tribunali della coscienza. Inquisitori, confessori, missionari* [Courts of Conscience. Inquisitors, Confessors, Missionaries]. Einaudi.
Tarditi, C. (2009). *René Girard interprete del novecento* [René Girard Interpreter of the Twentieth Century]. UNI Service.

**СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR**

Федерико Монаро
federico.monaro@studenti.unipd.it

Federico Monaro
federico.monaro@studenti.unipd.it

Статья поступила 9 октября 2022
одобрена после рецензирования 14 декабря 2022
принята к публикации 15 декабря 2022

Received: 9 October 2022
Revised: 14 December 2022
Accepted 15 декабря 2022

https://doi.org/10.48417/technolang.2022.04.05
Research article

# Enchanting Narratives: A Historical Ethnography of Contemplative Science

Mareike Smolka (✉)
RWTH Aachen University, Human Technology Center, Theaterplatz 14, 52062 Aachen, Germany,
mareike.smolka@humtec.rwth-aachen.de

## Abstract

In modernity, narratives seem to have lost their magical power to effect changes in the world. Language is generally considered as a system of arbitrary symbols coordinated with aspects of reality. Yet, research in the social studies of science and technology indicates that modern aspirations to exorcise magic co-exist with oppositional pulls towards re-enchantment: feelings of awe and wonder, practices akin to sorcery, searches for moral values, transcendental meaning, and magic words. This study on contemplative science, the neuroscientific, psychological, and clinical study of contemplative practices like mindfulness meditation, sheds light on the enchanting power of historical narratives. Historical narratives are revealed to play an important, but as yet unacknowledged role, in the re-enchantment of brain research. Drawing on historical ethnography, this study analyzes how the contemplative science community narrates history at conferences, commemorative events, and in published textual accounts to valorize this field of research as a project of re-enchantment without destabilizing its scientific legitimacy. First, the folk history of contemplative science is shown to endow the field with enchanting qualities by combining Weberian ideal types of charismatic and rational authority. Second, alternative histories of meditation research are reconstructed and their absence from the official narrative is explained in relation to the charismatic-rational Janus face of contemplative science. Third, contemplative scientists are found to take recourse to history in mobilizing regimes of valuation that help justify their work in light of socio-ethical critiques. The analysis contributes to scholarly discussions on the thesis that language can be considered as technology, having practical effects in the world. In support of this thesis, the argument presented indicates that historical narratives can serve to defend science against critics, attract novice researchers, and build a research community around the allure of modern enchantment.

**Keywords:** Enchantment; Contemplative science; Mindfulness; Historical narratives; Charisma; Regimes of valuation; Justification work

**Acknowledgment** This research was conducted for the dissertation "Ethics in Action: Multi-Sited Engaged Ethnography on Valuation Work in Contemplative Science" funded by the German Academic Scholarship Foundation. I would like to thank the contemplative science community for welcoming me at their conferences, seminars, symposia, webinars, and retreats. Special thanks go to Cyrus Mody, Cornelius Borck, Geert Somsen, Sebastjan Vörös, and the Maastricht University Science, Technology and Society Studies group for their feedback on earlier versions of this manuscript. I am also grateful to Alfred Nordmann for encouraging me to publish this research in *Technology and Language*.

**Citation:** Smolka, M. (2022). Enchanting Narratives: A Historical Ethnography of Contemplative Science. *Technology and Language*, *3*(4), 42-75. https://doi.org/10.48417/technolang.2022.04.05

УДК 13
https://doi.org/10.48417/technolang.2022.04.05
Научная статья

# Чарующие нарративы: Историческая этнография контемплативных исследований

Марейке Смолка (✉)
Рейнско-Вестфальский технический университет Ахена, Центр Гуманитарных Технологий,
Театрплац 14, 52062 Ахен, Германия
mareike.smolka@humtec.rwth-aachen.de

## Аннотация

Сегодня кажется, что нарративы потеряли свою магическую силу. Язык считается системой произвольных символов, согласованных с аспектами реальности. Несмотря на это, социальное исследование в области науки и техники показывает, что современные стремления изгнать магию сосуществуют с противоположным – к повторному очарованию: благоговение и чудо; практики, сходные с колдовством; поиск моральных ценностей, трансцендентного понимания мира; заклинания. Статья, посвященная контемплативной науке – нейро, психологические и клинические исследования созерцательных практик, таких как осознанная медитация – проливает свет на чарующую силу исторических нарративов. Исторические нарративы играют еще не признанную, но важную роль в повторном очаровании в исследованиях мозга. Опираясь на историческую этнографию, анализируется, как контемплативное научное сообщество преподносит историю на конференциях, выпускает текстовые отчеты для придания этой сфере исследований дополнительной ценности как проекта повторного очарования, не нарушающего научную законность. Во-первых, народная история контемплативной науки наделяет область чарующими качествами, совмещая Веберовские идеальные типы харизматичной и рациональной власти. Во-вторых, альтернативные истории исследования медитации реконструируются, и их отсутствие в официальной версии объясняется рационально-харизматичным лицом Януса – лицом контемплативной науки. В-третьих, ученые обращаются к истории для мобилизации режимов оценки, которая помогает оправдать их работу в свете социально-этической критики. Анализ способствует научным дискуссиям, посвященных тезису: “Может ли язык считаться технологией, учитывая его практическое влияние на мир?”. Аргумент в поддержку данного тезиса – исторические нарративы могут служить для защиты науки от критики, привлечения новых исследователей, создания исследовательского сообщества вокруг обаяния современной магии.

**Ключевые слова:** Магия; Контемплативная наука; Осознанность; Исторические нарративы; Харизма; Режимы оценки; Обоснование

**Благодарность:** исследование проводилось в ходе написания диссертации “Ethics in Action: Multi-Sited Engaged Ethnography on Valuation Work in Contemplative Science”, финансируемой Немецким Фондом Академических Стипендий. Я хочу поблагодарить сообщество контемплативной науки за теплый прием на проводимых ими мероприятиях. Особая благодарность Сайрусу Моди, Корнелиусу Борку, Геерт Сомсен, Себастьяну Вёрёс, обществам по изучению науки, технологий и Маастрихтского университета за их отзывы о предыдущих версиях статьи. Я также благодарна Альфреду Нордманну за то, что он побудил опубликовать исследование в журнале “Technology and Language”.

**Для цитирования:** Smolka, M. Enchanting Narratives: A Historical Ethnography of Contemplative Science// Technology and Language. 2022. № 3(3). P. 42-75. https://doi.org/10.48417/technolang.2022.04.05

## INTRODUCTION

> On the way back from my first contemplative science conference, the European Summer Research Institute (ESRI) 2017 on the island Frauenchiemsee, I was in a pensive mood. After spending a week listening to academic talks and engaging in vibrant personal exchanges interspersed with regular periods of contemplative practice, the boat ride felt like transitioning back from an esoteric place into society, but in a new state of being. I wanted to become part of this community, which had instilled in me a sense of awe and wonder. The people at the conference seemed to be passionate, hardworking, ingenious researchers, while also coming across as profoundly spiritual, reflective, and committed to making the world a more compassionate and peaceful place. At the same time, I was puzzled. Many of the scientists attending the conference were doing brain research, reducing meditative states and moral virtues to neural firing. How could they give off the impression of being engaged in adding greater meaning and transcendental significance to the world while doing materialist neuroscience? (Vignette, ESRI 2017)

In the four ensuing years, I followed the contemplative science community to investigate this question. I captured my insights in vignettes – short sketches that provide an inkling of what it was like to "hang out" (Nair, 2021) with contemplative scientists. Contemplative science is an interdisciplinary field of research, which primarily utilizes neuroscientific, psychological, and clinical approaches to study the biochemical, psychophysiological, behavioral, and subjective changes that occur in and as a result of contemplative practices. Research mainly focuses on practices and experiences of different types of meditation, including the relevance of meditation to a wide variety of undertakings, ranging beyond religious contemplation to applications in healthcare, education, and other sectors of society (Komjathy, 2018).[1] Although the field has received little attention in the anthropology, sociology, and history of science and technology, a few scholars have offered interpretations for how the paradoxical blend of neuroscience, spirituality, and ethics is achieved in practice at contemplative science conferences. For example, Tresch (2013) analyzes these conference-retreats as initiation rituals through which participants develop a contemplative-scientific identity and culture whose internal frictions require recursive negotiation of self-definitions, values, and boundaries. Kucinskas (2018) finds that leading figures in contemplative science resolve such frictions by combining several forms of legitimacy, in particular charismatic and scientific authority. Harrington (2008a) highlights how the mix of visual symbols of the 'exotic East' and the 'modern West' – the Dalai Lama in electrodes, scientists in flowing monk robes – frames contemplative science as a "project in reenchantment" (p. 3). The aesthetics transmit the sentiment that contemplative science is "something deeper, finer,

[1] This description is meant to provide readers with a broad, initial idea of what contemplative science is. As the self-definition of contemplative science is itself a subject explored in this article, the nature of this kind of science will become more evident as the argument unfolds.

and more daring" (p. 6) than just brain science, something which creates space for human values and spiritual quests.

While I assume that identity formation, legitimacy building, and visual symbols all contributed to my sense of awe at ESRI 2017, I realized later that this particular experience had yet another source: contemplative science's purported history. In 2021, numerous events were organized on the occasion of two anniversaries: the 20th anniversary of the passing of one of contemplative science's founding figures, Francisco J. Varela, and the 30th anniversary of the publication of *The Embodied Mind* (Varela et al., 1991), a landmark for the field's emergence. When attending these events, it dawned on me that the commemoration of contemplative science's history comprised various captivating or even enchanting moments, including the Dalai Lama's disclosing details about his friendship with Varela, Varela's wife reiterating her husband's values and visions, and Jean-Philippe Lachaux, his former PhD student, remembering Varela's "magical powers."

According to Nordmann and Bylieva (2021), the enchanting power of narratives plays a role in the "drama of modernity" (p. 2). Through the progressive intellectualization and disenchantment of the world in the modern period, words came to be considered as arbitrary codes coordinated with things in the world. Hence, magical prophecies and religious invocations lost their self-fulfilling powers. Yet, the productivity of language to evoke a corresponding world has resurfaced in modern science and technology (ibid.). For example, MacKenzie (2008) says about modern economic theory that it is "an engine, not a camera" because financial models have shaped financial markets. Mody (2017) describes Moore's law – the rule of thumb that the number of circuit components on a computer chip will double every two years – as a "performative device" (p. 8) that guides action in the semiconductor industry, rather than predicting its development. Similarly, Nordmann and Schwarz (2012) indicate that narratives around nanotechnology's rise to prominence have a seductive power to assemble heterogenous actors who preserve the narratives' promises.

In the light of these findings, I ask: how do narratives about the history of contemplative science re-enchant the brain sciences? How does the contemplative science community narrate its history to create the impression that contemplative science reinvests the world with meaning, without destabilizing its scientific legitimacy? To which ends do they valorize their field of research as a project of re-enchantment? To answer these questions, I study the "folk history" (Shanley, 2022, p. 24) that members of the contemplative science community construct to retell the evolution of the field at conferences, meetings, commemorative events, and in published written accounts. The contemplative science community encompasses mainly researchers from the neurosciences, psychology, and the clinical sciences who collaborate with smaller numbers of humanities scholars, social scientists, and contemplative practitioners (Komjathy, 2018, p. 20). An extensive body of literature in religious studies sheds light on Buddhist practitioners' interests in and the rhetoric around their collaborative engagements with scientific researchers (Hermann, 2011; Lopez, 2008; McMahan, 2009, 2010). I shift the analytical focus to Western scientists and scholars involved in

contemplative science to investigate how they valorize this kind of research by taking recourse to history.

This study contributes to the literature on how scientists attribute value to objects, technologies, and work-related activities to justify and legitimize their research (Anderson, 2012; Dussauge, et al. 2015; Mody et al., 2020; Morrison, 2018). This body of work has established that a range of discursive repertoires function in valuation and justification practices, but the strategic use of history has so far remained understudied (for exceptions, see Abir-Am, 1985, 1992; Olazaran, 1996). Specifically, I expose how the folk history of contemplative science combines Weberian ideal types of charismatic and rational authority to endow the field with enchanting qualities while underpinning its scientific legitimacy. Next, I reconstruct alternative histories of meditation research based on secondary sources in the history of science and explain how their absence from the official historical narrative shapes the charismatic-rational Janus face of contemplative science. Finally, I elucidate how contemplative scientists made appeals to the past when mobilizing "regimes of valuation" (Fochler et al., 2016) – social responsibility, contemplative values in science, diversity and inclusivity – in response to recent critiques of their work's socio-ethical implications (e.g., Purser et al., 2016). By demonstrating how the past becomes a forceful repertoire to defend contemplative science against critics, to attract novice researchers, and to build a contemplative science community, we gain a better understanding of how this kind of research establishes its multivalent status as credible, worthwhile, and inspirational in the present.

## LITERATURE REVIEW, ANALYTICAL PERSPECTIVE, AND METHODOLOGY

This research builds on three bodies of literature: a review of research on (re-)enchantment of science and technology, an analytical perspective on valuation and justification work, and methodological approaches to historical ethnography. The literature review summarizes empirical studies which show that the modern project of disenchantment has never been complete or uncontested. In fact, there have been numerous attempts within science to move in the opposite direction. One of these attempts involves a blend of charismatic and rational authority in scientific personae and technologies. In the section on valuation and justification work, I present charismatic and rational authority as repertoires through which the contemplative science community valorizes and justifies its research. The section further explains how the deductive analysis is complemented with an inductive approach to identify additional repertoires that emerge from the empirical material. All these repertoires are historical, meaning they feature in or draw upon the narration of contemplative science's history. Finally, I introduce methodological approaches to historical ethnography to specify how data was collected on the construction of contemplative science's history.

## (Re-)Enchanted Science and Enchanting Scientists

Working in the shadow of Max Weber, numerous scholars have emphasized the corrosive effects of scientific thinking on religious or spiritual systems of orientation (for an overview, see Saler, 2006). In his famous disenchantment thesis, Weber (1918/1958) characterizes modernity as a process of "intellectual rationalisation created by science and scientifically oriented technology" that obliterates "mysterious incalculable forces" (p. 117). Since the 1990s, however, postmodern scholarship has recognized the tensions and oppositions constitutive of modernity (Bilgrami, 2010; Latour, 1993; Taylor, 2011). With the rise of modern science, magical sorcery, spiritual beliefs, and religious values did not disappear but fragmented into patches within a complex pattern of modern enchantment. In social studies of science and technology, different understandings of modern enchantment come to the fore: re-enchanted science as a historical backlash in the *longue durée* of Western disenchantment; scientists' aesthetic experiences of enchantment; discourses and practices through which scientific personae, objects, or knowledge gain enchanting qualities. To distinguish between these understandings throughout this article, I use the terms 're-enchantment,' 'enchantment,' and 'to enchant,' respectively.

Historians of science and technology have conducted case studies of "reenchanted science" (Harrington, 1996). Examples are the spread of occultism in Victorian science (Owen, 2004; White, 2014), the emergence of a German-speaking science of wholeness in the early decades of the 19$^{th}$ century (Harrington, 1996; Treitel, 2004), and a range of "groovy sciences" (Kaiser & McCray, 2016) – cybernetics in Great Britain (Pickering, 2010) and parapsychology in the United States (Kaiser, 2011) – flourishing from the late 1960s to the early 1980s. Historical studies frame scientific and public interest in paranormal phenomena and altered states of consciousness as fringe reactions to religious doubts sparked by Enlightenment thinking, uncertainty in times of rapid socio-political changes, and postwar alienation following from the fatal sides of science, technology, and bureaucratic society.

Research in cultural studies, science and technology studies, and phenomenology, by contrast, highlights that the affective experience of enchantment is part of normal science. Experiences of awe, astonishment, and delight, usually reserved for spiritual experiences, accompany the intuitive grasp of how things work (Barbalet, 2009; Ellis, 2011) and the engagement with poorly understood but potentially transformative technologies (Mosco, 2005; Davies, 2014). Moreover, the use of instruments and devices to expand human perception and enter unknown worlds – the deep sea and divine heights (Adamowsky, 2010, 2015) or the inside of the body (Trimble, 2020) – have been shown to evoke wonder as well as uncanny feelings.

Lastly, media and discourse analyses demonstrate how scientists, engineers, and journalists bestow science and technology with magic to enchant other researchers, stakeholders, and wider publics. For example, the mystery and awe-inspiring potential of nuclear technology (Anshelm, 2010) and artificial intelligence (Ames, 2018) have not only been invoked for the sake of marketing and media hype. This potential also shields their creators from responsibility for the societal impacts of these seemingly unpredictable, superhuman technologies (Campolo & Crawford, 2020).

Some contributions to the last-mentioned body of literature highlight the link between Weber's concept of (dis)enchantment and his work on charisma (e.g., Ames, 2019). For Weber, modernity is a conundrum because the disenchanting process of rationalization is constantly threatened by the enchanting counterforce of charisma. While rational authority secures the stability of social order through bureaucracy and procedural rule-following, charismatic authority appeals to forces outside of formal structures (Parsons, 1946). Charismatic leaders are considered "extraordinary and treated as endowed with supernatural, superhuman, or at least specifically exceptional powers" (Weber, 1922/1968, p. 242), which enable them to fill the void of spiritual meaning and ethical purpose in a disenchanted world. Charismatic leaders can enchant followers – which literally means "to put them under a spell" (Ladkin, 2006, p. 167) – to either rebel against, reform, or support the existing rational order in modern societies (Islam, 2014).

Studies have illuminated how technological objects, digital networks, and scientific personae are portrayed as rational and charismatic at the same time (Ames, 2019; Kucinskas, 2018; Lee, 2020; Tresch, 2012). Their enchanting power of charisma no longer constitutes an alternative form of authority, but expands the social vision of technological fixes, the euphoric attachment to digital systems, and the legitimacy of scientific expertise. Along these lines, I analyze enchantment in contemplative science. I build on Kucinskas' (2018) observation that leading figures in the field attract other researchers and professionals from different backgrounds by emanating the impression that one could become "wise and spiritually aware by being part of this contemplative community" (p. 145). She locates the enchanting force of these figures in their interdependent forms of legitimacy, in particular the combination of epistemic authority derived from scientific credentials and charismatic authority grounded in Buddhist moral leadership. Her analysis of the discourses and practices that foster legitimacy is reminiscent of valuation studies.

## Repertoires of Valuation and Justification Work

The study of how actors prove themselves legitimate is at the center of valuation studies (Kjelberg et al., 2013), which are influenced by science and technology studies (Dussauge et al., 2015; Heuts & Mol, 2013; Van De Werff, 2018) and pragmatism (Boltanski & Thévenot, 2006; Dewey, 1939). As actors justify their behavior, they resort to values that have legitimacy in the community they address. These values, broadly defined as something "good, proper, and desirable" (Dussauge et al., 2015, p. 7), are treated not as absolute or universal, but as produced in and through practices of valuation. Albeit locally accomplished, practices of attributing value to something and/or assessing something as worthwhile are not arbitrary. In fact, scholars have shown that actors in specific contexts habitually appeal to recurring "orders of worth" (Boltanski & Thévenot, 2006) to inform, orient, valorize, and justify their actions.

The analytical perspective deployed here relies on Reinecke et al. (2017) in approaching the orders of worth' framework as containing Weberian ideal types of charismatic and rational authority. In the industrial order, scientific and technical experts appeal to the good of technical efficiency. They engage in practices of valuation based on quantification and classification to establish rational authority – the derivation of expert

legitimacy from procedural rule-following. In the inspirational order, by contrast, charismatic authorities claim worth "through what they have that is most *original* and most *peculiar* to them, that is, through their own *genius*" (Boltanski & Thévenot, 2006, p. 161). Empirical research informed by Boltanski and Thévenot illuminates how actors perform "justification work" (Jagd, 2011, p. 343), the process of flexibly integrating and alternating between orders of worth to establish or repair moral and epistemic legitimacy (Mody et al., 2020; Morrison, 2018; Patriotta et al., 2011; Yamaguchi & Suda, 2010). Likewise, I examine how the combination of the industrial order of worth (rational authority) and inspirational order of worth (charismatic authority) valorizes, justifies, and legitimizes contemplative science as a project of re-enchantment.

Similar to researchers who found Boltanski and Thévenot's deductive scheme too rigid for their empirical research (Fochler, 2016; Fochler et al., 2016; Heuts & Mol, 2013), I do not limit my analysis to pre-defined repertoires. Instead, I follow Fochler et al. (2016) in identifying additional "regimes of valuation" inductively. Regimes of valuation "are comprised not only of institutional discourses, practices and material and digital infrastructures, but also of people living in, complying with and resisting these very regimes" (p. 180). Albeit open to change through acts of resistance and subversion, the regimes that researchers comply with in valuing and justifying their work (for example, in terms of publications and citations) are relatively durable. I follow a grounded theory approach (Charmaz, 2006) to analyze the dominant regimes invoked by contemplative scientists to shield their work against critique.

## Historical Ethnography

In this study I employ "historical ethnography" (Abir-Am, 1992) to investigate how orders of worth and regimes of valuation are mobilized in the ways in which the history of contemplative science is preserved. Multiple methodological approaches to historical ethnography have been developed at the intersection of history, anthropology, and ethnology. While most of them use ethnographic methods and perspectives to study the past (Fenske & Bendix, 2007; Kornblum, 2004; Vaughen, 2004), this study traces "the uses to which people put history" (Frankel & Abir-Am, 1992, p. 361). Scientists narrate history at scientific anniversaries (Abir-Am, 1992; Richmond, 2006), conferences (Fisher, 2017; Stephens & Dimond, 2016), memorial volumes (Abir-Am, 1982), and in other commemorative practices of science (Abir-Am & Elliot, 1999). At these occasions, they generate and solidify a "myth of origin" (Abir-Am, 1985), an "imagined past" (Wilson, 2017), or a "folk history" (Shanley, 2022). While the terms 'myths' and 'imagination' invoke the impression that these distort reality (Badino, 2017; Miller, 2004), the concept of folk history acknowledges that the past is not an autonomous entity to be unearthed, but a way to give meaning to individuals and communities.

Shanley (2022) describes folk history as a simplified historical account, sometimes based on witnesses' experiences, but not systematically verified. This account is generally accepted by the members of a specific community, who can use and adapt it for strategic purposes to subtly direct or justify (future) actions. Abir-Am (1982) further emphasizes that "the real importance of collective public representations of science by scientists lies not so much in their content but in their systematic omissions" (p. 283). Folk histories

and their omissions serve to generate disciplinary loyalties to specific technologies, theories, or colleagues – rather than others – to legitimize authority by obscuring the relation between "scientist-heroes" (p. 284) and female or student scientists, to offer moral guidance for scientific behavior, identity formation, and community building around a shared historical anchor.

To capture the folk history of contemplative science, I combine participant observation with document analysis. Ethnographies of conferences and scientific commemorations have shown that such ceremonies are an important site where "heroes" are celebrated, "myths" are codified, and stories are shared to bind scientists together around a specific version of the past (Abir-Am, 1992; Egri, 1992; Friese, 2001; Henderson, 2020; Mody, 2012). Moreover, ethnographies of scientific seminars and symposia have demonstrated that these events facilitate academic socialization through which scientists come to recognize and sustain the values, beliefs, and practices of their community (Lomnitz, 1983; Molyneux-Hodgson & Meyer, 2009; Sandler & Thedvall, 2017). Following these examples, I participated in contemplative science conferences, symposia, and seminars from 2017 to 2021, including events commemorating Francisco Varela (Table 1). While previous anthropological and sociological studies of contemplative science conferences took place in the US (Kucinskas, 2018; Tresch, 2013), most of the events I attended took place in Europe, where the field has been prospering since the early 2000s (Lutz et al., 2006). I triangulated my observations with contemplative scientists' published accounts of their field's history in documentaries, interviews, books, magazines, and journal articles.

To reconstruct alternative histories of contemplative science that are omitted from its established narrative, I drew on scholarly literature by historians of science. As a full-fledged historiography of contemplative science has yet to be written, I focused on histories of such adjacent fields as mind-body medicine (Harrington, 2008b), biofeedback (Robbins, 2000), and the neurosciences (Lysen, 2022). A pitfall of this approach is the asymmetry between the analyst's trust in historical secondary sources and her skepticism vis-à-vis actors' memories and historical narratives shared at conferences, meetings, interviews, and other published records. Yet, as Frankel points out "such asymmetrical distribution [of trust] is indispensable to knowing anything at all" (Frankel & Abir-Am, 1992, p. 358) since each explanation or interpretation depends on provisionally trusting a large body of 'facts' or 'understandings' inherited from past investigators. As each body of beliefs can be further deconstructed, I deem it the task of my historical ethnography to convince readers of the plausibility of alternative histories, rather than claiming them to be more trustworthy than the established folk history.

**Table 1.** Participation in contemplative science conferences, seminars, symposia, webinars, and retreats

| Event | Year | Location |
|---|---|---|
| European Summer Research Institute (ESRI) | 2017<br>2020<br>2021 | Frauenwörth Abbey in Chiemsee, Germany<br>Digital event due to Covid-19<br>Digital event due to Covid-19 |
| International Conference on Mindfulness (ICM) | 2018<br>2020 | University of Amsterdam, the Netherlands<br>Digital event due to Covid-19 |
| European Contemplative Science Symposium (CSS) | 2019 | Venue Fürstenfeld in Fürstenfeldbruck, Germany |
| Varela Symposium | 2020 | Digital event due to Covid-19, otherwise at Upaya Zen Center in Santa Fe, US |
| Mind & Life Contemplative Research Conference (CRC) | 2020 | Digital event due to Covid-19, otherwise at Garrison Institute in New York, US |
| National Symposium on Mindfulness | 2020 | Digital event due to Covid-19, otherwise at Radboud University Medical Center, the Netherlands |
| European Mind & Life Retreat | 2021 | Digital event due to Covid-19, otherwise at the Center for Mindful Living in Niederwangen, Switzerland |
| Mind-Brain-Mindfulness Seminars | 2019–2021 | Free University of Amsterdam, the Netherlands, digital events since Covid-19 |
| Mind & Life Europe Friends webinar series | 2020–2021 | Digital events organized by the European Mind & Life Institute |
| Francisco & Friends Life webinar series | 2021 | Digital events organized by the European Mind & Life Institute |
| Ouroborus seminars | 2021 | Digital events organized by the European Mind & Life Institute and the Metanoia Research Group from University of Ljubljana, Slovenia |

## FOLK HISTORY OF CONTEMPLATIVE SCIENCE

### Francisco J. Varela's Research on Expert Meditators

> After sitting the entire day in a cross-legged position on a meditation cushion, I felt relieved to take a seat in the auditorium of the Frauenwörth Abbey for an award ceremony and documentary streaming. I was excited to find out who had received a Varela Grant, named after the Chilean neuroscientist and contemplative practitioner Francisco J. Varela. The grants were awarded to young researchers who formulated promising ideas for furthering Varela's legacy: the examination of contemplative practices that combines first- and third person perspectives on the human mind and brain. As I had heard about Varela for the first time during the conference, I was curious about this 'visionary' – as he was frequently called by conference speakers and participants. Watching *Monte Grande*, a moving documentary about Varela's life and science, I was captivated by his vivid smile in scenes filmed during his illness and shortly before his death in 2001 (Figure 1). I also gained a first inkling of the history of contemplative science. (Vignette, ESRI 2017)

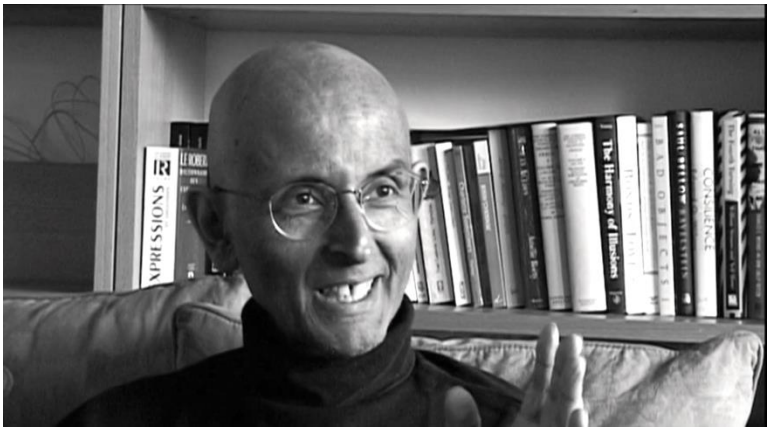



**Figure 1**. Francisco J. Varela in *Monte Grande – What is Life?* Documentary produced by Franz Reichle and released in 2004.

Varela's historical presence at ESRI provided conference participants with a specific ideal for their (emerging) contemplative science identity. This identity was grounded in a shared value of openness toward dialogue. In a CRC 2020 plenary panel on the origin of contemplative research, Varela's wife Amy Cohen Varela recited his understanding of dialogue as a way to find underlying relations between different cultures, moral systems, and knowledge traditions.

The first dialogue between the Dalai Lama and Western scientists in 1987 is often described as the birth of contemplative science, as well as that of the Mind & Life Institute (Davidson & Harrington, 2002; Harrington & Zajonc, 2006; Hasenkamp & White, 2017). The institute was founded by the Dalai Lama, Varela, and the entrepreneur Adam Engele as a non-profit organization. Today's vision of the institute is articulated in reference to its founding figures: "When the Mind & Life Institute began over three decades ago, our founders envisioned a future where science and contemplative wisdom would come together to promote human flourishing . . . We're inspired not only by questions that drive scientific insight, but also by those that move people to greater compassion and action" (Mind & Life Institute, 2020a). This double agenda combining epistemology and ethics is supposedly at the roots of the meetings between the Dalai Lama, Buddhist monks, scientists, and other intellectuals.

While these meetings initially took place in a living room setting, after 2002 they would develop into increasingly publicized events disseminated through life streaming. Moreover, contemplative science conferences, known as Summer Research Institutes, have been held on an annual basis, typically at the Garrison Institute in New York since 2004, to build a community of contemplative scientists (Mind & Life Institute, 2020b). Four years later, Mind & Life Europe (MLE) split off from its American sister organization. According to Antoine Lutz, MLE associate and former PhD student of Varela, one of the objectives of MLE's establishment was to ground contemplative science conferences and activities more firmly in Varela's original vision of dialogue (personal communication, November 8, 2019).

Varela's vision of dialogue was inspired by retreats he had attended in the 1970s at the Lindisfarne Association (Reichle, 2004). Lindisfarne was a community first based in

the state of New York and later in Colorado, where people convened who were contemplative practitioners, intellectuals, and those who combined both identities like Varela himself. When he joined the community as a scientist in residence in his early thirties, he was already a distinguished biologist with a PhD degree from Harvard. Besides Varela, by now leading figures in contemplative science, such as psychologist Daniel Goleman, neuroscientists Richard Davidson and Cliff Saron, biologist Jon Kabat-Zinn, and philosopher Evan Thompson, were among the mix. According to Thompson, their conversations at Lindisfarne were often circling around Varela's ideas to "revolutionize" science. Varela sought to expand neuroscience by including disciplined first-person investigations of experience cultivated through Buddhist contemplative practice to better understand how the brain works (Thompson, 2004; Varela, 1996).

Varela sought to further translate his interest into experimental research in the 1990s while he was setting up his laboratory at the University of Paris in France. After initial attempts to collaborate with Tibetan monks were thwarted by cross-cultural communicative difficulties (Houshmand et al., 2002), a study succeeded to produce remarkable results in the early 2000s. Lutz, Davidson, and other scientists found that expert meditators with lifelong meditation experience produced a gamma brain activity while resting that was twenty-five times stronger than that of college students inexperienced in meditation (Lutz et al., 2004). To mark the study as a major breakthrough, an electroencephalogram of brain waves increasing in amplitude was printed on the cover page of Goleman and Davidson's (2017) popular science book *Altered Traits* (2017). Davidson's by now most highly cited paper (Davidson et al., 2003), however, was published one year earlier with Jon Kabat-Zinn: the first randomized controlled clinical trial of mindfulness-based stress reduction.

### Jon Kabat-Zinn's Mindfulness-Based Stress Reduction

> I was surprised by the bustle in the entry hall of a university building in Amsterdam. People with conference badges huddled at bar tables, some were standing in line for coffee, ginger tea or cucumber water, and others were pinning their posters to panels. The urge to find my way through a crowded building to one of the seven parallel sessions reminded me that this was a scientific conference with a focus on clinical research and application, rather than a meditation retreat.
>
> On the second day, however, the conference got a contemplative flavor. Jon Kabat-Zinn was projected on a large screen (Figure 2) in a lecture hall where about 300 conference attendees had gathered to watch him on video live-stream. Although 74 years of age, he spoke clearly and forcefully when making appeals to the audience: to increase the rigor of mindfulness research, to bring mindfulness to society, to maintain a personal mindfulness practice, and to pursue 'Buddhadharma' in all these activities. (Vignette, ICM 2018)


**Figure 2**. Keynote lecture by Jon Kabat-Zinn at ICM 2018. Photograph taken by Jason Gonzales at the University of Amsterdam.

The subtle contradictions at ICM – coffee and cucumber water, hustle bustle and communal meditation, scientific rigor and quasi-religious preaching – reflect the interpretive flexibility that has permeated clinical research on meditation since its emergence.

The clinical branch of meditation research was instigated by Kabat-Zinn in the 1980s. After finishing his PhD in molecular biology at MIT, he had a "flash as to how meditation training could effectively be introduced into the mainstream of medicine" (Kabat-Zinn in Davidson et al., 2009) during a meditation retreat in 1979. Goleman and Davidson (2017) describe the episode as follows: "On that retreat Jon had an insight, which he quickly wrote down on the back of an envelope . . . In his vision he realized that pain clinics are filled with people whose symptoms are excruciating and who can't escape the pain except through debilitating narcotics. He saw that the body scan and other mindfulness practices could help these patients uncouple the cognitive and emotional parts of their experience of pain from the pure sensation, a perceptual shift that can itself be a significant relief" (p. 84). This was the birth of mindfulness-based stress reduction or MBSR. Shortly after, Kabat-Zinn opened a Stress Reduction Clinic at the University of Massachusetts Medical School to introduce the program to patients with chronic pain, illness, or stress. In the classic documentary *Healing and the Mind* (Wagner, 1993), Kabat-Zinn is portrayed as an inspired and inspiring healthcare practitioner who conveys more to his patients than a simple technique.

Kabat-Zinn's success had a clinical base, but also a scientific one. Historical sketches in scientific reviews of mindfulness often locate the origin of meditation research in the early 1980s, coinciding with the development of MBSR as the dominant paradigm for clinical studies on meditation (Baer, 2003; Loizzo, 2014; Moulinet et al., 2018). Due to its standardized eight-week format, MBSR lends itself as a clinical intervention and has become the most widely tested meditation program with more than 600 published studies in 2017 (Kabat-Zinn, 2019). Such research was functional in implementing

mindfulness-based programs in hospitals. “If you want to be able integrate into medicine, you’ve got to be able to charge insurance companies for it,” Kabat-Zinn stated at a conference on Buddhism in America in 1997 to explain his motivation for conducting randomized controlled clinical trials on MBSR (cited in Purser, 2019, p. 66).

Despite his ambition to bring meditation into evidence-based medicine, Kabat-Zinn has framed mindfulness as both scientific and spiritual. Although he had couched MBSR in secular language in *Full Catastrophe Living*, in 1990 he published the book with a preface by the prominent Zen teacher Thich Nhat Hanh (Kabat-Zinn, 1990). Four years later, he brought out his international bestseller *Wherever you go there you are* (Kabat-Zinn, 1994), in which he makes the Buddhist roots of mindfulness explicit. Furthermore, he acknowledged in a magazine for Buddhist communities (Kabat-Zinn, 1993) and later in outlets for academic audiences (Kabat-Zinn, 2011) that there was no difference between ‘Buddhadharma,’ the teachings of the Buddha, and ‘universal Dharma,’ the lawful nature of the human mind and suffering captured in MBSR. With his ambiguous language – flexibly adapting to different audiences and making more room for allusions to Buddhism over time – Kabat-Zinn tried to find the “right vocabulary and the right framework . . . to reach many people at a heart level” (Kabat-Zinn in Davidson et al., 2009; see also Braun, 2017). As meditation and Buddhism slowly lost their countercultural, New Age, and mystic connotations, he became increasingly outspoken about the confluence of Buddhist dharma, medicine, and science.

## Topoi of Charismatic and Rational Authority

The folk history of contemplative science reconstructed in two branches – Varela’s laboratory experiments on expert meditators and Kabat-Zinn’s clinical trial research on mindfulness – touched upon *topoi* of authority. *Topoi* are commonplaces, relatively stable themes common to audiences and authors who deploy and adapt them according to occasion for rhetorical purposes (Walsh, 2013). Some well-known *topoi* of charismatic authority – (1) extraordinary features of body and face, (2) exceptional manners of working and living, (3) visionary ideas, and (4) moral guidance – are revisited above. Inspired by Walsh’s (2013) and Hamilton’s (2017) analyses of charismatic scientists, I show that the purported personae of Varela and Kabat-Zinn express the convolution of these *topoi* of charisma with rational authority.

First, both scientists were captivating speakers whose power of mind seemed to be elevated by the fragility of their bodies resulting from old age or imminent death (Shapin, 1998). Second, both were not only long-term meditation practitioners, but also highly productive, influential scientists with degrees from and positions at prestigious universities. Their work and life were shaped by efforts to navigate their “hybrid role identity” (O’Kane et al., 2020) merging a contemplative self with a scientific one. Third, their experience in meditation fueled their original ideas: Varela’s vision to revolutionize the cognitive sciences through a combination of first- and third-person approaches and Kabat-Zinn’s inspiration to treat chronic conditions by separating the experience of pain from its cognitive-emotional overlays. Fourth, their research was entangled with the moral aspiration to alleviate suffering and promote human flourishing. Varela sought to create spaces for open dialogue in which opposing viewpoints, approaches to knowledge,

and political positions could find common ground. Kabat-Zinn aimed to disseminate mindfulness in society to improve health and well-being by generating evidence for the positive effects of meditation through clinical trials.

The blend of Kabat-Zinn's and Varela's scientific personae with *topoi* of charisma could be interpreted in the light of Porter's (1995) understanding of expert authority. Porter proposes that expert communities endorse rational procedures as a source of authority whenever the legitimacy of expert consensus becomes vulnerable. Accordingly, rational authority underpinned by publications in respectable journals and scientific credentials has helped establish contemplative science as a legitimate field of research. Within the contemplative science community, however, foregrounding the mesmerizing qualities of historical figures like Varela and Kabat-Zinn fosters social cohesion. Although the folk history spun around these figures is only one reason why researchers feel attracted to contemplative science among several others (for instance, epistemic and contemplative interests, the recent 'hype' around mindfulness, and career-related ambitions), it helps interpret the Janus-faced nature of contemplative science. As charisma rallies 'insiders' while rationality persuades 'outsiders,' contemplative science looks into two directions at once, and is thus imbued with antinomies and tensions. In the following, I show how the rational-charismatic Janus face is inverted in the alternative histories of meditation research that are absent or explicitly demarcated from the official narrative of contemplative science.

## ALTERNATIVE HISTORIES OF MEDITATION RESEARCH

### The Green's Groovy Biofeedback Research

Although historical sections in scientific reviews of meditation research reference studies on contemplative practices in the 1960s and early 1970s in passing (Lutz et al., 2006; Loizzo, 2014), this period does not feature prominently in the folk history of contemplative science. This is surprising since during that time first EEG-biofeedback experiments were conducted on meditating yogis. Biofeedback attracted public attention through reports in popular magazines and documentary films, and are today remembered in books and articles on the history of neurofeedback (Brenninkmeijer, 2013).

At the center of these historical accounts are Elmer Green, an applied physicist, and his wife Alyce, a trained psychologist. They were best known for their 1974 research expedition to India (ibid.). Equipped with a portable laboratory, they made physiological recordings of yogis controlling their heart rate, body temperature, and brain activity. Their findings demonstrated that humans undergoing extensive training could attain volitional physiological control, which substantiated the biofeedback research they had been doing since 1964 at the Menninger Clinic in Kansas. They had tried to teach self-regulatory skills to ordinary people by monitoring physiological changes and feeding them back to volunteers for greater self-awareness (Parks et al., 2020).

The Greens' research was motivated by their long-term meditative practice. They discovered that whenever Elmer slipped into a meditative state, his EEG displayed low-frequency theta brain waves. After conducting further research on theta, they claimed that it was associated with an enhanced state of well-being through the quieting of body,

emotions, and thought (Robbins, 2000). Informed by their observation that every change in mental-emotional state was accompanied by a physiological change and vice versa, they envisioned "a science in which mind and matter were not forever separate" (Green & Green 1977, p. 13).

Their visionary science was intertwined with their socio-political convictions – an intertwinement that became evident in their work's emphasis on volition. Their understanding of volition referred to people's freedom to willfully choose a mental-physiological state. According to Hartman (2016), the training of volition was of societal relevance for the Greens, since they considered it as a "vital response to a pervasive social dependence on top-down systems of governance" (p. 10). They believed that through the combination of biofeedback technology and meditative practices, ordinary people could learn to take responsibility for their own health and activities, and, in this way, free themselves from a patronizing political system.

This sketch of the Greens' work and life highlights that, similar to Varela and Kabat-Zinn, their scientific personae merged with charismatic features: their hybrid role identity combined meditative practice with scientific ambitions, they had non-mainstream ideas about the relation between mind and matter, and their research extended into political philosophy. Although their research in India was widely publicized through the documentary *Biofeedback: Yoga of the West* (Hartley & Hartley, 1975), which reproduced East-West clichés similar to those pervading meetings between the Dalai Lama and Varela, they are not remembered as early forerunners of contemplative science (for an exception, see Edwards, 2011). A reason may be that "biofeedback had a New Age whiff about it" (Robinson, 2000, p. 6) and that the Greens associated their research with transpersonal psychology (Hartman, 2016), sometimes considered a New Age trend (Sutcliffe, 2003). As such, the Greens' biofeedback research could be considered part of the 1960s "groovy sciences" (Kaiser & McCray, 2016), which had a countercultural air around them.

It is this link to the counterculture that contemplative scientists have downplayed to gain scientific legitimacy for Buddhist meditation. As mindfulness researchers like Kabat-Zinn have aimed to introduce meditation practice into established institutions, such as hospitals, schools, and governments, an association with countercultural revolutionary ideas could harm their cause (Kucinskas, 2018). Therefore, Davidson, Goleman, and Varela made careers in mainstream science before they came "out of the closet" (Davidson et al., 2009; Varela, 2000) with their interest in Buddhism in the 1990s, when countercultural stereotypes slowly started to fade (Turner, 2008). As contemplative science has constantly faced the risk of being identified with the New Age wing of the American counterculture, it has distanced itself from its history in biofeedback research. In the case of the Greens, the charismatic-rational Janus face is not constitutive of contemplative science's re-enchantment, but threatens its project with too much grooviness.

## Benson's Disenchanted Relaxation Response

Another biofeedback researcher who did *not* become a player of note in the folk history of contemplative science is the cardiologist Prof. Herbert Benson. For one thing,

he has not featured in commemoration practices at contemplative science conferences. Also, in retelling the history of the field, Goleman and Davidson (2017) mention him only briefly. His relative absence from the origin story of contemplative science in comparison to Kabat-Zinn and Varela is salient because in other respects their research careers appear to have been quite alike.

Similar to Varela, Benson was keen on meeting the Dalai Lama. In 1979, eight years before the first Mind & Life Dialogue, the opportunity arose when the Dalai Lama came to Harvard for a visit. On that occasion, Benson told him about his interest in studying "g'Tum-mo" or "inner heat meditation," during which experienced Tibetan meditators upregulated their thermal production to burn defilements of improper thinking (Benson, 1991, p. 42). Several months later, Benson received a letter from the Dalai Lama inviting him to study g'Tum-mo practitioners near Dharamsala. Benson completed the research project with a *Nature* publication reporting that these practitioners had increased the temperature of their fingers and toes by 8.3 °C (Benson et al., 1982).

Benson's research on g'Tum-mo supported his clinical interest in studying the possibility that meditation, conditioning techniques, and biofeedback could lead to striking changes in the body and treat stress-related illnesses. After training patients with hypertension to lower their blood pressure through biofeedback (Benson et al., 1971), he conducted research on young meditators. He observed that their blood pressure, metabolism, breathing rate, and brain wave frequency rate decreased when they performed mantra meditation in comparison to a state of quiet repose (Wallace & Benson, 1972). He interpreted the result as the systematic reversal of the stress-induced fight-or-flight response, which he eventually called "Relaxation Response" (RR) in a best-selling book (Benson, 1975).

By the 1990s, the RR technique had been incorporated into modern medicine as a recommended therapy for hypertension, chronic pain, depression, and other conditions (Benson, 1991). Just like Kabat-Zinn, Benson had brought meditation into the clinic by authoring more than 190 scientific publications and by founding an Institute for Mind Body Medicine at the Massachusetts General Hospital (Benson, 2019). Although both researchers are considered as having laid the foundation for meditation's proliferation in Western medicine (Horowitz, 1999; Langer & Ngnoumen, 2018), contemplative scientists are vocal about Kabat-Zinn's contributions but remain rather silent on Benson.

My interpretation of Benson's relative absence from the folk history of contemplative science is twofold: he lacks charismatic authority and curtailed his rational authority by siding with the 'wrong' allies. Benson has always presented the RR in strictly secular terms. To evoke it, one should sit quietly and relax the body, breathe slowly and repeat a word, sound prayer, or muscular activity, and disregard other thoughts that come to mind. As "it is not religion per se, it is what the person believes in" (Benson, 1997), one could choose to repeat "*Ave Maria*," "*Om*," "Peace & Harmony," or any other phrase. Benson's descriptions do not only allude to the placebo effect, but also compare the RR to daily exercise (Benson et al., 2019). In this way, he could maintain an allure of objectivity, even though he himself started practicing the RR technique to relieve age-related aches. In contrast to Varela and Kabat-Zinn, Benson does not display a

contemplative-scientific hybrid role identity and his language has remained plainly secular over the years. His authority has been purely rational.

In the eyes of contemplative scientists, however, his rational authority may have looked damaged due to his research history. The study that helped Benson coin the RR was conducted with practitioners of Transcendental Meditation (TM). TM's spiritual leader, Maharishi Mahesh Yogi, had advertised his mantra meditation as celebrities' favored path to psychedelic bliss, with iconic images of the Beatles at his ashram (Wonfor & Smeaton, 1995), before searching for scientific legitimacy. Although TM produced what some call the "the first large wave of scientific studies on meditation's effects" (Farias & Wikholm, 2015, p. 48) in the 1970s, with hundreds of studies paving the way for a second wave on mindfulness thirty years later, contemplative scientists refuse such lineage. After TM had attracted negative attention for court cases, exaggerated claims, and conflicts of interest, scientists tended to dismiss TM research as 'pseudoscience' (Tøllefsen, 2014). To avoid such labelling of their own meditation research, contemplative scientists have "attempted to do this work in a way that's different than in the seventies with the TM people" (Davidson cited in Kucinskas, 2018, p. 81). They carefully focused their research on empirical rather than metaphysical questions and made great efforts not to overgeneralize results. They also excluded any links to TM in contemplative science's history, like Benson's research on the RR.

## HISTORY AS A REPERTOIRE OF JUSTIFICATION WORK

Having demonstrated how history is constructed to tell an origin story of contemplative science that bolsters its charismatic-rational authority, I now examine how scientists deploy the past strategically to fend off critical backlashes. Although they made efforts to learn from the failures of TM researchers, contemplative scientists frequently met with criticism. They have been criticized, for example, for claiming authority to speak about meditation despite methodological limitations of meditation studies (Van Dam et al., 2018), and for advancing the commodification, commercialization, and militarization of meditative practices (Purser, 2019). In the last decade, reporters, social scholars, Buddhist meditators, and contemplative scientists alike have reacted with critical scrutiny to the exponential growth of peer-reviewed articles on mindfulness and the application of mindfulness practices in nearly every sector of society. In a recent special issue on mindfulness, contemplative scientists Bernstein et al. (2019) emphasize that "critical perspectives and questions have not fallen on deaf ears. Many scholars, scientists and practitioners have been and continue to grapple with these challenges" (p. vii). I analyze the strategies that contemplative researchers have developed to respond to such challenges. This analysis identifies regimes of valuation – social responsibility, contemplative values in science, diversity and inclusivity – and directs attention to their historical nature. It reveals how they make references to Varela and Kabat-Zinn for the purpose of justification work, while, at the same time, reproducing contemplative science's enchanting qualities.

## Social Responsibility

An early, far-reaching socio-cultural critique of meditation's scientific framing in programs like MBSR was put forward by the professor of business and Zen Buddhist teacher Ronald Purser. He published a blog post on *Huffington Post* (Purser & Loy, 2013) that went viral and fed into his book *McMindfulness* (2019). He warns that uncoupling mindfulness from its Buddhist roots could reduce the practice to an attention training amenable to ethically dubious ends, for example in the military or corporate business. He further invokes Žižek's (2001) critique of mindfulness. In the sense of Marx, Žižek describes mindfulness as an opiate that smoothens the functioning of global capitalism by lowering employees' stress levels just enough that they are deflected from structural injustices. Contemplative scientists are accused of being complicit in the dissemination of corporate mindfulness by purporting to show that mindfulness enhances productivity at work.

Critiques like Purser's have given rise to expressions of commitment to social responsibility in contemplative science, which often invoke Kabat-Zinn's socio-ethical conception of mindfulness. A response to Purser's book issued by the Centre for Mindfulness Studies in Toronto points out that Kabat-Zinn "designed the 8-week MBSR program to help those with chronic illness and *pain*, not just stress . . . These contexts drove its rising popularity, not corporate or capitalist adoption" (MacPherson & Rockman, 2019). It is further suggested that Purser fails to recognize the "real problem of mental illness" (MacPherson & Rockman, 2019), which obstructs people from advocating for corporate justice. Mindfulness is not an opiate, but instead enables people to take responsibility for social change. The moral vision of healing society through healing the self, famously encapsulated in Kabat-Zinn's (2005) description of meditation as a "radical act of sanity" (p. 8; see also Kabat-Zinn, 2010, 2019), is the underlying thread of the response to Purser.

Kabat-Zinn's vision has been further reiterated in written responses to the McMindfulness critique (Repetti, 2016; Willmott, 2018), in interviews with contemplative researchers (Davidson, 2020; Thompson, 2020b), and at conferences. MLE conferences addressed the climate crisis, political conflicts, and social injustices under themes, such as "Beyond Confines: Integrating Science, Consciousness and Society" (CSS 2019) and "Care for life: Enacting knowledge in an interdependent and uncertain world" (ESRI 2021). Calls to go beyond the confines of the individual and to recognize interdependencies are reminiscent of Kabat-Zinn's (2005) emphasis on the links between the self, society, and the planet (p. 14). Keynote lectures were given by speakers with a background in party politics, activism, and economics whose personal stories and political agendas grounded solutions to grand challenges in cultivating virtuous qualities through contemplative practice. Implicit and explicit allusions to Kabat-Zinn's socio-ethical conception of mindfulness are embedded in their justifications against McMindfulness critics.

## Contemplative Values in Science

After the McMindfulness critique had been raised mainly by social scholars and Buddhist practitioners from outside of the contemplative science community, scientists

held the proverbial mirror up to themselves. While Tresch's (2013) ethnographic study of the early American Mind & Life Summer Research Institutes indicates that a conflict between contemplative values and scientific life has occupied contemplative scientists since the 2000s, I observed it gain momentum in the last three years in Europe. Former physicist Wolfgang Lukas, for example, had relentlessly tried for years to spread his proposal for a "mindful research culture" at annual ESRI events. He had not gained much attention until ESRI 2020 where his proposal sparked vibrant discussions (Lukas, 2020). In these discussions, Tania Singer, a prominent contemplative scientist who hit the headlines as the "The World's Top Empathy Researcher Revealed as a Bully" (Heaney, 2018), was frequently referred to. She appeared to embody the paradox of contemplative scientists who do not 'practice what they preach.'

Attempts to address this paradox have often framed the integration of contemplative values in science as a problem of individual integrity to which solutions can be found in contemplative science's history. For instance, MLE developed value cards intended for use during meetings, conferences, and everyday work to reconnect to the "heritage and founding principles" of the institute (Mind & Life Europe, n.d.). Each card is decorated with an icon and a quote by Varela expressing the meaning of values like "take care" and "stimulate dialogue." Similar appeals to Varela for moral guidance were recurringly made at the MLE retreat 2021, and these aimed to support contemplative scientists in giving space to their contemplative as well as professional practice. Retreat participants were suggested to read an interview with Varela (2000), in which he described his attempts to never lose sight of the purpose of his research, contemplating whether he was motivated by the pursuit of fame and glory or his wonderment about life and the intention to alleviate its inherent suffering. In support of such contemplations, scientists following Varela's legacy, like Lutz and Davidson, have encouraged meditation practice during workdays and have sent their teams to meditation retreats. The moral message derived from history seemed to be that 'practice what you preach' meant first and foremost 'contemplate your values on the cushion.'

## Diversity and Inclusivity

A critique raised both within and without the community marks the exclusive character of contemplative science. As observed by sociologist Kucinskas (2018): "For a movement inspired and motivated by democratic aspirations, progressive politics . . . and spiritual liberation for all, it is striking how the contemplative base was composed of such a privileged homogenous, group of people" (p. 193). In recognizing that to pass as a 'contemplative scientist' one has to be both a high-achieving researcher and a dedicated meditation practitioner, participants in contemplative science events have become increasingly critical of the label. While some dislike that it excludes researchers who study contemplation but do not work in the 'hard sciences,' such as psychologists, religious studies scholars, and cultural anthropologists (Komjathy, 2018), others are skeptical of the qualifier 'contemplative.' In contemplative science's definition of contemplation, Thompson (2020a) recognizes "Buddhist exceptionalism" (p. 1). He observed the development of an "in-group/out-group structure" in the 2000s, which sidelined people who criticized the "special treatment" (p. 12) given to Buddhism.

Buddhist meditation has come to be considered superior to other forms of contemplation in that it provides access to the fundamental nature of the mind, which puts it in a privileged position to work with the neurosciences.

Although Thompson had himself defended that view in *The Embodied Mind* (1991) co-authored with Varela and Rosch, he wrote in the introduction of its revised edition: "[W]hen I reread the book now, I cannot help but see it as limited by several shortcomings, ones that have become increasingly apparent to me over the years and that we need to leave behind in order to advance the vision and project of this book" (Thompson, 2016, p. xxii). Thompson has come to consider meditation, just like any other form of contemplation, as a ritual whose experience is as much shaped by social context as it reveals the inner domain. For him, the idea that Buddhist meditation is closer to direct experience than other forms of contemplation, which deeply informed Varela's thinking, is misguided. In taking distance from Varela, Thompson establishes himself as an authentic, reflexive participant in the past. His reflexive take on *The Embodied Mind*, rejecting some while confirming other parts, helps him stress the sustained relevance of the book's overarching vision: Varela's idea of inclusive, cross-cultural dialogue.

In reference to this conception of dialogue, diversity and inclusivity have been presented as central aspirations of contemplative science conferences. Conferences were organized with such themes as "mindfulness teachings around the world" (ICM 2020) and "diversity and equality" (ICM 2021), hosting keynote speakers from different countries, including Colombia, Iran, Israel, South Africa, to name but a few. At ICM 2020, discussions on spiritual healing following Ubuntu philosophy, Muslim Ramadan, and Jewish prayer emphasized their fundamental equality with mindfulness. One could consider such conference discussions as enactments of Varela's understanding of dialogue, which seeks to expose underlying relations across differences. The revival of the past in the turn to diversity and inclusivity performs justification work in response to critiques of Buddhist exceptionalism in contemplative science. At the same time, the appeal to Varela for moral guidance bestows contemplative science with deeper meaning, purpose, and moral vocation.

## CONCLUSION

The analysis above reveals that it is possible to understand contemplative science as a case of modern enchantment. While several historiographies have foregrounded the presence of spirituality, religious beliefs, and magic in modernity (Castle, 1995; Daston & Parks, 1998; Landy & Saler, 2009), in this study I shift scholarly attention to the enchanting power of historical narratives. Through a combination of participant observation and document analysis, I examine how scientists and scholars involved in contemplative science narrate their field's history as a project of re-enchantment. Their folk history and its eluded alternatives are "partial connections" (Strathern, 1991) that hold together seemingly incommensurable accounts of the world: Eastern contemplation and Western science, ethical significance and materialist brain research, charismatic and rational authority (cf. De La Cadena & Blaser, 2018; Ellis, 2011; Morita, 2017; Verran, 2001).

This study further contributes to literature on charismatic scientists. In line with Weber's (1922/1968) description of charismatic authority as a revolutionary force, charismatic scientists have been shown to dwell outside established institutions (Hamilton, 2017) or to take on transitory leadership (MacKenzie & Elzen, 1996). Other scholars find that charismatic authority thrives within modern scientific institutions (Lengwiler, 2006; Shapin, 2010; Thorpe & Shapin, 2000). What both interpretations of charisma have in common is that they consider it to be contingent on normative uncertainty – either due to the absence of established procedures in revolutionary times or created by tightly structured organizations, in which an individual vouches for situational, local courses of action. This case study on contemplative science, by contrast, highlights that charisma can function as a glue attaching individuals to a community of researchers. In conveying the impression that one could become as spiritually profound and academically successful as contemplative science's charismatic founders, the contemplative science community instils a powerful desire to belong. While I focus on the charisma of Varela and Kabat-Zinn because they feature most prominently in the folk history of contemplative science, future research could inquire into the role of other leading figures, for instance Davidson and Lutz, in strengthening communal ties and attracting novices to meditation research.

The reconstruction of the folk history of contemplative science, in other words, exemplifies the role of language as a technology that effects things in the world (Belyaeva, 2021; Hasse, 2022; Heß, 2021; Nordmann, 2020). To defy the traditional distinction between word and deed, this study portrays narratives as powerful instruments to achieve specific ends. In contemplative science, historical repertoires are mobilized to assemble a research community, to defend science against critics, and to create moral obligations in the present. The analysis of regimes of valuation in response to socio-ethical critiques of contemplative science illuminates that appeals to past visions and moral ideals do not only perform modern enchantment, but also justification work. Enacting allegiances to a particular version of the past creates obligations through the articulation of a moral indebtedness of descendants to their ancestors. Tracing these allegiances opens up contemplative scientists' regimes of valuation to closer scrutiny. For example, presenting Varela's soul-searching contemplations on the meditation cushion as a path to 'practice what you preach' may divert attention from structural violence in contemporary academia to individual responsibility. In foregrounding such examples in the analysis, I intend to prompt socio-ethical reflexivity about the oft-unacknowledged practical effects of narratives within contemplative science.

I also seek to promote reflexivity about contemplative science's present by shedding light on historical figures expelled from its official historical narrative. Attributing the omission of the Greens to their countercultural bent may help explain why relations between contemplative science and other sciences with a groovy past, such as research on psychedelics (McCray, 2016), have remained rather obscure until today. In light of the "modern renaissance of psychedelic research" (Pollan, 2018, p. 24), psychedelics are often talked about over dinner at contemplative science events, but only seldomly appear in scientific presentations and have neither made it into conference themes or keynotes. Future research could further examine and interpret the hidden or

refuted connections between contemplative science and research on psychedelics (Langlitz, 2013), psychoanalysis (Harrington & Dunne, 2015), and cybernetics (Pickering, 2010). This sort of analysis could also be fruitful for other academic fields. A case in point is Shanley's (2021) alternative historiography of the responsible research and innovation community, which highlights interlinkages with largely forgotten elements in the history of science and technology studies.

Finally, I suggest not only to investigate why certain alternative histories fall into oblivion, but also to explore what renders the official narrative so powerful in building a contemplative science community. Whereas skeptics of Weber's disenchantment thesis wonder why it has been so compelling in the West (Saler, 2006, p. 693), I propose to specify the question and ask: why is the re-enchantment narrative so powerful in areas such as the brain sciences, where disenchantment seems to be realized most industriously? Although this question goes beyond the scope of this case study, I draw on Harrington (2008a) and McMahan (2010) in formulating a tentative hypothesis: re-enchantment may be most vigorously sought after in epistemic cultures where science and technology drastically threaten to subvert what many of us hold dear – moral virtues, free will, and experiences of transcendental significance. It may well be easier to translate agency and experience into neural activation patterns if research makes room for inexplicable, mysterious aspects of our subjectivity.

## REFERENCES

Abir-Am, P. G. (1982). Essay Review: How Scientists View Their Heroes: Some Remarks on the Mechanism of Myth Construction. *Journal of the History of Biology, 15*(2), 281-315. https://doi.org/10.1007/BF00233019

Abir-Am, P. G. (1985). Themes, Genres, and Orders of Legitimation in the Consolidation of New Scientific Disciplines: Deconstructing the Historiography of Molecular Biology. *History of Science, 23*(59), 73-117. https://doi.org/10.1177/007327538502300103

Abir-Am, P. G. (1992). A historical Ethnography of a Scientific Anniversary in Molecular Biology: The First Protein X-Ray Photograph. *Social Epistemology*, *6*(4), 323-354. https://doi.org/10.1080/02691729208578670

Abir-Am, P. G. & Elliot, C. A. (Eds.). (1999). Commemorative Practices in Science: Historical Perspectives on the Politics of Collective Memory. *Osiris, 14*, i-383. University of Chicago Press.

Adamowsky, N. (2010). *Das Wunder in der Moderne. Eine andere Kulturgeschichte des Fliegens* [The Miracle in Modernity. Another Cultural History of Flying]. Wilhelm Fink.

Adamowsky, N. (2015). *The Mysterious Science of the Sea, 1775–1943.* Routledge.

Ames, M. G. (2018). Deconstructing the algorithmic sublime. *Big Data & Society, 5*(1), 1-4. https://doi.org/10.1177/2053951718779194

Ames, M. G. (2019). *The Charisma Machine. The Life, Death, and Legacy of One Laptop per Child.* The MIT Press.

Anderson, W. (2012). Objectivity and its Discontents. *Social Studies of Science, 43*(4), 557-576. https://doi.org/10.1177/0306312712455732

Anshelm, J. (2010). Among Demons and Wizards: The Nuclear Energy Discourse in Sweden and the Re-Enchantment of the World. *Bulletin of Science, Technology, & Society, 30*(1), 43-53. https://doi.org/10.1177/0270467609355054

Badino, M. (2017). Using, Abusing, and Perusing the Past. *Isis, 108*(4), 836-840. https://doi.org/10.1086/695606

Baer, R. A. (2003). Mindfulness Training as a Clinical Intervention: A Conceptual and Empirical Review. *American Psychological Association, 10*, 125-143. https://doi.org/10.1093/clipsy.bpg015

Barbalet, J. (2009). Consciousness, Emotions, and Science. In D. Hopkins, J. Kleres, H. Flam, H. Kuzmics, J. Barbalet, P. Becker, N. Demertzis, K. Döveling, J. Goodman, & A. Russell Hochschild (Eds.), *Theorizing emotions: Sociological explanations and applications* (pp. 39–72). Campus.

Belyaeva, I. G. (2021). The Technical Transformation of the Literary Epigraph. *Technology and Language, 2*(1), 122-133. https://doi.org/10.48417/technolang.2021.01.09

Benson, H. (1975). *The Relaxation Response*. Harper Collins.

Benson, H. (1991). Mind/Body Interactions including Tibetan Studies. In D. Goleman & R. A. F. Thurman (Eds.), *Mind Science: An East-West Dialogue* (pp. 37-50). Wisdom Publications.

Benson, H. (1997). The Biology of Belief. Interview by Allen Gregg. https://www.youtube.com/watch?v=uQAIaVmHyAE&ab_channel=Seipjere.

Benson, H. (2019, November 7). Tracking the Mind-Body Connection. Interview by Margaret Emory. *Brain World Magazine*. https://brainworldmagazine.com/tracking-mind-body-connection-interview-dr-herbert-benson/.

Benson, H., Lehmann, J. W., Malhotra, M. S., Goldman, R. F., Hopkins, J., & Epstein, M. D. (1982). Body Temperature Changes during the Practice of g'Tum-mo Yoga. *Nature, 295*, 234-236. https://doi.org/10.1038/295234a0

Benson, H., Shapiro, D., Tursky, B., & Schwartz, G. E. (1971). Decreased Systolic Blood Pressure through Operant Conditioning Techniques in Patients with Essential Hypertension. *Science, 173*(998), 740-742. https://doi.org/10.1126/science.173.3998.740

Bernstein, A., Vago, D. R., & Barnhofer, T. (2019). Understanding Mindfulness, One Moment at a Time: an Introduction to the Special Issue. *Current Opinion in Psychology, 28*, vi-x. https://doi.org/10.1016/j.copsyc.2019.08.001

Bilgrami, A. (2010). What Is Enchantment? In M. Warner, J. Van Antwerpen, & C. Calhoun (Eds.), *Varieties of Secularism in a Secular Age* (pp. 145-165). Harvard University Press.

Boltanski, L., & Thévenot, L. (2006). *On Justification: Economies of Worth.* Princeton University Press.

Braun, E. (2017). Mindful but Not Religious: Meditation and Enchantment in the Work of Jon Kabat-Zinn. In D. L. McMahan & E. Braun (Eds.), *Meditation, Buddhism, and Science* (pp. 173-197). Oxford University Press.

Brenninkmeijer, J. M. (2013). Brain technologies of the self [Doctoral Thesis, University of Groningen]. University of Groningen.

Campolo, A. & Crawford, K. (2020). Enchanted Determinism: Power without Responsibility in Artificial Intelligence. *Engaging Science, Technology, and Society, 6*, 1-19. https://doi.org/10.17351/ests2020.277

Castle, T. (1995). *The Female Thermometer. Eighteenth-Century Culture and the Invention of the Uncanny*. Oxford University Press.

Charmaz, K. (2006). *Constructing grounded theory*. Sage.

Daston, L. & Park, K. (1998). *Wonders and the Order of Nature 1150–1750*. Zone Books.

Davidson, R. J. (2020, July 22). The Science of Meditation. Interview by Wendy Hasenkamp. *Mind & Life Podcast.* https://podcast.mindandlife.org/richie-davidson/

Davidson, R. J., Goleman, D., & Kabat-Zinn, J. (2009). Friends in Mind, Friends at Heart. Interview by Barbara Gates, Margaret Cullen, and Wes Nisker. *Inquiring Mind, 25*(2). https://www.inquiringmind.com/article/2504_davidson-goleman_kabatzinn/

Davidson, R. J. & Harrington, A. (Eds.). (2002). *Visions of Compassion: Western Scientists and Tibetan.* Oxford University Press.

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., Urbanowski, F., Harrington, A., Bonus, K., & Sheridan, J. F. (2003). Alterations in Brain and Immune Function Produced by Mindfulness Meditation. *Psychosomatic Medicine, 65*, 564-570. https://doi.org/10.1097/01.PSY.0000077505.67574.E3

Davies, S. R. (2014). Knowing and Loving: Public Engagement beyond Discourse. *Science & Technology Studies, 27*(3), 90-110. https://doi.org/10.23987/sts.55316

De La Cadena, M. & Blaser, M. (Eds.). (2018). *A World of Many Worlds.* Duke University Press.

Dewey, J. (1939). *Theory of valuation*. University of Chicago Press.

Dussauge, I., Helgesson, C.-F., Lee, F., & Woolgar, S. (2015). On the Omnipresence, Diversity, and Elusiveness of Values in the Life Sciences and Medicine. In I. Dussauge, C.-F. Helgesson, & F. Lee (Eds.), *Value Practices in the Life Sciences and Medicine* (pp. 1-30). Oxford University Press.

Edwards, L. (2011). Biofeedback, Meditation, and Mindfulness. *Biofeedback, 39*(2), 67-70. https://doi.org/10.5298/1081-5937-39.2.02

Egri, C. P. (1992). Academic Conferences as Ceremonials: Opportunities for Organizational Integration and Socialization. *Journal of Management Education, 16*(1), 90-115. https://doi.org/10.1177/105256299201600107

Ellis, R. (2011). Jizz and the Joy of Pattern Recognition: Virtuosity, Discipline and the Agency of Insight in UK Naturalists' Arts of Seeing. *Social Studies of Science, 41*(6), 769-790. https://doi.org/10.1177/0306312711423432

Farias, M., & Wikholm, C. (2015). *The Buddha Pill. Can Medication Change You?* Watkins.

Fenske, M., & Bendix, J. (2007). Micro, Macro, Agency: Historical Ethnography as Cultural Anthropology Practice. *Journal of Folklore Research, 44*(1), 67-99. http://www.jstor.org/stable/4640221

Fisher, M. (2017). White Corporate Feminine Spirituality: The Rise of Global Professional Women's Conferences in the New Millennium. In H. H. Leivestag & A. Nyqvist (Eds.), *Ethnographies of Conferences and Trade Fairs* (pp. 43-63). Palgrave Macmillan.

Fochler, M. (2016). Variants of Epistemic Capitalism: Knowledge Production and the Accumulation of Worth in Commercial Biotechnology and the Academic Life Sciences. *Science, Technology, & Human Values, 41*(5), 922-948. https://doi.org/10.1177/0162243916652224

Fochler, M., Felt, U., & Müller, R. (2016). Unsustainable Growth, Hyper-Competition, and Worth in Life Science Research: Narrowing Evaluative Repertoires in Doctoral and Postdoctoral Scientists' Work and Lives. *Minerva, 54*, 175-200. https://doi.org/10.1007/s11024-016-9292-y

Frankel, B. & Abir-Am, P. G. (1992). Historical ethnography as a way of knowing (with response). *Social Epistemology, 6*(4), 355-364. https://doi.org/10.1080/02691729208578671

Friese, H. (2001). Thresholds in the Ambit of Discourse: On the Establishment of Authority at Academic Conferences. In P. Becker & W. Clark (Eds.), *Little Tools of Knowledge: Historical Essays on Academic and Bureaucratic Practices* (pp. 285-312). University of Michigan Press.

Goleman, D. & Davidson, R. J. (2017). *Altered Traits. Science Reveals How Meditation Changes Your Mind, Brain, and Body*. Avery.

Green, E. E. & Green, A. M. (1977). *Beyond Biofeedback.* Delacorte Press.

Hamilton, S. N. (2017). The Charismatic Cultural Life of Cybernetics: Reading Norbert Wiener as Visible Scientist. *Canadian Journal of Communication, 42*(3), 407-429. https://doi.org/10.22230/cjc.2017v42n3a3205

Harrington, A. (1996). *Reenchanted Science: Holism in German Culture from Wilhelm II to Hitler*. Princeton University Press.

Harrington, A. (2008a). Buddhist Brains: A Case Study in the Reenchantment of the Brain Sciences. *Philoctetes: The Journal of the Multidisciplinary Study of Imagination 3*. http://nrs.harvard.edu/urn-3:HUL.InstRepos:3996840.

Harrington, A. (2008b). *The Cure Within. A History of Mind-Body Medicine.* W. W. Norton.

Harrington, A. & Dunne, J. D. (2015). When Mindfulness is Therapy: Ethical qualms, Historical Perspectives. *American Psychologist, 70*(7), 621-631. https://doi.org/10.1037/a0039460

Harrington, A. & Zajonc, A. (Eds.). (2006). *The Dalai Lama at MIT*. Harvard University Press.

Hartley, I. & Hartley, E. (1975). *Biofeedback: The Yoga of the West*. Hartley Productions.

Hartman, I. (2016, June 22). *"The Yoga of the West": Biofeedback, Transpersonal Psychology, and the Making of the Quantified Self* [Conference presentation]. Society for the History of Technology, Singapore.

Hasenkamp, W. & White, J. R. (Eds.). (2017). *The Monastery and the Microscope* Yale University Press.

Hasse, C. (2022). Language and Robots: from Relations to Processes of Relations. *Technology and Language, 3*(1), 127-135. https://doi.org/10.48417/technolang.2022.01.12

Heaney, K. (2018, August 9). World's Top Empathy Researcher Revealed As a Bully. *The Cut.* https://www.thecut.com/2018/08/worlds-top-empathy-researcher-revealed-as-a-bully.html.

Henderson, E. F. (2020). *Gender, Definitional Politics and 'Live' Knowledge Production. Contesting Concepts at Conferences.* Routledge.

Hermann, A. (2011). Buddhist Modernism in 19th Century Siam and the Discourse of Scientific Buddhism: Towards a Global History of 'Religion.' *South and Southeast Asia Culture and Religion Journal, 5*, 33-56.

Heß, M. (2021). Politics of Usernames. *Technology and Language, 2*(4), 144-167. https://doi.org/10.48417/technolang.2021.04.10

Heuts, F. & Mol, A. (2013). What Is a Good Tomato? A Case of Valuing in Practice. *Valuation Studies, 1*(2), 125-146. https://doi.org/10.3384/vs.2001-5992.1312125

Horowitz, S. (1999). Rehabilitation Medicine. The Mainstreaming of a More Holistic Approach. *Alternative Complementary Therapies 5*, 12-17. http://doi.org/10.1089/act.1999.5.12

Houshmand, Z., Harrington, A., Saron, C., & Davidson, R. J. (2002). Training the Mind: First Steps in a Cross-Cultural Collaboration in Neuroscientific Research. In R. J. Davidson & A. Harrington (Eds.), *Visions of Compassion. Western Scientists and Tibetan Buddhists Examine Human Nature* (pp. 3-17). Oxford University Press.

Islam, G. (2014). Charisma as Re-enchantment: Leadership, Emancipation, and the Rejuvenation of Institutions. *International Leadership Journal, 6*(3), 116-131.

Jagd, S. (2011). Pragmatic sociology and competing orders of worth in organizations. *European Journal of Social Theory, 14*(3), 343-359. https://doi.org/10.1177/1368431011412349

Kabat-Zinn, J. (1990). *Full catastrophe living.* Delacorte.

Kabat-Zinn, J. (1993). Bringing Mindfulness into the Mainstream of America. Interview by Barbara Gates and Wes Nisker. *Inquiring Mind, 10*(1). https://www.inquiringmind.com/article/1001_8_kabat-zinn/.

Kabat-Zinn, J. (1994). *Wherever you go there you are: Mindfulness Meditation in Everyday Life.* Hachette Books.

Kabat-Zinn, J. (2005). *Coming to Our Senses: Healing Ourselves and the World through Mindfulness.* Hyperion Books.

Kabat-Zinn, J. (2010, September 8). Toward a Mindful Society. Interview by Barry Boyce. *Mindful, healthy mind, healthy life.* https://www.mindful.org/toward-a-mindful-society/

Kabat-Zinn, J. (2011). Some Reflections on the Origins of MBSR, Skillful Means, and the Trouble with Maps. *Contemporary Buddhism, 12*(1), 281-306. https://doi.org/10.1080/14639947.2011.564844

Kabat-Zinn, J. (2019). Foreword: Seeds of a Necessary Global Renaissance in the Making: the Refining of Psychology's Understanding of the Nature of Mind, Self, and Embodiment through the Lens of Mindfulness and its Origins at a Key Inflection

Point for the Species. *Current Opinion in Psychology, 28*, xi-xvii. https://doi.org/10.1016/j.copsyc.2019.02.005.

Kaiser, D. (2011). *How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival*. W. W. Norton & Company.

Kaiser, D. & McCray, W. P. (Eds.). (2016). *Groovy Science: Knowledge, Innovation, and American Counterculture*. University of Chicago Press.

Kjelberg, H., Mallard, A., Arjaliès, D.-L., Aspers, P., Beljean, S., Bidet, A., Corsin, A., Didier, E., Fourcade, M., Geiger, S., Hoeyer, K., Lamont, M., MacKenzie, D., Maurer, B., Mouritsen, J., Sjögren, E., Tryggestad, K., Vatin, F., & Woolgar, S. (2013). Valuation Studies? Our Collective Two Cents. *Valuation Studies, 1*(1), 11-30. https://doi.org/10.3384/vs.2001-5992.131111

Komjathy, L. (2018). *Introducing Contemplative Studies.* Wiley Blackwell.

Kornblum, W. (2004). Discovering Ink: A Mentor for an Historical Ethnography. *The Annals of the American Academy of Political and Social Science, 595*(1), 176-189. https://doi.org/10.1177/0002716204267484

Kucinskas, J. (2018). *The Mindful Elite. Mobilizing from the Inside Out.* Oxford University Press.

Ladkin, D. (2006). The Enchantment of the Charismatic Leader: Charisma Reconsidered as Aesthetic Encounter. *Leadership, 2*(2), 165-179. https://doi.org/10.1177/1742715006062933

Landy, J. & Saler, M. (Eds.). (2009). *The Re-Enchantment of the World. Secular Magic in a Rational Age.* Stanford University Press.

Langer, E. J. & Ngnoumen, C. T. (2018). Mindfulness. In D. S. Dunn (Ed.), *Positive psychology: Established and emerging issues* (pp. 97-111). Routledge.

Langlitz, N. (2013). *Neuropsychedelia. The Revival of Hallucinogen Research since the Decade of the Brain.* University of California Press.

Latour, B. (1993). *We have never been modern.* (C. Porter, trans). Harvard University Press.

Lee, R. L. M. (2020). Charisma and the Digital Age. Mass Re-enchantment Online and Networking the New Iron Cage. In J. P. Zúquete (Ed.), *Routledge International Handbook of Charisma* (pp. 457-467). Routledge.

Lengwiler, M. (2006). Research Cooperation. Between charisma and heuristics: four styles of interdisciplinarity. *Science and Public Policy, 33*(6), 423-434. https://doi.org/10.3152/147154306781778821

Loizzo, J. (2014). Meditation research, past, present, and future: perspectives from the Nalanda contemplative science tradition. *Annals of the New York Academy of Sciences, 1307*, 43-54. https://doi.org/10.1111/nyas.12273

Lomnitz, L. (1983). The Scientific Meeting: An Anthropologist's Point of View. *4S Review, 1*(2), 2-7.

Lopez, D. S. (2008). *Buddhism and Science: A Guide for the Perplexed.* University of Chicago Press.

Lukas, W. (2020). The Mindful Researcher: Transforming Academia from Within. https://www.contemplativecollaboration.org/2020/11/09/the-mindful-researcher-transforming-academia-from-within/

Lutz, A., Dunne, J. D., & Davidson, R. J. (2006). Meditation and the Neuroscience of Consciousness: An Introduction. In P. D. Zelazo, M. Moscovitzh, & E. Thompson (Eds.), *The Cambridge Handbook of Consciousness* (pp. 497-550). Cambridge University Press.

Lutz, A., Greischar, L. L., Rawlings, N. B., Ricard, M., & Davidson, R. J. (2004). Long-term Meditators Self-induce High-amplitude Gamma Synchrony during Mental Practice. *Proceedings of the National Academy of Sciences, 101*, 16369-16373. https://doi.org/10.1073/pnas.0407401101.

Lysen, F. (2022). *Brainmedia: One Hundred Years of Performing Live Brains, 1920–2020*. Bloomsbury Academic.

MacKenzie, D. (2008). *An Engine, Not a Camera: How Financial Models Shape Markets.* MIT Press.

MacKenzie, D & Elzen, B. (1996). The Charismatic Engineer. In D. MacKenzie (Ed.). *Knowing Machines. Essays on Technical Change* (pp. 131–158). MIT Press.

MacPherson, S., & Rockman, P. (2019, July 2). A Mindful Response to Ronald Purser. *Centre for Mindfulness Studies*. https://www.mindfulnessstudies.com/mindfulness-response-2019/

McCray, W. P. (2016). Timothy Leary's Transhumanist SMI2LE. In D. Kaiser & W. P. McCray (Eds.), *Groovy Science: Knowledge, Innovation, and American Counterculture* (pp. 238-269). University of Chicago Press.

McMahan, D. L. (2009). *The Making of Buddhist Modernism.* Oxford University Press.

McMahan, D. L. (2010). Buddhism as the 'Religion of Science': From Colonial Ceylon to the Laboratories of Harvard. In J. R. Lewis & O. Hammer (Eds.), *Handbook of Religion and the Authority of Science* (pp. 117-140). Brill.

Mind & Life Institute. (2020a). Our Vision for Humanity. https://media.mindandlife.org/email/Mind_&_Life_-_Our_Vision_for_Humanity.pdf.

Mind & Life Institute. (2020b). Summer Research Institute. https://www.mindandlife.org/events/summer-research-institute/.

Mind & Life Europe. (n.d.). MLE Values. https://www.mindandlife-europe.org/about-us/mle-values/.

Miller, D. P. (2004). Review: Absolutely Fabulous History of Science? *Social Studies of Science, 34*(3), 453-459. https://doi.org/10.1177/0306312704042094.

Mody, C. C. (2012). Conferences and the Emergence of Nanoscience. In B. H. Harthon & J. W. Mohr (Eds.), *The Social Life of Nanotechnology* (pp. 52–65). Routledge.

Mody, C. C. (2017). *The Long Arm of Moore's Law. Microelectronics and American Science.* MIT Press.

Mody, C. C., Sibum, H. O., & Roberts, L. L. (2020). Integrating Research Integrity into the History of Science. *History of Science, 58*(4), 369-385. https://doi.org/10.1177/0073275320952257

Molyneux-Hodgson, S., & Meyer, M. (2009). Tales of Emergence – Synthetic Biology as a Scientific Community in the Making. *Biosocieties, 4*(2-3), 129-145. https://doi.org/10.1017/S1745855209990019

Morita, A. (2017). Encounters, Trajectories, and the Ethnographic Moment: Why "Asia as Method" Still Matters. *East Asian Science, Technology and Society: An International Journal, 11*(2), 239-250. https://doi.org/10.1215/18752160-3825820

Morrison, M. (2018). Making Cells Worthwhile: Calculations of Value in a European Consortium for Induced Pluripotent Stem Cell Banking. *Science as Culture, 28*(1), 46-69. https://doi.org/10.1080/09505431.2018.1538331

Mosco, V. (2005). *The Digital Sublime: Myth, Power, and Cyberspace.* The MIT Press.

Moulinet, I., Touron, E., & Chételat, G. (2018). La meditation dans le vieillissement: impact sur le bien-être, la cognition et le cerveau de la personne âgée. *Revue de neuropsychologie, 10*, 304-312. https://doi.org/10.3917/rne.104.0304

Nair, D. (2021). "Hanging Out" while Studying "Up": Doing Ethnographic Fieldwork in International Relations. *International Studies Review, 23*(4), 1300-1327. https://doi.org/10.1093/isr/viab001

Nordmann, A. (2020). The Grammar of Things. *Technology and Language, 1*(1), 85-90. https://doi.org/10.48417/technolang.2020.01.18

Nordmann, A. & Bylieva, D. (2021). In the Beginning was the Word. *Technology and Language, 2*(1), 1–11. https://doi.org/10.48417/technolang.2021.01.01

Nordmann, A. & Schwarz, A. (2012). Lure of the 'Yes': The Seductive Power of Technscience. In M. Kaiser, M. Kurath, S. Maasen, & C. Rehmann-Sutter (Eds.). *Governing Future Technologies: Nanotechnology and the Rise of an Assessment Regime* (pp. 255-278). Springer.

O'Kane, C., Mangematin, V., Zhang, J. A., & Cunningham, J. A. (2020). "How university-based principal investigators shape a hybrid role identity." *Technological Forecasting & Social Change, 159*, 120-179. https://doi.org/10.1016/j.techfore.2020.120179

Olazaran, M. (1996). A Sociological Study of the Official History of the Perceptrons Controversy. *Social Studies of Science, 26*(3), 611-659. https://doi.org/10.1177/030631296026003005

Owen, A. (2004). *The Place of Enchantment. British Occultism and the Culture of the Modern.* University of Chicago Press.

Parks, P. A., Nichols, J., & Parks, S. B. (2020). Contributions of Elmer and Alyce Green to Neurofeedback and the Science of Human Consciousness. In J. R. Evans, M. B. Dellinger, & H. L. Russell (Eds.), *Neurofeedback* (pp. 169-182). Academic Press.

Parsons, T. (Ed.). (1946). *Max Weber: The Theory of Social and Economic Organization.* (A. M. Henderson & T. Parsons, trans.). Oxford University Press.

Patriotta, G., Gond, J.-P., & Schultz, F. (2011). Maintaining Legitimacy: Controversies, Orders of Worth, and Public Justifications. *Journal of Management Studies, 48*(8), 1804-1836. https://doi.org/10.1111/j.1467-6486.2010.00990.x

Pickering, A. (2010). *The Cybernetic Brain. Sketches of Another Future.* University of Chicago Press.

Pollan, M. (2018). *How to Change Your Mind. What the New Science of Psychedelic Teaches Us About Consciousness, Dying, Addiction, Depression, and Transcendence.* Penguin Press.

Porter, T. (1995). *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life.* Princeton University Press.

Purser, R. E. (2019). *McMindfulness: How Mindfulness Became the New Capitalist Spirituality.* Repeater.

Purser, R. E., Forbes, D., & Burke, A. (Eds.). (2016). *Handbook of Mindfulness. Culture, Context, and Social Engagement*. Springer.

Purser, R. E. & Loy, D. (2013, July 1). Beyond McMindfullness. *HuffPost.* https://www.huffpost.com/entry/beyond-mcmindfulness_b_3519289.

Reichle, F. (2004). *Monte Grande – What is Life?* Icarus Films.

Reinecke, J., Van Bommel, K., & Spicer, A. (2017). When Orders of Worth Clash: Negotiating Legitimacy in Situations of Moral Multiplexity: Contributions from French Pragmatist Sociology. *Research in the Sociology of Organization, 52,* 33-72. https://doi.org/10.1108/S0733-558X20170000052002

Repetti, R. (2016). Meditation Matters: Replies to the Anti-McMindfulness Bandwagon! In R. E. Purser, D. Forbes, & A. Burke (Eds.), *Handbook of Mindfulness. Culture, Context, and Social Engagement* (pp. 473–494). Springer.

Richmond, M. L. (2006). The 1909 Darwin Celebration: Reexamining Evolution in the Light of Mendel, Mutation, and Meiosis. *Isis, 97*(3), 447-484. https://doi.org/10.1086/508076

Robbins, J. (2000). *A Symphony in the Brain: The Evolution of the New Brain Wave* Groove Press.

Saler, M. (2006). Modernity and Enchantment: A Historiographic Review. *The American Historical Review, 111*(3), 692–716. https://doi.org/10.1086/ahr.111.3.692

Sandler, J. & Thedvall, R. (Eds.). 2017. *Meeting Ethnography. Meetings as Key Technologies of Contemporary Governance, Development, and Resistance* Routledge.

Shanley, D. (2021). Imagining the Future through Revisiting the Past: the Value of History in Thinking about R(R)I's Possible Future(s). *Journal of Responsible Innovation, 8*(2), 234-253. https://doi.org/10.1080/23299460.2021.1882748

Shanley, D. (2022). Making Responsibility Matter: The Emergence of Responsible Innovation as an Intellectual Movement [Doctoral Thesis, Maastricht University]. Maastricht University. https://doi.org/10.26481/dis.20221208ds

Shapin, S. (1998). The Philosopher and the Chicken: On the Dietetics of Disembodied Knowledge. In C. Lawrence & S. Shapin (Eds.). *Science Incarnate. Historical Embodiments of Natural Knowledge* (pp. 21–50). The University of Chicago Press.

Shapin, S. (2010). *The Scientific Life: A Moral History of a Late Modern Vocation.* University of Chicago Press.

Stephens, N. & Dimond, R. (2016). Debating CRISPR/cas9 and Mitochondrial Donation: Continuity and Transition Performances at Scientific Conferences. *Engaging Science, Technology, and Society, 2,* 312-321. https://doi.org/10.17351/ests2016.80

Strathern, M. (1991). *Partial Connections.* Altamira Press.

Sutcliffe, S. (2003). Category Formation and the History of 'New Age'. *Culture and Religion, 4*(1), 5-29. https://doi.org/10.1080/01438300302814

Taylor, C. (2011). Disenchantment—Reenchantment. In G. Levine (Ed.). *The Joy of Secularism. 11 Essays for How We Live Now* (pp. 57-73). Princeton University Press.

Thompson, E. (2004). Life and mind: From autopoiesis to neurophenomenology. A tribute to Francisco Varela. *Phenomenology and the Cognitive Sciences, 3*, 381-398, https://doi.org/10.1023/B:PHEN.0000048936.73339.dd

Thompson, E. (2016). Introduction to the Revised Edition. In F. J. Varela, E. Thompson, & E. Rosch (Eds.), *The Embodied Mind. Cognitive Science and Human Experience* (pp. xvii-xxxiii). MIT Press.

Thompson, E. (2020a). *Why I Am Not a Buddhist.* Yale University Press.

Thompson, E. (2020b, August 19). Expanding Our View of the Mind. Interview by Wendy Hasenkamp. *Mind & Life Podcast*. https://podcast.mindandlife.org/evan-thompson/.

Thorpe, C. & Shapin, S. (2000). Who Was J. Robert Oppenheimer? Charisma and Complex Organization. *Social Studies of Science, 30*(4), 545-590. https://doi.org/10.1177/030631200030004003

Tøllefsen, I. B. (2014). Transcendental Meditation, the Art of Living Foundation, and Public Relations. In J. R. Lewis & J. A. Petersen (Eds.), *Controversial New Religions* (pp. 159-175). Oxford University Press.

Treitel, C. (2004). *A Science for the Soul: Occultism and the Genesis of the German Modern.* John Hopkins University Press.

Tresch, J. (2012). *The Romantic Machine. Utopian Science and Technology after Napoleon*. University of Chicago Press.

Tresch, J. (2013). Experimental Ethics and the Science of the Meditating Brain. In F. Ortega & F. Vidal (Eds.), *Neurocultures. Glimpses into an Expanding Universe* (pp. 49-68). Peter Lang.

Trimble, W. (2020). Brains Situated, Active, and Strange: Neurosurgical Magnification and Physicalism's Aesthetic Consequences. In A. Friedrich, P. Gehring, C. Hubig, A. Kaminski, & A. Nordmann (Eds.), *Jahrbuch Technikphilosophie, Vol. 6* (pp. 101–116). Nomos.

Turner, F. (2008). *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network and the Rise of Digital Utopianism.* University of Chicago Press.

Van Dam, N. T., Van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., Meissner, T., Lazar, S. W., Kerr, C. E., Gorchov, J., Fox, K. C. R., Field, B. A., Britton, W. B., Brefczynski-Lewis, J. A., & Meyer, D. E. (2018). Mind the Hype: A Critical Evaluation and Prescriptive Agenda for Research on Mindfulness and Meditation. *Perspectives on Psychological Science, 13*(1), 36-61. https://doi.org/10.1177/1745691617709589

Van De Werff, T. (2018). Practicing the plastic brain: Popular neuroscience and the good life. [Doctoral Thesis, Maastricht University]. Maastricht University. https://doi.org/10.26481/dis.20180516tw

Varela, F. J. (1996). Neurophenomenology. A Methodological Remedy for the Hard Problem. *Journal of Consciousness Studies, 3*(4), 330-349.

Varela, F. J. (2000, May 21-24). Interview with Francisco Varela. Interview by Philipp D. Clayton. *Science and the Spiritual Quest II*.

Varela, F. J., Thompson, E., & Rosch, E. (1991). *The Embodied Mind. Cognitive Science and Human Experience.* MIT Press.

Vaughen, D. (2004). Theorizing Disaster: Analogy, Historical Ethnography, and the Challenger Accident. *Ethnography, 5*(3), 315-347. https://doi.org/10.1177/1466138104045659

Verran, H. (2001). *Science and an African Logic*. University of Chicago Press.

Wagner, P. M. (1993). *Healing and the Mind*. David Grubins Productions.

Wallace, R. K. & Benson, H. (1972). The Physiology of Meditation. Is the Meditative State that is Achieved by Yogis and other Far Eastern Mystics Accompanied by Distinct Physiological Changes? A Study of Volunteer subjects in the U.S. Indicates that it is. *Scientific American, 226*, 84-91. https://www.scientificamerican.com/article/the-physiology-of-meditation/

Walsh, L. (2013). *Scientists as Prophets. A Rhetorical Genealogy*. Oxford University Press.

Weber, M. (1958). Science as Vocation. *Daedalus, 81*(1), 111–134. (Original work published 1918)

Weber, M. (1968). *Economy and Society: An Outline of Interpretive Sociology*. Bedminster. (Original work published 1922)

White, C. (2014). Seeing Things: Science, the Fourth Dimension, and Modern Enchantment. *American Historical Review, 119*(5), 1466-1491. https://doi.org/10.1093/ahr/119.5.1466

Willmott, H. (2018). Madness and Mindfulness: How the 'Personal' Is 'Political'. In S. Stanley, R. E. Purser, & N. N. Singh (Eds.), *Handbook of Ethical Foundations of Mindfulness* (pp. 259–284). Springer.

Wilson, A. (2017). Viewpoint: Science's Imagined Past. *Isis, 108*(4), 814-826. https://doi.org/10.1086/695603.

Wonfor, G. & Smeaton, B. (1995). *The Beatles Anthology*. Apple Corps.

Yamaguchi, T. & Suda, F. (2010). Changing Social Order and the Quest for Justification: GMO Controversies in Japan. *Science, Technology & Human Values, 35*(3), 382-407. https://doi.org/10.1177/0162243909345837

Žižek, S. (2001). From Western Marxism to Western Buddhism. *Cabinet Magazine* 2. http://www.cabinetmagazine.org/issues/2/western.php

**СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR**

Марейке Смолка, mareike.smolka@humtec.rwth-aachen.de, ORCID: 0000-0002-0343-0888

Mareike Smolka, mareike.smolka@humtec.rwth-aachen.de, ORCID: 0000-0002-0343-0888

Статья поступила 9 октября 2022
одобрена после рецензирования 14 декабря 2022
принята к публикации 15 декабря 2022

Received: 09 October 2022
Revised: 14 December 2022
Accepted 15 December 2022

https://doi.org/10.48417/technolang.2022.04.06
Research article

# Father Christmas: Magic and Technology

Daria Bylieva (✉) and Anton Zamorev
Peter the Great St.Petersburg Polytechnic University, Polytechnicheskaya, 29,
St.Petersburg, 95251, Russia
bylieva_ds@spbstu.ru

## Abstract

Father Christmas is the last generally accepted domain of belief in miracles in today's world. Focused on his two most important functions, which are to collect children's wishlists and deliver presents in a single night, Santa Claus almost from the very start has used not only magic tricks, but has also adopted technologies from people. These technologies (like snail mail or sleigh), however, now seem outdated. In this study we examined hundreds of examples (postcards, films, tales, toys, games, etc.) demonstrating the use of new technologies by Santa Claus, Papá Noel, or Ded Moroz. In the 20th century the image of the wizard is often used to showcase the latest technology. The new trend to attribute Father Christmas's magical powers both in popular culture and by scientists to the use of uber-complex technologies both real-life and science fiction (drones, tensor cores, ion-shield of charged particles, curvature of the space-time continuum, etc.) is an interesting feature of today's technology-driven society. The article suggests that the emergence of the need to deprive even Father Christmas of magic can be accounted for by a simplification of cultural views, a departure from symbolic/figurative interpretation and an emergence of “post-logical” thinking that is unable to derive meaning from a magical story.

**Keywords:** Santa Claus; Father Christmas; Magic; Technology; Wizard; Belief; Mass culture; Fairy-tale; Science

**Acknowledgment:** The authors wish to thank Ms. Anna Lisitsyna for her help in translating the paper into English.

**Citation:** Bylieva, D. & Zamorev, A. (2022). Father Christmas: Magic and Technology. *Technology and Language*, *3*(4), 76-89. https://doi.org/10.48417/technolang.2022.04.06

УДК 13
https://doi.org/10.48417/technolang.2022.04.06
Научная статья

# Рождественский дед: Волшебство и технологии

Дарья Быльева (✉) и Антон Заморев
Санкт-Петербургский политехнический университет Петра Великого,
Политехническая, 29, 195251, Санкт-Петербург, Россия
bylieva_ds@spbstu.ru

**Аннотация**

Рождественский дед является последним островком веры в чудесное, оставшимся в современном мире. Практически изначально для выполнения двух главных функций: собрать письма с пожеланиями детей о новогодних подарках и раздать подарки детям в течение одной ночи, Санта Клаус не ограничивается магическими артефактами, а использует людские технологии, которые, однако, современному человеку кажутся устаревшими. В работе проанализировано несколько сотен примеров использовании новых технологий Санта Клаусом/Пер Ноэлем/Дедом Морозом (в открытках, фильмах, сказках, игрушках, играх и т.п.). В XX веке образ волшебника часто используется для демонстрации новейших технологий, чтобы “блеснуть” новыми возможностями перед стариной. Новая тенденция объяснения магических способностей Рождественского Деда как в массовой культуре, так и учеными использованием суперсложных технологий, как реально существующих, так и научно-фантастических (дроны, тензорные ядра, ионный экран из заряженных частиц, искривление пространственно-временного континуума и т.п.) – интересная черта современной техногенной цивилизации. Является ли данная тенденция свидетельством возрастающей рациональности, или, наоборот, симптомом упадка логического мышления? В статье высказывается предположение, что потребность лишить магии даже Деда Мороза можно объяснить упрощении культурных представлений, уходом от символически-образной интерпретации и формированием постлогического мышления, теряющего способность извлекать смысл сказочного сюжета.

**Ключевые слова:** Санта Клаус; Дед Мороз; Магия; Технологии; Волшебник; Вера; Массовая культура; Сказка; Наука

**Благодарность:** Авторы благодарят Анну Лисицыну за помощь в переводе статьи на английский язык.

**Для цитирования:** Bylieva, D. & Zamorev, A. Father Christmas: Magic and Technology // Technology and Language. 2022. № 3(4). P. 76-89. https://doi.org/10.48417/technolang.2022.04.06

## INTRODUCTION

The character of Father Christmas or Father Frost is one of the most significant mythical figures in the modern world. As early as 1959, J. Shlien suggested that the American Santa Claus may be the most sacred folk hero after Christ. Russian Ded Moroz (Father Frost) is a part of just New Year's holiday celebration and therefore can easily enter homes of people of any religion or none. But even for those who associate Father Frost with Christmas, he remains a generally accepted secular symbol of the festive season. In this age of technology, to believe in him is one of the few universally allowed forms of belief. In fact, it can hardly be called “belief” in the full sense of the word. Rather, it is a sort of indulgent *“*permission to believe*”* given to the younger ones. Still, many authors say that there are great similarities between belief in Santa Claus and belief in God (Larivée, Sénéchal, & Baril, 2010; McGowan, 2007; Verba, 1996).

Given all the effort and investment put into this project, it seems that the preservation of this last remaining tiny piece of belief *in miracles* is somehow important. And it cannot be down to just commercial pressures alone, although these do play a significant role and are seen by many as the opposite of spiritual values. Following Belk's (1987) lead, Batinga et al. (2017) refer to Santa Claus as the *“*god of materialism” (p. 564), if for no other reason than Christmas spending accounting for around a third of the annual retail turnover in many Western economies (Hancock & Rehn, 2011, p. 738). However, the boom of Christmas season consumption alone is not enough to justify the existence of the Winter Wizard. For some reason, people wish to keep children's belief in miracles intact, although some authors tend to place a greater focus on the development of disbelief in Santa Claus as a “rite of passage” (Breen, 2004; Dushechkina, 2001) or transition from ignorance to scepticism (Lévi-Strauss, 1993).

Although the origins of the winter gift-bringer figure vary across nations, today's Santa Claus (Ded Moroz, Papá Noel) is quite an independent character enjoying integration in people's lives to as high a degree as conceivably possible for a magical creature in the age of technology. During the festive season, you cannot avoid coming into contact with this famous character, be it at children's centres, theatres, shops, in the street – or just on television and online (at least when exposed to advertising).

## MAGIC AND TECHNOLOGY

Magic and technology can be thought of as alternative ways of achieving complicated goals. To the uninitiated, there is no difference between the two at all. Just like the magic apple from the Russian fairy tale that rolled on the saucer enabling the owner to see what was going on in far off lands, modern web cameras, television, etc. can be used to the same effect. Indeed, why would a girl from the tale need all these gadgets, if her apple works just as well?

Father Christmas is not only the most well-known magical character. He is also the one who most actively interacts with people rather than being just a tokenistic element of *holiday celebration*. Significantly, almost from the very start, he adopts certain technologies that are useful to people and therefore does not confine himself only to magic tricks to solve his complicated communication and logistics tasks. Technology

helps Father Christmas perform two functions which are the most important (as they involve direct communication with children): collect children's wishlists and deliver all their presents in just one night.

However, in this age of accelerating life-changing breakthroughs, technologies like snail mail or sleigh look archaic. Theoretically, as the embodiment of traditions, Father Christmas could just as well stay old-fashioned, but our study shows that technology is aggressively imposed on him. We examined about one thousand pieces of items and materials (postcards, films, tales, toys, games, etc.) demonstrating the use of new technologies by Santa Claus, Ded Moroz and other national Christmas characters.

Apart from the key functions, technology helps Father Christmas carry out supplementary duties: reveal the well behaved and naughty children (tracking cameras, high-tech crystal balls, etc.), manufacture gifts (production facilities with higher or lower technological capacity), protect his place of residence from detection. There are also a number of optional technologies such as an air-filled dome to breathe underwater and a wind tunnel ("The Secret World of Santa Claus-1", 1998), automated doors ("The Santa Clause", 2006), machine voice translation from reindeer language ("Saving Santa", 2013), night vision goggles to navigate the house ("Arthur Christmas", 2011) as well as all sorts of household gadgets commonly used by people (a television, headphones, an electric guitar, a phone, a laptop, etc.).

Furthermore, Father Christmas must keep abreast of modern technological developments as many of them are required for the presents demanded by children. Even in a late-nineteenth century illustration we can see a bicycle among the toys that Saint Nicholas is about to give to children (Perrot, 1994, p. 128).

We can also note a special Christmas mood created by an array of lights switching on as Santa trucks carrying soft-drink bottles drive past, as shown in iconic adverts (1995–2018) by the beverage company credited for popularizing a world-famous image of Santa Claus.

## Technology in Communication with Children

Santa Claus's first task to collect children's letters is also the least supernatural of all (apart from the task of reading all those letters). Accordingly, technology which helps the Christmas character in this matter develops in line with the latest communication innovations in the human world.

In a 1889 drawing by Thomas Nast – the cartoonist who is remembered as the creator of a meticulously detailed image of the mythic figure – we see Santa Claus reading the letters which the children sent. However, mail is not the only possible way of delivering letters from kids – there are dozens of others, ranging from traditional Scandinavian snowball lanterns (structures made of tightly packed snowballs with a candle inside) to one of the latest Russian traditions of putting the letter into the freezer. Still, delivery by mail remains the most popular method.

In the 1950s, some children in France received letters signed by Père Noël. This was the personal initiative of postal clerks who had instruction to discard letters to an incorrect addressee, but scruples to do so. In 1962, a dedicated Santa's Secretariat of the French post office started responding to all letters to Father Christmas, no matter what

address was indicated on the envelope (De la Ville & Georget, 2015), and in Canada a similar service was created in 1974. Today, letters from the Winter Wizard can come not only in France and Canada, but also in Germany, Austria, Belarus, Finland, USA and other countries.

The telephone became a new means of communication with Father Christmas with the advent of the phone era. Thus, organisations emerged that would provide the phone number of the magical old man and employ switchboard operators or establish an appropriate automated answering service. In 1955, due to an error, an advertisement encouraging children to call Santa Claus included the phone number of U.S. Air Force Continental Air Defense Command (the ancestor of today's NORAD). Thus the annual NORAD tracking of Santa's sleigh originated (Faubert, 2005).

E-mail as a new communication tool was not lost upon Father Christmas as well. Unlike ordinary letters that can be sent to any address, the wrong address of an e-mail recipient can be spotted immediately. Today, e-mail correspondence complements rather than replaces handwritten letters. For example, in 2012 as many as 1,700,000 letters and 200,000 e-mail messages to Père Noël were received by the French team (De la Ville & Georget, 2015, p. 197).

At the beginning of the 21st century, as social media began to take over the world, most Christmas characters set up their own account. As a way of distinguishing themselves from fake profiles, winter wizards used a validated account. Soon after, technology went further and allowed children to use the benefits of video conferencing, so that now they can make a video-call to Father Christmas. The service is available on the market and featured in films such as "PAW Patrol" (2017).

## Technology in Logistics

Father Christmas traditionally used animal-drawn transport. The Russian Ded Moroz journeys in a "troika," or sleigh pulled by three horses running side by side. The American Santa Claus and the Finnish Joulupukki fly through the sky in a sleigh pulled by reindeer while the Norwegian Julenissen uses foxes instead. The French Père Noël, the Chinese Shengdan Laoren and the Uzbek Qorbobo ride a donkey whereas the Dutch Sinterklaas has a horse.

Unlike Santa's magic sleigh, Ded Moroz's "troika" was a common mode of transportation in Russia. And the Slavic hero often used other vehicles as well (for example skis, a car, a train, a motorbike, an aircraft, etc.) In Soviet-era cartoons Ded Moroz was regularly provided with a car and a snowman driver ("When They Light the New Year Trees" (1950), "Father Frost and the Grey Wolf" (1978)).

Some early-twentieth century postcards show Father Christmas sitting in a car (at the wheel or next to a driver) or driving a train, flying an airplane (fig. 1).


**Figure 1**. New Santa Claus transport (John Winson, 1913)

Soviet-era postcards portray the Russian equivalent of Father Christmas riding a sputnik or a nuclear-powered icebreaker. In the “Grandfather Frost and Summer” cartoon (1969) Ded Moroz embarks on a journey to find out what summer is, and in the process gets exposed to children's comfortable ways of lifewhere public transportation, refrigerators for ice-cream, and other technologies are widely used (fig. 2). Both summer and sputniks are apparently of no use to Ded Moroz, but such examples make it clear that people at that stage wished to demonstrate their Inventions to the Winter Wizard in order to impress him by showcasing their technological capabilities.

**Figure 2.** Frame from the cartoon *Grandfather Frost and Summer* (1969)

The tradition of showcasing the latest innovations and offering them to Father Christmas is taken up by today's TV adverts. The magical character is most often engaged by vehicle producers (primarily car-makers, but also manufacturers of snowmobiles or off-road vehicles), airlines and telecommunication companies. Sometimes advertisers employ the image of Santa to promote gift ideas (for example, GameStop ran a TV commercial with Santa advertising its video games). The key message of 21st century advertising is: “Santa Claus needs to change his look and lifestyle, as people are ready to

offer him something better than he already has." This idea is perfectly conveyed in the advert with the tagline: "Progress is rewriting your own story," which shows the big man adopting a workout regime, shedding weight, taking on a modern look and getting a sports car as a gift (fig. 3, Audi Presents: New Santa, 2018).

Not only does the early 21st century inviteSanta Claus to use aircrafts, helicopters, aerosledges, rocket engines, etc. and sophisticated built-in computer equipment, but it also envisages technologies that would help the Christmas hero accomplish his mission. What we are referring here to is not just a spate of cartoons and feature films that showcase all sorts of technology ranging from computer-controlled sleighs ("The Santa Clause", 1994) and sleigh helicopters ("Santa's Magic Crystal", 2011), to superfast flying vessels for the delivery of presents ("Arthur Christmas", 2011) and teleportation from chimney to chimney ("The Christmas Chronicles", 2018). The trend is also evident in academic studies dealing with cutting-edge science.

**Figure 3.** Metamorphosis of Santa Claus
(commercial *Audi Presents: New Santa*, 2018)

## ACCOUNTING FOR MAGIC IN TERMS OF TECHNOLOGY

As Gérald Bronner's survey has shown, in thirty percent of cases, the reason why children give up their belief in Père Noël is because they eventually realise that his acts go against physical laws (the old man cannot get around the whole earth in a single night, his sack and sleigh are too small to hold all toys, he is too fat to come down a chimney, etc.) (Bronner, 2004). We might therefore surmise that technical gimmickry of modern filmmakers is to make up for the lack of faith. However, some claim that such doubts are easily dismissed by children on grounds such as the use of a magical wand, availability of help, high speed, etc. (Larivée et al., 2010). Yet, the authors emphasize that even "naïve" human cognitive mechanisms require that Père Noël as a "superhero" be bound

by the laws of physics (Larivée et al., 2010, p. 439). Be that as it may, in today's age, it is not possible to get away with supernatural powers such as omnipresence or not being confined by time and space. As Mina Verba (1996) wrote, Père Noël dies due to "an excess of extraordinary abilities," with new technologies only extending his agony.

Trend is also evident in academic studies dealing with cutting-edge science In fact, scientists have been attempting to find Santa's most efficient present delivery route – or to solve what is known as Travelling Santa Problem (or TSP) – since the late 20th century. Vernon P. Templeman demonstrated that Santa Claus would have to travel faster than light, which is not feasible, and in any case fatal to any living being due to heating and centrifugal forces (Waller, 1991). Physicists Matthew Davies and Martin Slaughter refuted many of the claims made by Templeman and proposed a number of possible explanations of Santa's properties, including a model that views Santa as a waveform (Carroll, 2015). Another version of solving Santa's logistics problems is based on papers dealing with the latest scientific developments in various fields. For example, a hyper-fast gift distribution network powered by Amazon delivery drones and Hyperloops can solve the transportation problem, whereas to collect data about children's behaviour TPU devices can be used. The latter will transmit high-frequency sound waves to specific regions of the brain to control naughty behavior, and will transmit information to an Exabyte-capable data storage facility (Chang, 2013).

Norwegian astrophysicist Knut Jørgen and Røed Ødegaard contributed to the discussion by pointing out that Santa Claus obviously has equipped his sleigh with an ion-shield of charged particles, which makes him and his reindeers heat-resistant (as cited in (Westin & Skjetne, 2016). North Carolina State University's Dr. Silverberg posits that Santa uses his knowledge of the space/time continuum to form what the physicist calls "relativity clouds". "Based on his advanced knowledge of the theory of relativity, Santa recognizes that time can be stretched like a rubber band, space can be squeezed like an orange and light can be bent," Silverberg says. "Relativity clouds are controllable domains – rips in time – that allow him months to deliver presents while only a few minutes pass on Earth. The presents are truly delivered in a wink of an eye." With a detailed route prepared and his list checked twice through the onboard computer on the technologically advanced sleigh, Santa is ready to deliver presents (Shipman, 2011). The tongue-in-cheek article quickly went viral and was translated into many languages, suggesting that the kind of explanation is highly demanded and relevant for today's readers. In other words, people now want to deprive Santa Claus of his magical essence and show that the latter is based on sophisticated, but still feasible technologies. However, in case of solving problems that lie beyond the reach of modern technologies, it is sometimes difficult to determine whether the properties of Santa's gadgets are of magical or technical nature, for example, a gingerbread detector used to make sure there aren't any creatures stirring ("Prep & Landing: Operation: Secret Santa", 2010). As Arthur C. Clarke's famous Third Law states, "Any sufficiently advanced technology is indistinguishable from magic."

Even though this scientific discussion is apparently of a joking nature, the very fact of its emergence is indicative, as no other era could have produced a desire to find such rational explanations for mythical happenings.

In Russia, fairy-tale characters experienced a period of persecution during Soviet times. Children's poet Korney Chukovsky recounts how, in 1929, he was reading “The Adventures of Baron Munchausen” aloud to a roomful of sick children in a convalescent home. But the supervising staff snatched the book out of his hand explaining that “books for Soviet children must not be fantasies, not fairy-tales, but only the kind that offer most authentic and realistic facts” and demanding that instead of “Gulliver's Travels”, “The Fairy Tales of the Brothers Grimm” and “The Little Humpbacked Horse” he provide books about diesels and radio (CHukovskij, 1968, p. 115). Soviet educators claimed that it was necessary “to replace unrealistic, fantastic folktales with plain, truthful stories derived from real life and nature.” They pointed to an example set by a boy who, after hearing the poetic fairy-tale “The Magic Swan Geese” red to him by his mother, exposed her as a liar: “Nonsense, mother. Ovens cannot talk, apple trees cannot talk, and rivers cannot talk. The girl could not have taken cover in the river, she just drowned” (Ekskursii po gorodu so shkol’nikami 1 stupeni, 1926, p. 9). Following the Russian Revolution, Ded Moroz was prohibited until 1937 for being part of a religious cult. “Children are deceived into believing that presents are from Ded Moroz. Christmas tree is the point where children's religion emerges. Furthermore, dominant exploitative classes use the 'nice' tree and the 'kind hearted' Father Frost to turn the working population into humble and submissive servants of capital” (Materialy k antireligioznoj propagande, 1927).

Our current mass culture is more ingenious. Father Christmas may stay, but has to change and undergo a technological transformation in keeping with the times.

Santa has been around since the late 19$^{th}$ century and until recently has quite happily done without any scientific explanations, content with the use of magic. But today's people are desperate to provide the good old man with sophisticated technologies beyond the reach of humanity.

## POST-LOGICAL THINKING

One may object that there is nothing wrong with seeking the truth and hating lies. People do not want to be fooled and therefore regard fairy-tales as a deception or a dream at best. Yes, they prefer to achieve this dream by purely scientific means. But what's wrong with that? Can the mere fact of traditional positivist hostility toward all things magical (from religious mythology to children's tales) be an argument against this stand?

Certainly not! In fact, if religious myths and fairy-tales made any claim for truth, we could rightly accuse them of lying. But the thing is that magic and underlying myths have nothing to do with truth or falsehood in scientific sense. It can be easily shown that magic is based on a specific worldview which does precede scientific knowledge, but is fundamentally different from the latter and is not to be judged by its standards.

In order to make sure of that, it will be recalled that there are two types of magic: “Homoeopathic magic is founded on the association of ideas by similarity ... assuming that things which resemble each other are the same: contagious magic ... assuming that things which have once been in contact with each other are always in contact” (Frazer, 1922, p. 12). It can readily be seen that both types of magic rely on the same principle of equating apparently unlike things and transferring properties (wholly or partly) from one

object to another: “For example, when an Ojebway Indian desires to work evil on any one, he makes a little wooden image of his enemy and runs a needle into its head or heart (...) believing that (...) his foe will the same instant be seized with a sharp pain in the corresponding part of his body; but if he intends to kill the person outright, he burns or buries the puppet” (Frazer, 1922, p. 13).

Apparently the same principle underlies the myths that support magical practice: before proceeding to exactly understand an unknown object, any savage first tries to reason by analogy, i.e. to compare the unknown object to something familiar. For example, they attempt to explain an earthquake as “a dance of the Earth”, by analogy with their own bodies that shudder as they dance. Or they attribute the outward resemblance between the Sun and the Moon to the fact that the celestial objects are siblings, by analogy with family relationships of living organisms. Thus, the principle of transfers and analogies, which involves equating apparently unlike things, is the basis for any magical practice as well as any mythical theory – and therefore, for any children's fairy-tale as it combines both. That means that the very attempt to take fairy-tales literally is absurd. The language of a fairy-tale is, in Roland Barthes's words, “not expected to represent reality, but to signify it” (Barthes & Lavers, 1972).

Employing a convincing method to confirm our reasoning, we challenge any not-so-busy positivist to try to interpret literally (in line with the above scientific explanations of Santa′s activities) the Lithuanian folk tale of Neringa, a kind-hearted girl who grew taller as she did good works. She grew and grew so quickly that soon she became a giantess. One day during a storm she put sinking ships into her apron and thus saved them from wreckage. Now how can the positivist explain this story using equations of relativistic mechanics? Even if science can explain the phenomenon of Neringa′s growing, it can hardly relate the effect to the number of her good acts. It is even more difficult to explain how Neringa managed, without shrinking in height, to enter homes of ordinary people and not break ceilings with her head.

It is obvious that the author of the tale did not even think about such things. He was not concerned about all the inconsistencies, as he treated the giant size of the girl metaphorically rather than literally, i.e. understood it as a symbol of her big kind heart and the glory gained by good deeds. It is therefore clear that the two Greek terms for “word”-“mythos” (story) and “logos” (study)- actually mean two widely different types of language use, and these should not be confused, unless we want to destroy our cultural heritage by ludicrous interpretations:

1) The term “mythos” refers to figurative poetic language use, or the principle of analogy which implies comparing and likening, in whole or in part, apparently different things. This type of language use is basically not intended for literal interpretation.

2) The term “logos” refers to direct scientific language use, or the principle of identity which requires that we understand every word exactly in the sense it was initially meant and take each thing as it is.

One may object that figurative thinking is not possible without the direct one. This is, of course, true as with no direct meaning there would be no indirect meaning and no substitution of one thing for another based on correspondence or similarity. That's why

mythical thinking is related to and intertwined with logical one in a way that makes it difficult to distinguish the two uses.

Luckily, or unluckily, even if science had the intention to fully get rid of the mythical way of thinking, it would not work out as the two types of thinking are interdependent. Not only cannot figurative thinking exist without the literal one, but also literal thinking cannot exist – and even does not emerge – without the figurative one. Not just because science itself also sometimes resorts to analogies when illustrating its theoretical points, but also because any abstract concept is created by comparing unlike things.

The fact is that any abstract concept, for example the concept of the number “three” per se, cannot possibly be conceptualized in a way other than by means of conventional signs (“3”, “III”, …) or specific objects (counted by three). Whatever the case, what we perceive is not the concept itself, but rather a tangible sign which is conventionally understood to stand for the concept, *as if the sign actually were identical to the concept it signifies*. Therefore, the principle of the equation of apparently unequal things (in our case, a concept and a conventional sign) underpins not only mythical thinking, but also any form of thinking in general. As Leibniz puts it, we “never know, discover, or prove any truth without using words or other signs (...). Indeed, if characters were lacking, we would never distinctly know or reason about anything” (Leibniz, 1989, pp. 270–271). Science is unthinkable without signs/symbols, without abstract conceptualization.

A possible objection may be that the process has nothing to do with mythical things. Can we really compare a scientist who, in a deliberately conventional manner, identifies the sign and the concept it stands for – and an Indian who likens his foe to a wooden puppet? Certainly, any scientist is clear about the difference between the sign and the signified. Admittedly, an Indian also has a clue as to the difference between the doll representing a foe and the foe as the real person. However, the two approaches to understanding the differences are not the same:

1) The “logos” approach means a direct and exact language use which avoids identifying unlike things. Specifically, it requires a clear differentiation between direct and figurative language use whenever the latter us employed.

2) The “mythos” approach, on the other hand, is based on the principle of linking apparently unlike things, including the two types of language use, to the extent of totally eliminating any difference between them.

But it does not mean that one can draw a distinction between scientific and mythical thinking only within the scope of the former, i.e. *scientific* one, – and only provided that this scientific thinking, according to its own principle, develops a criterion which determines when words and images are to be interpreted literally and when metaphorically, because a different interpretation would lead to a logical or factual inconsistency.

People today are often surprisingly indifferent to inconsistencies and readily believe any nonsense, even when logic and facts do not support it (Levine, 2018). That's the point where the most outrageous discovery is made: In truth, the modern longing for literal understanding of Father Christmas's activities is not an evidence of the growing rationality, but rather quite the contrary – a symptom of a decline in logical reasoning,

i.e. the worst heritage of religious/magical thinking. It is not to say that human thinking in our post-modern, post-secular and post-truth society becomes religious, but it would be appropriate to describe it as *post-logical*.

## CONCLUSION

Father Christmas as one of the few representations of the magical in today's world has a hard time surviving in this technology-driven society. Postcards, adverts, films and games are pushing him to use cutting-edge technology. The character has been coaxed into admiring human capabilities and changing his outdated ways for quite a while. However, what we see now is a new trend to regard Santa's magical powers as a result of uber-complex technologies that are not yet known to people. Not only is the trend evident in films of the last decade, but it is also described in writings of acclaimed scholars (even if jokingly). We make an assumption that the emergence of need to deprive even Father Christmas of magic can be accounted for by a simplification of thinking and a departure from symbolic/figurative interpretation. Further research comparing the understanding of Santa Claus and other characters by the children of the past and the present could examine the shrinking trends of magical beliefs more clearly.

## REFERENCES

Barthes, R., & Lavers, A. (1972). *Mythologies. New York: Hill and Wang*. Hill and Wang.

Belk, R. W. (1987). A child's christmas in America: Santa Claus as Deity, Consumption as Religion. *Journal of American Culture*, *10*(1), 87–100.

Breen L. (2004). What if Santa died? Childhood myths and development. *Psychiatrie Bulletins*, *28*(12), 455–456.

Bronner, G. (2004). Contribution à une théorie de l'abandon des croyances: la fin du Père Noël [Contribution to a theory of abandonment of beliefs: the end of Santa Claus]. *Dans Cahiers Internationaux de Sociologie*, *1*(116), 117–140.

Carroll, R. T. (2015). An answer to the Traveling Santa Problem. *The Sceptic's Dictionary*. Retrieved from http://skepdic.com/santa.html

Chang, J. (2013). Cyber Santa Claus: Amazon Drones, Supercomputers and Other Cutting-edge Technologies Santa Can Use To Deliver Your Christmas Gifts. https://financesonline.com/cyber-santa-claus-amazon-drones-supercomputers-and-other-cutting-edge-technologies-santa-can-use-to-deliver-your-christmas-gifts/

CHukovskij, K. (1968). *Ot dvuh do pyati* [From two to five]. University of California Press.

De la Ville, V.-I., & Georget, A. (2015). *Le Père Noël de La Poste. La surprenante histoire de son secrétariat (1962-2012)*. [Santa Claus from La Poste. The surprising history of its secretariat (1962-2012)] Peter Lang AG.

Dushechkina, E. V. (2001). Ded Moroz: etapy bol'shogo puti (K 160-letiyu literaturnogo obraza) [Ded Moroz: stages of a long journey (Towards the 160th anniversary of the literary image)]. *Novoe Literaturnoe Obozrenie*, *47*.

http://magazines.russ.ru/nlo/2001/47/dush.html

*Ekskursii po gorodu so shkol’nikami 1 stupeni [City tours with 1st level schoolchildren]*. (1926). Rabotnik prosveshcheniya.

Faubert J. (2005). Follow Santa Claus at www.noradsanta.org: SantaCams to track Santa’s Christmas journey. *Advocate*, *112*(51), 1.

Frazer, J. (1922). *The Golden Bough: A Study in Magic and Religion. Vol.1*. Macmillan.

Hancock, P., & Rehn, A. (2011). Organizing Christmas. *Organization*, *18*(6), 737–745. https://doi.org/10.1177/1350508411428214

Larivée, S., Sénéchal, C., & Baril, D. (2010). Le Père Noël, Piaget, Dieu et Darwin [Santa Claus, Piaget, God and Darwin]. *Studies in Religion/Sciences Religieuses*, *39*(3), 435–452. https://doi.org/10.1177/0008429810373620

Leibniz, G. W. (1989). *Philosophical Essays. Vol.3* (R. Ariew & D. Garber, Eds.). Hackett Publishing Company.

Lévi-Strauss C. (1993). Father Christmas executed. In D. Miller (Ed.), *Unwrapping Christmas* (pp. 38–51). Clarendon Press.

Levine, D. S. (2018). *Common Sense and Common Nonsense*. https://rc.library.uta.edu/uta-ir/handle/10106/27541

Luna Batinga, G., de Rezende Pinto, M., & Pimenta Resende, S. (2017). Christmas, consumption and materialism: discourse analysis of children’s Christmas letters. *Review of Business Management*, *19*(66), 557–573. https://doi.org/10.7819/rbgn.v0i0.3429

*Materialy k antireligioznoj propagande v rozhdestvenskie dni (Dlya dokladchikov, klubov i izb-chitalen)* [Information materials for anti-religious propaganda during Christmas days (For speakers, clubs and reading rooms)]. (1927). Tula Provincial Council of the Union of Atheists.

McGowan, D. (2007). *Parenting beyond belief : on raising ethical, caring kids without religion*. American Management Association.

Perrot, J. (1994). Play Prepares Father Christmas’s Future. *Children’s Literature Association Quarterly*, *19*(3), 128–133. https://doi.org/10.1353/chq.0.0957

Shipman M. (2011). Researcher Explains How Santa Delivers Presents in One Night. *NC State University*. https://news.ncsu.edu/2011/12/wmssilverbergsanta2011/

Verba, M. (1996). Le réel, le “surréel” et le surnaturel chez l’enfant à propos de la croyance au Père Noël [The Real, the “Surreal” and the Supernatural in Children about Belief in Santa Claus]. *Enfance*, *49*(2), 270–279. https://doi.org/10.3406/enfan.1996.3023

Waller, R. (1991). No, Virginia, there isn’t a Santa Claus. *Spy Magazine*, 50–52.

Westin, A. A., & Skjetne, P. (2016). Julenissen – en global helsetrussel [Santa Claus – a global health threat]. *Tidsskr Nor Legeforen*, *23–24*(135), 2002–2004.

## СВЕДЕНИЯ ОБ АВТОРАХ / THE AUTHORS

Дарья Быльева. bylieva_ds@spbstu.ru
ORCID 0000-0002-7956-4647

Антон Заморев, azamorev49@gmail.com
ORCID 0000-0002-3925-488X

Daria Bylieva, bylieva_ds@spbstu.ru
ORCID 0000-0002-7956-4647

Anton Zamorev, azamorev49@gmail.com
ORCID 0000-0002-3925-488X

Статья поступила 14 июня 2022
одобрена после рецензирования 15 октября 2022
принята к публикации 30 ноября

Received: 14 June 2022
Revised: 15 October 2022
Accepted: 30 November 2021

https://doi.org/10.48417/technolang.2022.04.07
Research article

# Language in the Age of Mechanical Reproduction

Sven Thomas (✉)
University of Paderborn, Warburgerstr. 100, Paderborn, 33098, Germany
sven.thomas@uni-paderborn.de

## Abstract

The technology of machine translation has become an integral part of our interaction with the world. This article wants to explore the effects these systems might have on our languages. Most of the time this technology is being investigated regarding its reproduction of (gender) bias. This article argues that the reproduction produced by machine translation is of a more fundamental type: it reproduces language itself. To motivate research in this direction this article will first look at Walter Benjamin’s thoughts on language and translation to then show that machine translation can be seen as a mechanical reproduction reproducing language itself. This will become visible in the way machine translation systems are being trained. By relying on past translations these systems reproduce former states of our languages. With this observation this article then focuses on a certain aspect that was highlighted by Benjamin in his essay on mechanical reproduction: the shift in historicity of the reproduced (language). With this we will be able to glimpse a shift in our perception that accompanies this changed situation: the withering of dialectical moments in our interaction with the world.

**Keywords:** Machine translation; Mechanical reproduction; Language; Translation; Philosophy; Walter Benjamin

**Citation:** Thomas, S. (2022). Language in the Age of Mechanical Reproduction. *Technology and Language*, *3*(4), 90-100. https://doi.org/10.48417/technolang.2022.04.07

УДК 15: 004.032.26
https://doi.org/10.48417/technolang.2022.04.07
Научная статья

# Язык в эпоху механического воспроизводства

Свен Томас (✉)
Университет Падерборна, Варбургерштрассе, 100, Падерборн, 33098, Германия
sven.thomas@uni-paderborn.de

**Аннотация**
Технология машинного перевода стала неотъемлемой частью нашего взаимодействия с миром. Эта статья посвящена изучению того, какое влияние эти системы могут оказать на наши языки. В большинстве случаев эта технологии исследуется на предмет воспроизведения (гендерной) предвзятости. В данной статье утверждается, что воспроизводство, которое производит машинный перевод, имеет более фундаментальный характер: он воспроизводит сам язык. Чтобы мотивировать исследования в этом направлении, в данной статье сначала будут рассмотрены мысли Вальтера Беньямина о языке и переводе, а затем показано, что машинный перевод можно рассматривать как механическое воспроизведение, воспроизводящее сам язык. Это становится заметно по тому, как обучаются системы машинного перевода. Опираясь на прошлые переводы, эти системы воспроизводят прежние состояния наших языков. Опираясь на это наблюдение, данная статья затем фокусируется на определенном аспекте, который Беньямин выделяет в своем эссе о механическом воспроизведении: сдвиг в историчности воспроизводимого (языка). При этом мы сможем увидеть возможный сдвиг нашего восприятия, который сопровождается этой измененной ситуацией: ослаблением диалектических моментов в нашем взаимодействии с миром.

**Ключевые слова:** Машинный перевод; Репродуктивная технология; Язык; Перевод; Философия; Вальтер Беньямин

**Для цитирования:** Thomas, S. Machine translation as a reproductive technology. Technology and Language. 2022. № 3(4). P. 90-100. https://doi.org/10.48417/technolang.2022.04.07

## INTRODUCTION

Due to the advancing process of globalization and the accompanying need for translation, the market share of the translation industry grew from 23 billion USD in 2009 to an estimate of 48 billion USD in 2020.[1] Just by looking at these numbers one can see why there is a rising interest in the technology of machine translation – a technology that has already entered our everyday lives. While scrolling through Twitter one can press the *Translate Tweet* button to read Tweets from another language in one's own; when we watch a French panel discussion on YouTube we can read automatically translated subtitles; or we can use Google Chrome and its function to translate whole webpages. Machine Translation is already shaping our interaction with the world.

The question we want to explore in this article can be summarized as follows: How does the technology of machine translation affect the development of our languages? What happens to us if we get everything we want to read presented in our own language? As a first step of investigation we will look into a shift in the temporality regarding the translational process and its accompanying effects.

To do so we will first turn to Walter Benjamin's philosophy of language and translation. His approach offers a way to view language as more than just an instrument. After that we will have a closer look on how machine translation works and why it can be seen as a mechanical reproduction that reproduces language itself. Combining these two perspectives Benjamin offers, we will be able to glimpse a potential shift of our perception: the loss of dialectical moments in our interaction with the world.

## WALTER BENJAMIN ON LANGUAGE

Walter Benjamin, born in 1892 in Berlin, was a philosopher and cultural critic, who had to exile to Paris in 1933 due to the fascistic regime in Germany and his Jewish heritage. Not just his contributions to aesthetic theory and historical materialism became influential in various academic disciplines; he is well known also for translating texts from Honoré de Balzac, Charles Baudelaire and Marcel Proust. His philosophical interest in language and translation, which he investigated for example in his two essays *On Language as Such and the Language of Man* and *The Task of the Translator*, were coupled with his focus on how technologies can change our perception of the world, which he explores in his famous essay *The Work of Art in the Age of Mechanical Reproduction*. This makes Benjamin an exciting figure to turn to when being interested in the technology of machine translation and its potential effects on our languages. Before we can look at the reproductive aspect of machine translation technology, we have to first understand the potentially reproduced subject itself: language. Therefore, we will first introduce fundamental aspects of Benjamin's thoughts on language and translation to then talk about mechanical reproduction.

[1] https://www.statista.com/statistics/257656/size-of-the-global-language-services-market/

When we talk or listen, read or write, we are using and experiencing language as a medium for communication. Most of the time we are interested in what has been said or written. We focus on the verbal content and start to think about the meaning that is expressed through language. But Benjamin focuses on another aspect of language. For him language expresses something immediately that cannot be reduced to its verbal content.

Before we get into Benjamin's thoughts on this immediate content of language, being transcendent of its verbal content, we will look into some common examples where this aspect can be experienced. A first example is the tone of a language. Imagine you are talking to someone who is speaking in a low and sad voice. Whatever verbal content she is communicating through her choice of words, the expression in her depressed tone lets you perceive her message differently then when she would have uttered the same words in a high spirited and happy voice. What is communicated through her language is the same. But what is expressed in her language is something quite different and has an effect on how your experience and understanding of this conversation will be. Similar to this emotional tone is the ironic one in which the tone alone suggests that the exact opposite of the verbal content is actually meant. Another example is the style of language. Not just the style of expressing the same verbal content in different languages is of interest here. Styles differ not just in different regions (dialects) or over time but as well between individuals. If a close friend of yours writes you a message in a totally unfamiliar style, you will become suspicious whether the author for this content really was that friend of yours. These examples show us that there is more to language than just its meaning.

This raises the question: What is a language communicating that is immediately expressing something which cannot be reduced to its verbal content? "It communicates the mental being corresponding to it. It is fundamental to know that this mental being communicates itself *in* language and not *through* language" (Benjamin, 1972c, p. 142).[2] Benjamin's focus on language lies in the immediate expression we perceive "and if one chooses to call this immediacy magic, then the primary problem of language is its magic" (p, 142).[3] Language understood in this regard is powerful without being reduced to its instrumental or technical reasoning, a view which Benjamin calls "the bourgeois conception of language" (p. 144).[4] The immediate expression of the mental being exceeds this way of understanding the effects of language. To look at the magical side of language (*Sprachmagie*) Benjamin is applying terms commonly used in mystical or occult settings. It is not surprising that he is going back to the first book of Moses, the Genesis, and starts

[2] „Sie teilt das ihr entsprechende geistige Wesen mit. Es ist fundamental zu wissen, daß dieses geistige Wesen sich *in* der Sprache mitteilt und nicht *durch* die Sprache." (Benjamin, 1972c, p. 142) All citations, unless otherwise noted, are from Walter Benjamin, *Gesammelte Schriften* (Frankfurt a.M.: Suhrkamp Verlag, 1972). References are made with the volume number (in roman numerals) and the page number. Throughout the whole article, the German original will be presented in the footnotes to follow up on some of Benjamins thoughts we are going to talk about. The English translations are all made with DeepL to build in a self-exemplifying performative element.

[3] „und wenn man diese Unmittelbarkeit magisch nennen will, so ist das Urproblem der Sprache ihre Magie." (Benjamin, 1972c, p. 142).

[4] „Diese Ansicht ist die bürgerliche Auffassung der Sprache." (Benjamin, 1972c, p. 144)

his investigation of *Sprachmagie* with the story of creation. All things express themselves via language, what Benjamin therefore calls "revelation" (p. 146),[5] and it is stated in Genesis that God knows everything regarding its given name. From this, Benjamin draws an epistemological consequence. The Fall from Grace divorced humans from the *names* of things and enabled the human ability to name things by *words*: "It is therefore the linguistic being of the human being to name things" (p. 143).[6] *Name* and w*ord* are his fundamental distinction between absolute and perspectival knowledge, represented by the language of God and the Adamic language.

For addressing *Sprachmagie* Benjamin's fundamental distinction between the verbal content communicated through and the mental being communicated in language appears not just in his early essay *On Language as such and the Language of Man*. In *The Task of the Translator* he uses this distinction to investigate the problem of translation between human languages. If we adhere to Benjamin's biblical terms, we could say that the problem of translation has to deal not just with the Fall from Grace but with the Tower of Babel as well. Humans are not just cut off from the pure knowledge of names given by God and therefore have to deal with an Adamic language; the Adamic language itself has been split up into uncountable different languages, so that humans cannot become too powerful.

To examine the problem of translation between languages in light of the magical aspects of language he is interested in, Benjamin reuses his early distinction of what is communicated through and in language, but changes his terminology. In *The Task of the Translator* he is calling the first the actually *meant* and the second *the way of meaning* it (Benjamin, 1972b, p. 14).[7] How can we understand this distinction? If we look at the words „Brot" (German), „bread" (English) or „pain" (French), what is meant in all languages is the same. But the way of meaning, the pronunciation, the linguistic tradition and the styles of expressions differ. So what is communicated within different languages might on a verbal side be the same meaning, but considering its magical aspects, there are powerful differences due to the different ways of meaning. But since the different words for „bread" actually mean the same thing, we can see that languages are translatable and that they have a common something, a kind of kinship among them. This raises the question: What kind of kinship exists between languages?

We do know that in terms of verbal content the same thing is meant, the same thing is pointed towards. But since all languages point towards the same meaning in their various ways of meaning it, no single one is expressing the actual meaning. They just state their word for the original name. By comparing the different ways of meaning, the many different intentionalities or forms of directedness towards the same thing, we experience in this translatability "the innermost relationship of languages to each other. (The translation …) cannot possibly reveal this hidden relationship itself, cannot possibly produce it; but it can represent it by realizing it germinatively and intensively" (Benjamin,

[5] „Offenbarung" (Benjamin, 1972c, p. 146).
[6] „Das sprachliche Wesen des Menschen ist also, daß er Dinge benennt." (Benjamin, 1972c, p. 143).
[7] „das Gemeinte" and „die Art des Meinens" (Benjamin, 1972b, p. 14).

1972b, p. 12).[8] Since this relationship can only be represented in the translation itself, it is this innermost relationship towards which all supplementary intentions converge; corresponding to an ideal perspective which a philosophical God can assume; an ideal language Benjamin calls the *pure language* (p. 13).[9]

What happens if we turn this argument around? What does it say about our possible knowledge in, for example, our mother tongue that it is just one way of wording or meaning things, as opposed to Benjamin‘s concept of a pure language? The first thing we find out is: what we understand at a certain point of time in a certain language is just a fraction of what could be expressed in the pure language. But translation offers us a way to add another fraction to this fractured state of our language. And by combining these two pieces together, we can see that they are just a part of a bigger picture that we have not been able to see before. So within the process of translation we can experience the harmony of ways of meaning pointing towards a convergent state of the pure language. This is only possible if we focus on the magical aspects of language, since the verbal content is always already the shared meaning.

Therefore, Benjamin declares as the task of the translator to represent the inner relationship between languages. This is a task that will never be completed as different translations, even in the same language, will differ at different times due to the constant changes of our languages. It is important to note that one cannot actually express this innermost relationship through verbal contents. The only thing possible is to represent this kinship. The pure language can only be highlighted within the translation, combining fractions of ways of meaning. What is important here is what is magically gestured at or pointed towards and not – as according to the bourgeois view – the accurate translation of meanings. “With this, however, it is conceded that all translation is only a somehow provisional way of dealing with the strangeness of languages” (Benjamin, 1972b, p. 14).[10] For a translation to represent the kinship between languages, it therefore should not try to eliminate the ways of meaning from the original language. “The true translation is translucent; it does not obscure the original, does not stand in its light, but allows the pure language, as if amplified by its own medium, to fall only the more fully upon the original” (p. 18).[11]

This brings us to another important aspect of Benjamin’s philosophy of translation: the temporal structure of a translational process. Before we can even think or talk about a translation of a word, sentence, phrase or text, these linguistic entities have to be uttered or written in the first place. Therefore, “the translation originates from the original”

[8] „So ist die Übersetzung zuletzt zweckmäßig für den Ausdruck des innersten Verhältnisses der Sprache zueinander. Sie kann dieses verborgene Verhältnis selbst unmöglich herstellen; aber darstellen, indem sie es keimhaft und intensiv verwirklicht, kann sie es““(Benjamin, 1972b, p. 12)..

[9] „Die reine Sprache“(Benjamin, 1972b, p. 13).

[10] „Damit ist allerdings zugestanden, daß alle Übersetzung nur eine irgendwie vorläufige Art ist, sich mit der Fremdheit der Sprachen auseinanderzusetzen.“ (Benjamin, 1972b, p. 14)

[11] „Die wahre Übersetzung ist durchscheinend, sie verdeckt nicht das Original, steht ihm nicht im Licht, sondern lässt die reine Sprache, wie verstärkt durch ihr eigenes Medium, nur um so voller aufs Original fallen.“ (Benjamin, 1972b, p. 18)

(Benjamin, 1972b, p. 10).[12] A translation can only appear later than the original. And since a "true translation is translucent" and brings the original to light "only the more fully," a translation can be considered the "state of continuance" of the orignal (p. 11).[13]

This "state of continuance" already implies a certain historicity of our languages. Retrospective we can recognize a linguistic tradition, that is being highlighted due to translation – even (or especially) if we talk about translation from former states of the same language to the contemporary one. Following Benjamin, a "true translation" therefore should make the dynamic processes visible that our languages are constantly in. The translation enhances this process since the contemporary form of our language represents a certain way of meaning which becomes recognizable as just one form of intentionality towards the subject at hand. All of this is just possible if the translation is viewed as "a somehow provisional way of dealing with the strangeness of languages" and not as a final way of communicating a fixed meaning. With Benjamin's magical perspective we know that the powerful aspects of language are not comprehensible by just looking at the bourgeois view on language.

## MACHINE TRANSLATION AS A MECHANICAL REPRODUCTION

With this understanding of Benjamin's thoughts on language and translation we can now tend to the technology of machine translation and examine how it puts our languages in a new situation. In a first step, we will explain a specific aspect of how these systems translate one language into another. This understanding will make it possible for us to see this technology as a mechanical reproduction and this will then be used to argue for a crucial change in the temporality of translation and to consider its implications.

In the 1990s the computing capacity of computers became efficient enough to realize early research on machine learning (Hutchins, 1995). Especially in machine translation, statistical methods were used to find structures in existing translations and to calculate the statistically best result for a given input. To do so the algorithms had to be "fed" – as it is called in machine learning terminology – with corpora of professionally translated texts, pairing the two languages. This so-called statistical machine translation was used, for example, by Google Translate until 2016. With the rise of neural networks and the implementation of deep learning methods into machine translation systems in the mid 2010s these methods became even more sophisticated (Forcada, 2017). Due to repetition, massive data sets to feed them and savings in memory costs, these systems are generating fascinatingly good results – at least for languages for which these enormous data sets exist – as we have experienced in the translations of quotes from Benjamin in this paper so far. Even if we cannot fully understand the connections these neural machine translation systems find in their statistical analysis of the given corpora, just the fact that these systems perform in this way is already enough for the argument at hand.

Let us now look again at Benjamin's thoughts on the temporal aspects of translational processes. This temporal setting changes when using machine translation

[12] „geht die Übersetzung aus dem Original hervor." (Benjamin, 1972b, p. 10)
[13] „das Stadium ihres Fortleben." (Benjamin, 1972b, p. 11)

systems. Since translation engines learn from past translations, they are not based on the current state of our languages. Learning from existing translated texts, these algorithms can be called *conservative* – in a sense that they are not open for new developments. Even though some systems continue to learn from the user interaction with them, the connections these neural networks find in their training data, structure their ways of operating.

We called the translation earlier a continuation of the original. A "true translation" was supposed to represent the dynamic processes our languages are constantly in and to enhance this progress by shifting the boundaries of our languages. But due to the conservative functioning of machine translation systems, their translations cannot be called a continuation anymore. By reactivating former states of our languages the translation has to be seen as a *recurrence*. Instead of boosting the vital dynamic of our languages, a machine translation recreates a recurrent state of our language.

Due to this conservative recurrence, blurring the ever-changing nature of our languages, our perspective on languages itself changes. While we are presented with translations that enable us to understand the meaning stated in another language without acknowledging the different ways of meaning it, the magical aspects fall behind the instrumental usage of languages. And not just that; "the historical testimony of the subject" itself is shaken (Benjaminm, 1972a, p. 438).[14] As Benjamin highlights in his essay *The Work of Art in the Age of Mechanical Reproduction*, this shaken "historical testimony" is characteristic of mechanical reproductions. "Reproductive technology, it can be said in general terms, detaches the reproduced from the realm of tradition" (p. 438).[15] Hence machine translation can be seen as a *mechanical reproduction*, reproducing language itself.

The detachment from tradition is the characteristic of mechanical reproductions which has crucial effects in the case of languages. The "here and now" of a language, "its unique existence at a given place" and time (Benjaminm, 1972b, p. 437),[16] that what was supposed to be made visible in a translation, looses its meaning in times of its mechanical reproduction. But it was this authenticity and this historicity that was central for viewing language regarding its magical aspects and not just in a bourgeois way. Benjamin summarizes this development in the following way (Fürnkas, 2000):[17] "What withers in the age of technical reproducibility (…) is its aura" (Benjaminm, 1972b, p. 438).[18] The magically appealing aura of languages with their various ways of referring to the same meaning degenerates due to the conservative recurrence of the algorithmic reproduction produced by machine translation systems.

[14] „die historische Zeugenschaft der Sache (gerät) ins Wanken" (Benjaminm, 1972a, p. 438).

[15] „Die Reproduktionstechnik, so läßt sich allgemein formulieren, löst das Reproduzierte aus dem Bereich der Tradition ab" (Benjaminm, 1972a, p. 438).

[16] „Noch bei der höchstvollendeten Reproduktion fällt eins aus: das Hier und Jetzt (…) – sein einmaliges Dasein an dem Ort" (Benjaminm, 1972a, p. 437)

[17] Josef Fürnkäs argues in his article *Aura* that aura and magic are similar terms, focusing on on slightly different aspects of the appearance of things.

[18] „Was im Zeitalter der technischen Reproduzierbarkeit … verkümmert, das ist seine Aura." (Benjaminm, 1972a, p. 438)

The loss of aura of our languages has epistemological consequences, since a purely instrumental view on language strips us of the possibility to represent the innermost kinship between languages. By experiencing this kinship in a true translation, we were able to recognize the perspectival character of our words compared to the absolute knowledge of names in the language of God. Due to the loss of Aura we do not even consider our words to be just a fraction of all intentions anymore. Especially if these machines get even better, we will not experience other ways of meaning. In this regard, translations from machine translation systems can be seen as a mere tool instead of an aesthetic process which it was supposed to be in Benjamin's thoughts on translation. Using these systems will not make us think about the different ways of meaning in different languages anymore – as long as they function without any conspicuousness. Only a disconnect between these algorithmic translations and our current use of language will make us question the way of meaning which is offered to us by a machine translation system. This is why most research regarding the effects of machine translation on our languages is dedicated to gender bias in the translated results (Mehrabi et al., 2021, Savoldi, et al., 2021). It becomes recognized since, as societies, we have become more aware of gender and bias over the last few decades.[19]

All of what has been said can be summarized in the following way: The conservative recurrence that is forced upon our languages by machine translation systems goes hand in hand with the withering of their Aura. This hardens a bourgeois view on language and represses *Sprachmagie* itself. Without the focus on the different ways of meaning we are not confronted with the representations of the kinship between all languages and the accompanying realization that our language offers us only a perspectival knowledge, compared to the absolute knowledge represented by pure language. Hence, machine translation systems strip us of dialectical moments in our experiences with languages.

The effects of this new situation for our languages have to be investigated further. With Benjamin we know that mechanical reproductions have an impact on our perception of the world. He writes: "Within large historical periods, the entire mode of existence of historical collectives changes as well as their perception" (Benjaminm, 1972b, p. 438).[20] But if machine translation really is a reproductive technology that reproduces language itself, we are just at the beginning of this investigation.

## CONCLUSION

This paper discussed whether machine translation systems should be seen as a reproductive technology reproducing language itself. For this, we first looked into Benjamins philosophy of language where his fundamental distinction between verbal content and mental being was an essential first step, as is the distinction between what is communicated through and in language. With the concept of *Sprachmagie* we then turned

[19] Perhaps this kind of research is being funded so much because companies selling translation machines do not want to have bad public relations.

[20] „Innerhalb großer geschichtlicher Zeiträume verändert sich mit der gesamten Daseinsweise der historischen Kollektiva auch ihre Wahrnehmung." (Benjamin, 1972c, p. 439)

to his thoughts on translation and his concept of pure language. Here, the temporal aspect of translation proved important as well as its role for the dynamic of experience and understanding of languages.

With this we started investigating the functioning of machine translation systems and saw that their ways of operating can be called conservative. By highlighting that these systems are recurring former states of our languages, we saw that the machine translations were undermining the historicity of language as such. Since this, for Benjamin, is a fundamental characteristic of reproductive technologies, we learned to see that machine translation systems are reproductive technologies that are conservatively reproducing language itself. The loss of aura of this along with other reproductions then led us to understand that we are being stripped of dialectical moments in our ways of thinking and experiencing in general.

If machine translation really can be seen as a reproduction of language itself, there are many questions that seek answers. Benjamin sees in the introduction of a new medium a momentum for restructuring perception itself. If we understand language as the medium of our thought, what implications could the mere reproduction of language have on our possibilities for thinking about and acting within the world?

## REFERENCES

Benjamin, W. (1972a). Das Kunstwerk im Zeitalter seiner technischen Reproduzierbarkeit [The Work of Art in the Age of its Technological Reproducibility]. In R. Tiedemann and H. Schweppenhäuser (Eds.), *Gesammelte Schriften I*. Suhrkamp.

Benjamin, W. (1972b). Die Aufgabe des Übersetzers [The Task of the Translator]. In R. Tiedemann and H. Schweppenhäuser (Eds.), *Gesammelte Schriften IV*. Suhrkamp.

Benjamin, W. (1972c). Über Sprache überhaupt und über die Sprache des Menschen [On Language as Such and on the Language of Man]. In R. Tiedemann and H. Schweppenhäuser (Eds.), *Gesammelte Schriften II*. Suhrkamp.

Forcada, M. L. (2017). Making Sense of Neural Machine Translation. *Translation Spaces. 6*(2), 291-309. https://doi.org/10.1075/ts.6.2.06for

Fürnkäs, J. (2000). Aura. In M. Opitz and E. Wizisla (Eds.), *Benjamins Begriffe*. Suhrkamp.

Hutchins, W. J. (1995). Machine Translation: A Brief History. In *Concise history of the language sciences* (pp. 431-455). Pergamon.

Mehrabi, N., F. Morstatter, N. Saxena, K. Lerman, and A. Galstyan (2021). *A Survey on Bias and Fairness in Machine Learning*. *ACM Computing Surveys, 54*(6), 115. https://doi.org/10.1145/3457607

Savoldi, B., M. Gaido, L. Bentivogli, M. Negri, und M. Turchi (2021). Gender Bias in Machine Translation. *Transactions of the Association for Computational Linguistics, 9*, 845–874. https://doi.org/10.1162/tacl_a_00401

## СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR

Свен Томас,
sven.thomas@uni-paderborn.de,
ORCID 0000-0001-9435-3269

Sven Thomas,
sven.thomas@uni-paderborn.de,
ORCID 0000-0001-9435-3269

Статья поступила 20 октября 2022
одобрена после рецензирования 15 ноября 2022
принята к публикации 30 ноября 2022

Received: 20 October 2022
Revised: 15 November 2022
Accepted: 30 November 2022

https://doi.org/10.48417/technolang.2022.04.08
Research article

# Magic Materialism: From Atmospheric Technologies to Architectures of Affect

Irina Oznobikhina (✉)
National Research University Higher School of Economics, Myasnitskaya St., 20, Moscow, 101000, Russia
reneozanam@gmail.com

**Abstract**

Along with technologically advanced contemporary reality, there has been a renaissance in the study of affect and atmospheres. Despite the critique of atmospheres as a diffuse and "groundless" theory, this investigation shows it to be a promising concept for a variety of fields, including science, art, and technology. Of strongest interest to this paper is the field of spatial arts, with a special focus on the affective dimensions of sound and light. Aside from emphasizing the material qualities of the latter along with feelings and affects, the correlation between these "atmospheric" components will be traced in the current research with relation to volume and intensity. Along with affording a critique of dominant theoretical approaches such as the new materialism, atmospheres are considered affective qualities that can be reproduced and mediated by technologies. Accordingly, the notion of "atmosphere" serves not only to "set" a territorial climate but also as a scaffold for the atmospheric architecture composed of sound and feelings: vibrant, fluid, and poetic, yet material.

**Keywords:** Atmosphere; Architecture; Soundscape; Technology; Light

**Acknowledgments:** To the Center of Practical Philosophy "Stasis," Prof. Dr. Gernot Böhme and all the birdies.

**Citation:** Oznobikhina, I. (2022). Magic Materialism: From Atmospheric Technologies to Architectures of Affect. *Technology and Language*, *3*(4), 101-124. https://doi.org/10.48417/technolang.2022.04.08

УДК 1: 534.32
https://doi.org/10.48417/technolang.2022.04.08
Научная статья

# Магический материализм: От атмосферных технологий к архитектурам аффекта

Ирина Игоревна Ознобихина (✉)
Национальный исследовательский университет “Высшая школа экономики”, Мясницкая ул., 20, Москва, 101000 Россия
reneozanam@gmail.com

**Аннотация**
Наряду с технологически развитой современной реальностью наблюдается ренессанс в изучении аффектов и атмосфер. Несмотря на критику атмосферы “беспочвенной” теории, лишенной всякого основания, заявленное исследование показывает, что она является перспективной концепцией для изучения различных областей, включая науку, искусство и технологии, в которых компонент аффективного успускается по указанной причине. Наибольший интерес для данной работы представляет область пространственных искусств, где особое внимание уделяется аффективным аспектам звука и света. Помимо подчеркивания материальных качеств последних, а также чувств и аффектов, в данном исследовании будет прослежена взаимосвязь между этими “атмосферными” компонентами в отношении громкости и интенсивности. Наряду с критикой доминирующих теоретических подходов, таких как Новый материализм, атмосфера считается аффективным качеством, которое может быть воспроизведено и опосредовано технологиями. Соответственно, понятие “атмосфера” не только позволяет иссоедовать ритмические сгущения территориального климата, но также выступает в качественой невидимой основой для атмосферно-акустической архитектуры аффекта, состоящей из звука и чувств: живых, текучих, поэтических, но материальных.

**Ключевые слова:** Атмосфера; архитектура; аффект; саундскейп; Новый материализм; Новая феноменология

**Благодарность** центру практической философии “Стасис” (Европейский университет, Санкт-Петербург), профессору Герноту Бёме и птицам.

**Для цитирования:** Oznobikhina, I. Magic Materialism: From Atmospheric Technologies to Architectures of Affect // Technology and Language. 2022. № 3(4). P. 101-124. https://doi.org/10.48417/technolang.2022.04.08

*Leib* is our own nature
–Gernot Böhme, *Leib: Die Natur, die wir selbst sind*, 2019

Chaos seems to be everyone's threat; I find it in my rhythm.

–Hansen

The dice are thrown against the sky, with all the force of displacement of the aleatory point, with their imperative points like lightning, forming ideal problem-constellations in the sky. They fall back to Earth with all the force of the victorious solutions which bring back the throw. It is a game on two tables.

–Gilles Deleuze, *Difference and Repetition*, 1968

## INTRODUCTION

Along with the technological development of contemporary reality came a renaissance in the study of affect and atmospheres. Of strongest interest to this paper are several branches at once: the philosophy of media and sound art developed along with the affective turn focused on the intangible dimension of the world. It all began with ‚atmospheres.' The term has a spectacular history since its first mention, apart from its literal meaning as an envelope of gases surrounding the planet Earth. Among all scholars, Hermann Schmitz was the first one who systematically approached the following theme: despite the fact that his philosophy has never been popularised and is usually criticised by materialistic adepts of scientific proof and solid argumentation for the diffusive features of his 'groundless' theory and the vagueness of ‚atmospheres', Schmitz' System of Philosophy (1964–1980) expanded the horizon of environmental as well as technological investigations in different areas. The Society for New Phenomenology (Die Gesellschaft für Neue Phänomenologie, GNP) was founded in the 1960s to resuscitate the genuine phenomenological impulse, to revisit "the things themselves" and become attuned to the phenomena. As our imagination is being shaped by rationalistic scientific theories and constructions, which have become the accepted domain of education, they obscure the experience of the facts of life that was the initial aim of philosophy as such.

Following Hermann Schmitz' work on atmospheres in architecture, Gernot Böhme and several authors from various fields (see Fuchs, 2019; Massumi, 2019; Trigg, 2020) adopted that notion as a promising tool in studying the affective qualities of media and music. Italian philosopher Tonino Griffero argues that the possibilities of atmospheres have yet to be discovered (Griffero, & Tedeschini, 2019). Initially, atmospheres were understood as feelings poured into space or the environmental features that 'charge' a place with a certain energy that makes it meaningful (see Böhme and Thibaud, 2017; Griffero & Tedeschini, 2019; Relph, 1976, 1981; Schmitz, 2012;). In one of his seminal works, Böhme also notes the qualities that seem to 'float in the air' (Böhme and Thibaud,

2017) in relation to things and objects, inducing a certain manner of expression. This is the first point where I would note a difference to the approach of 'new' materialism. My critique of this approach emerges from Schmitz's neo-phenomenological theory derived from Gestalt psychology, it draws on examples from the physics of acoustics, and the history of the New Music, and is aimed at revealing its deficiency.

Written at the same time as Schmitz's "System of Philosophy," Deleuze and Guattari's (1987) "Thousand Plateaus" addresses with reference to Husserl "vague, in other words, vagabond or nomadic, morphological essences" (p. 366). The majority of authors from sound art, sound studies, and "new" materialism stick to this trajectory. Thus, the "magic" traces of sound and feeling, as well as their spherological occurrence, that are always present but in-between, are hugely neglected. Even though this endows a subjective side to the atmosphere charged with environmental, cultural, political, and historical predispositions (see Schmitz, 2011; Watsuji, 1961), the political possibility of sound and feelings (with their spatial mode) inevitably unfolds on a certain terrain that depends on the geological and culturological features of environments and landscapes. In this regard, after the technological, ontological, and affective turns in several disciplines, including sound art, it becomes possible to open the new possibility to express the "magic" realm by assembling and producing art installations with use of technology and involving the geological characteristics of landscapes that can be perceived corporeally [*leiblich*].

The noisy buzz of the world becomes non-sensical (Merleau-Ponty, 1947) with complexity of differentiation either by means of rational sense or virtually as a screen-framed reality – it can be comprehended only by means of physical body with its situatedness. Accordingly, the concept of felt-body (*Leib*), not physical body (*Körper*), becomes important for the reasons that will unfold in the following paragraphs. Listening and the felt-body become an inextricable unity for translation, attunement due to the subject being physically immersed in different urban environments and situations appearing as atmospheres. Technology seems to be a mediator to expand the affective qualities of environments in the chaotic diversity, it marks and encodes territories and composes architecturally dense buildings. These 'codes' do not necessarity require 'physical' participation but predetermine possibilities and involve a virtual dimension. Along these lines Jan Slaby argues that Massumi and Schmitz have much in common regarding the notion of atmosphere with their focus on affectivity. According to his idea, both of them consider affects as being independent of the human mind, regarding them as cyclonic and gripping forces (Massumi, 2021; Slaby and von Scheve, 2019). In turn, sounds and feelings are similarly structured by volume and intensity and figuratively revealed as constellations thus invoking the notion of *Gestalt* in psychology. From this notion there are several problems that arise here: (1) if sounding and affectivity are autonomous forces emerging from the external flux, what is the role of the subject in the settled spatial realm? (2) could technology 'magically' help reveal the characteristics of the sensory and the sound in urban spaces, or would it only distort these modalities, reinforcing the violent rhythms of contemporary life?

Considering this knot of questions I am suggesting a creative approach to the problem through atmospheres that can be re-produced and mediated in urban

environments by technologies. These would be atmospheres that do not only enclose or encode territory but to create ‘magical’ sonic worlds (Voegelin, 2010) and to enlarge the existing urban atmosphere and sonic environment available for everyone. On the one hand, technological development opens a new horizon for soundart and urban studies, on the other hand it reveals a new political dimension that allows for sonic manipulation by imposing a certain framing or ethics. In order to prove that the ‘magic’ qualities of atmospheres depend on approaches that are distinct from and critical of the new materialism, I will address several artists and scholars from sound studies. In this context, I will also refer to various works of such sound designers, musicians and composers as Jacob Kierkegaard, Iannis Xenakis, Alvin Lucier, Marien Amacher, Kristina Kubisch, and Elen Radigue to exhibit real cases of sonic techniques as they allow to unfold and manipulate rhythms and affective tonality in different environments. Finally, I aim to show that atmospheric constellations are set by a certain ontology access to which requires sonic imagination as well as a certain mode of belief and mood [*Stimmung*] for the ‘magic’ character to be attuned to the above mentioned imagination, belief and mood. This ontological realm must not be confused with merely a set of examples and illustrations that express a perspective (in most cases male and dominating) which identifies the ontology with rhythmicatical invasiveness and which is dictated by politics of intangible control. There should be a method to navigate the forcefully attractive field of atmospheres, a method not dictated by the ‘rational’ side of the problem that is always limited by experience or representation.

## THE NEW MUSIC AND NEW PHENOMENOLOGY: FULL EMBODIED EXPERIENCE OF SONIC FLUX

The fundamental shift in science that occurred in the second half of the 20th century was crucial in terms of perception. Inspired by phenomenology, this discipline sought to justify phenomena that occurred prior to experience. The situational wholeness of the figure emerging from the unity of elements was found to be more important than the separate features of what is perceived. The framework of various spaces took place throughout the 1960s, along with influential works by John Cage. Happenings, Fluxus, and installation art experiments brought together the visual and aural arts, revealing a multi-dimensional spatial practice based on various philosophical assumptions that supported sound, text, and enacted processes. These assumptions are significant for emphasizing the idea of an extended acoustical field against a certain theoretical background and understanding of temporality. They also relate to the meaning of space as understood by Schmitz. Although John Cage (1961), for example, did not specifically focus on the political possibilities of sounding, he certainly implied the liberation of sounds in space from any interpretative human-controlled intention. The legacy of Cage brought a massive shift to cultural and theoretical musical and site-based practice. Despite this, sound was still perceived as a material, an amplified object recorded on a magnetic tape with its phenomenal presence, and, more importantly, always marked by the linguistic codes of the listener‘s interpretative process. Later on, after abstract expressionism revealed the spontaneous burst of dynamic color and improvisation in

Jason Pollock's famous action paintings that involved bodily movements and sound, art became an event based on chance and possibility. Indeed, Pollock realized at some point that the purity of the rhythm could not be articulated exclusively with the movement of the human body (LaBelle, 2006).

Moreover, the human body comes out as an actor, a receiver and almost replaces an art object. By finding oneself always within the fluxes, flows, and rhythms, the immediacy of chance within such a chaotic currency becomes clear, and the body itself becomes the carrying vessel. This is where the referential line in abstract art reveals a visceral meaning. With material sound purity praised by Cage, the formalist aesthetics developed by Clement Greenberg, referencing Pollock and others, presents a plain but radical fluxus reality. There are multiple ways to obtain such ontological knowledge about placing people's bodies within the corporeality of their sensorium. The whole construction of the events moves away from the stability of visual objects, and the acoustic matrix of sound activates perception. Whereas the field of vision limits subjects and objects, sounding comes upon them with a certain power. One could point at a picture or an art object and note the distance to their beholders, but with sound and affect, there is a mode of aesthetization that manifests itself in a mirror-like fashion. An acoustic mirror of this type is a sounding plate made available through the kinetic-affective embodiment. In other words, according to the majority of theories from the period of the 1950s–60s, Fluxus appropriates music as a direct path to the core of perception, but the sounding register requires something else. The Fluxus movement blurs the distinction between subject and object. We could argue that this process is entirely post-cognitive: sound unfolds in one's imagination and is usually perceived through a certain mode of acoustic suggestion. Such an extensive and experiential domain is possible and reveals both aesthetic and political dimensions, leading to a series of critical notes. On the one hand, one may note that there is a contradiction in the notion of imagination in relation to sonic and affective modes, as one may claim that we perceive phenomena with an orientation to the visual. Generally speaking, the concept of imagination includes all of the senses (Oliveros, 2010).

Technological development allowed scholars to collect, produce and explore constellations and assemblages of various spaces, environments and landscapes aiming at getting to the 'real' register of sonic phenomena. Thus, the process of listening along the lines of the felt-body is point of departure for translation and becoming attuned to sounding environments. Technology, then, seems to serve as a mediator expanding the possibilities of atmospheres along with their environmental and affective features that may be reflected as a gestalt appearing from the vortex of chaotic manifold. Finally, this paper draws attention to atmospheres and their immersive qualities that can encode and mark territories or, in other words, build possible worlds (see Oznobikhina, 2022; Voegelin, 2018). Their influence, however, is not signified in purely materialistic terms.

Atmospheric grip is not simply a temporary change that affects an individual for a while and then passes away again. Schmitz articulates the notion of atmosphere as having had, historically, constitutive power. For him, history is not about critical situations and the productive responses of a mass of people to those events. Schmitz opposes an approach to history based on a chain of analogous events. He advances the idea that

spatially and affectively charged atmospheres with certain climatic features can shape the flux of history. Such climatic flows provide people with their dispositions, styles, impulses, inclinations, and specific creative powers, thereby leading them to the ideas and decisions that play out in historical events and selectively transform into cultures that are of a particular character.

Tonino Griffero, an Italian philosopher, explores the aesthetic dimension of atmospheres. His concept of aesthetics is similar to the political assumptions advanced by Swiss sound artist and critic Salome Voegelin as the political possibilities of sound. Both of the approaches presuppose a passive or pathic disposition towards events and situations with atmosphere and sound. At the same time, they adopt a passivity endowed with agency. These remarks are important for the current research because of the ‘pathic’ component, whether aesthetic or political, which means that the so-called ‘passivity’ in situational and all-encompassing situations still exhibits an agency that was historically hidden.

In the book “Sonic Flux,” Christoph Cox (2018) postulates the eponymous notion as being essential for aesthetic theories based on sound. We would agree with him at this point that overlapping with atmospheres has gained popularity over the last few years due to various and expansive peculiarities. Object-oriented ontology is no longer dominant within this aesthetic. The notion of sonic flux refers to an autonomous flow of sound appearing as a force, framing the atmospheric discourse in a more precise manner. Going beyond Deleuze and Guattari with the influential work of Emmanuel Delanda (2000), Cox denotes that sound art could be labeled as the “intensive” dimension of sound with its own history (Cox, 2018, p. 18). The opening gambit here casts Schmitz' atmospheres as affectively charged and captivating historically formed forces within which one can find oneself, if not vis-à-vis but at least in the same league as the mentioned authors. Thus, I would like to compare and contrast both of the approaches, the one unfolded by Christoph Cox and by neophenomenologly, in order to open possible lines for further development and research.

In every sound experience, physical contact primarily occurs through vibration (micro-rhythms). The acoustical physics of cymatics and the visualization of sound would, of course, pose the questions of listening and cognition, mentioning certain frequencies and harmonics. Ernst Chladni (1787) conducted experiments with vibrating plates and frequencies and published the results in his book “Entdeckungen über die Theorie des Klanges.” He made a significant contribution to the investigation of acoustic phenomena. Dealing with atmospheres as aural envelopes of gases or affectively charged space, classical acoustical theory refers not only to a liquid medium that envelopes and resonates with environments and territories but deals also with aerial qualities. The notion that sound designer and musician Steve Goodman labels as an ontology of vibrational force reveals “… when intuitional (visceral) percepts are initiated by the sonic and the body (in a couple of seconds) is instinctively triggered by surpassing the cognitive ability to process the impulse. Peculiarities of atmospheres, though, are not limited by their captivating or all-encompassing powers at the very certain moment” (Goodman, 2010, p. 48). With specific designs their 'magical,' yet in-between disposition allows us to

investigate a variety of possibilities and transitive constellations available for attunement rather than intentional or cognitive processing.

Christoph Cox claims, however, that his research moves in the opposite direction (see Cox, 2018, esp. chapters 2–4), thus revealing the new domain opened by sonic arts, realistic as well as ontological. With reference to Friedrich Kittler (1943–2011) Cox notes that "recorded sound bypasses the imaginary and the symbolic" to give access to "the real": the perceptible plenitude of matter that underlies all representation, a material core that is not basic but a primordial flux out of which all signals and signs emerge and into which they inevitably recede." (Kittler, 1999/2009; cf. Cox, 2018). Thus, he suggests that sonic flux might confront the phenomenological as well as poststructuralist accounts of sound imposed by a sound art where the human subject is the one who "receives and interprets the auditory signals" (Cox, 2018). There is no doubt for Cox when he regards human history and culture as part of the history of nature and claims that sound precedes the emergence of humanity. This goes beyond the field of sound art, where asonic flux is treated technically. In this regard, Cox also tries to provide an anti-correlationist argumentative line enframed by a wide range of authors experimenting with sound techniques aimed at reaching the 'real' sound domain, or sound-in-itself. The majority of them are following the same perspective resulting from practical confusions and interpretative relations associated with cultural and historical conditions, binary oppositions, and the problem of cartesian duality that comes out of notions of sound capture, fragmentation, and interpretation (pro or contra the existing tradition).

Alongside this materialist account emerged the New Phenomenology as a community that develops an alternative approach with a wide scope of disciplines including law, art, medicine, urban and sound techniques. Of main interest here is a conceptualization that goes beyond the schematizations of the natural sciences, offering a perspective that may fill the gaps in sound art and urban studies. By means of philosophical criticism, the phenomenologist can point out and dismantle the concepts and constructions that govern and constrict our everyday perceptions and train a more open attitude towards the urban environment and life. Most relevant to this position is the insight that rational human thinking productive of so-called disenchantment (*Entzauberung*) does not embrace the affectivity of the autonomous powers. In contrast to scholars from sound studies with orientation to new materialism, I would consider New Phenomenology to be the discipline that could draw attention to the various environments and spaces with certain atmospheres, that could thus develop sonic imagination and provide possible ways to create non-intentional spaces available for everyone. Needless to say that Cox' urge to settle a taxonomy for the variety of flows, branches and approaches towards sound art perfectly matches the traditional set of authors and artists common for his own field. Moreover, he unites the multi-dimensionality of the fluxes into the one autonomous realm without even considering the paths that lay beyond his research scope and methodology.

Such knowledge does not help us with the totality of contemporary environments with their invasive chaotic rhythms that could be approached by way of atmospheric methods. Atmospheres are perfect conceptual moves in this case as their non-intentionality is, firstly, not dictated by the Promethean attitude aimed to strive, capture,

interpret and preserve or, to put it in Cagean terms, to conserve, intangible knowing by innovative listening. Secondly, apart from sound art the non-intentional stance of atmospheric methods poses no risk of deformation of the emergent and passing style of the phenomena. Some of the experimental works and installations based on scientific inventions though are crucial for the present research to answer the questions raised.

## ELECTRIC TERRITORIES AND URBAN ATMOSPHERES: MAGIC TECHNOLOGIES IN SONIC DESIGN AND LANDSCAPE ART

When in 1877 the phonograph was invented, Thomas Edison was the one who formulated the aesthetic focus on the world of sound apart from music and speech. He did so from the mechanic perspective endowing it with certain ontological facilities extracted from its source including the environmental noises and hum of the machine that produces it. In this section we are going to unfold some of the approaches from noise studies to get to the crossroads of three conceptual notions that will serve as further points of departure for the present research. The examples are derived from noise studies, minimalist music and the drone installations of Éliane Radigue, Kristina Kubisch, Max Neuhaus, Alvin Lucier, and Maryanne Amacher in the 1960s, 1970s, and beyond. They are aimed at revealing the autonomous yet influential qualities of sound that are usually dismissed while influencing our lives in major and quite 'magical' ways as we do not usually catch up with their influence.

Our sonic as well as affective thinking is predetermined by these intangible aspects as spatiality, temporality and intensity – drastically different from what we were taught in various institutions along with the technologically dense reality we inhabit. One of the significant approaches to sound was implemented by Ray Murray Schafer who gave explicit definition to sound design along with his notion of soundscape. His intention was to combine different aspects of sound production that finally transformed into whole disciplines known as film and theatre production, stage and urban design, different sound entertainment as well as objects from our daily life that we consider natural and include them into urban context, for example, electrical cables, traffic lights, flickering banners and ads. Remarkable studies of the CRESSON research team and laboratory were made with respect to this orchestra of designed sounds (Augoyard & Torgue, 2005) as the majority of these are repressed by citizens without even being consciously processed. Undoubtedly, this density caused a bad effect not only on the natural realm of human ears to hear the tiny sounds but also in respect to our attunement to the environment. In this manner, affective and sound density is always present before even being registered by humans. Moreover, it is also contingent with its indications of potentiality and relationality. Thus, the human body placed in metropolitan spaces is subsumed by a hyper-intensity that requires a certain kind of involvement and energy.

Among other fields urban and environmental design plays one of the central roles in composing or building the spaces suitable for human interaction, entertainment and public life. For Kevin Lynch (1960) the whole idea of the city is memorizable and mappable. However, a lot of mega-cities are losing their vibrancy due to unknown reasons. As a theorist in urban history Richard Sennett raised the same problem and

questioned the gap between the historically conditioned context of the cities that were originally built with the aim of creating spaces where people would be comfortable with each other, and the changed situation of a vertical and horizontal expansion of urban spaces. Lifeless urban landscapes and an abundance of non-places such as airports, gasoline stations and fast food spots are a part of big cities and yet they convey no sense of life due to their complete emptiness.

The domains of the vertical and horizontal are close to what Baudrillard was developing when mentioning the emptiness behind the flickering surfaces of the glass facades of an idealized metropolis. This appearance of the facades is determined by a view that puts too much weight on the surface, and that does not take into account the mode of the 'inside' where a signifier is constantly substituted or 'simulated' by another, leaving the signified isolated, or derelict (simulacra) (Baudrillard, 2006). Technological development initially aimed at improving the quality of citizens' lives but instead amplified lifeless forms of 'flat' experience: screen-framed reality and personal detachment lead to the loss of felt-bodily resonance is amplified and this loss is amplified by indigestible urban life rhythms. Communicative detachment and mass atomization remind us of Michel Certeau's description of New York in 1980. The city appears as lined space filled with the trajectories of the 'Wandersmänner down below' always being in flux, a city within a city inhabited by citizens contingently building their invisible paths with their transient sonic and affective agencies.

However, there was a period when technological development seemed to be on a promising path towards the future. The ideas hovering in the space of that time allowed many female artists to emerge from the shadows of their male colleagues and realize projects whose material products we see in our daily lives. Pioneering at sonic agency exploration in an urban environment, sound artist Marianne Amacher, a Research Fellow at the Center for Advanced Visual Studies, Massachusetts Institute of Technology (1972–1976) was primarily interested in psychoacoustics of space and personalized time successions and sequences. Her contribution is remarkable, especially because these artists were working with concepts of what is only today known as virtual reality and the Internet. For three years she received a continuous real-time transmission of the Boston Harbor sound environment in her private studio. During her experiment she installed a microphone on the window with a view of the ocean at Pier 6 Boston Harbor with separate radio channels transmitting live sound. Later on she was giving lectures at MIT, with her course called "Lived Space" working out the results of her experiments with overlapping stereo and auditory dimensions:

> Composite mental images of immersion in space, direct physiological experience of an acoustic space, as distinguished from the perception of an acoustic space, aurally as image. After-images. Thresholds. Physiological resonances..... (Amacher, 1994).

Along with this she was experimenting with the subjective experience of sound and emotions in urban spaces creating aural architectures such as the telematic installation series "City-Links" (1967–1981). With long-duration recordings of urban sites, "City-

Links" exhibits the musicality of ambient sound recorded on tape. Amacher herself comments on her research in the following manner:

> I think of it quite literally in terms of architecture itself. When I'm able to have the opportunity to make a large installation, I learn the acoustics of the place, and I can work in more than one room: I may have six, I may have four, I may have seven rooms, or the entire structure. All of that began not because I had a fixed notion. Really it began because I hated loudspeakers. I was working in electronic media, so it was quite a contradictory thing. I was always interested in the spatial aspects of sound. I discovered that maybe if I put the speaker in there [points to the kitchen] – the way that you heard it from another room became much more rewarding. I could make a virtual meta-space, so you wouldn't get the sense of these [gestures to a nearby loudspeaker] boxes. (Amacher, 1994)

One of her works with the title "Synaptic Island: A Psybertonal Topology" is devoted not strictly to the material qualities of a building's infrastructures but also to the anatomy of the human body that was not passive in sound perception anymore: The plasticity of the inner ear stimulated by the tones automatically transformed itself into mini-synthezisers that amplified the sounding. The regions of space she researched 'on site' allowed her to experiment with textures and waves by building installations within a certain environmental location. Further series of installations designed by Amacher were called "MUSIC FOR SOUND-JOINED ROOMS" (1980–1995) and "MINI-SOUND SERIES" where she referred to the architectural features of sound, but this time the main interest of her was concerned with intense, location-based, dramatic sonic experiences built from "structure borne" sound (sound randomly passing through walls, floors, rooms, corridors) which acoustical engineers distinguish from the "airborne" sound experienced with commonly used loudspeaker stationing. A series of rooms were providing the space for staged design of sonic and visual installations created by the artist. This aural architecture was so immersive that it captivated the audience. One of her main aims was to create a special atmosphere with sound forming 'sonic theater' magnified by the expressive qualities of places: from rooms and corridors to walls, balconies, stairways. Sounding site-specific installations allowed her to build affective multi-dimensional experience before virtual reality was even created. The spaces were literally 'singing': reverberating and magnifying such environmental qualities as color and light; amplifying spatial presence as the sound shaped and interacted with the structural characteristics of the rooms before reaching the ears of the audience. The spaces themselves produced sound perceived through the bodies: felt and physical. This spatial realm is experienced by addressing the sonic aspect of architecture and the vibrancy of the urban environment. Indeed, it is not so much about implementing sound into the environmental context, it is really about rethinking listening, perception and affective aspects of finding oneself within the environment.

Extensive development of computer programs allowed for manipulative practices to explore sound synthesis possibilities in architecture. In order to master the orchestral sound masses Iannis Xenakis experimented with probability theories. He was primarily interested in the unity of heterogeneity to compose an intangible architecture of sound.

And yet, many theoreticians are comparing the concepts of stochastic and aleatoric or 'chance' music emerged from serialism as a method of composition initially crystallized from Olivier Messiaen's technique and further developed by John Cage and Karlheinz Stockhausen with high variability of such sonic components as rhythm, pitch and tone. They differ, however, in how they leave the musical setting open, allowing improvisation to emerge. Apart from the conceptual framework of "chance" music, the stochastic approach implemented by Xenakis allows for a greater understanding of a disordered coherency that he orchestrated through sound masses by folding a united set of random events forming a heterogeneity. Thus, randomness understood by chance as a free choice is entered into without any persuasion or method but predetermined by successive statistics inherent in the more probable 'state of affairs.' That leaves a certain openness and contingency of the sonic situation and that is what makes Xenakis works significantly different from aleatoric music – especially Pithoprakta (1955–1956) translated as "actions by means of probability." With negation of the common compositional structure Xenakis made revolution in music and opened a new temporal domain revealed through the atmospheres which rhythmical pulsations perceive corporeally. We will turn to this with greater precision in the next paragraph.

Since the beginning of the 19th century, human beings understood landscape formations from a geological perspective. Urban development led to pollution and prompted several changes in nature itself. Because of this, the whole idea of nature was reconsidered. The ethical questions of how to aesthetically, practically, and politically integrate nature into society were raised. In the middle of the 1960s, the majority of the artists started undertaking attempts to place their works of art outside the galleries, right into the landscape or urban environment. Their aim was not to emphasize land or earth peculiarities; they simply incorporated various aspects of the environment in their projects, with the materials engaging the landscape. Such artists worked with galleries only occasionally, given the fact that modern urban industries were rearranging and deforming the general landscape and structure of the ground. A full understanding of this would imply techniques for the emergence of a wide range of human interactions between the natural and built environments. In this respect, landscape and site-specific art offer a variety of possibilities and models.

One of the pioneers of landscape art, Hans Haacke, incorporated into his works such components as wind, water, and changing aspects of the environment with its natural systems, which were not necessarily placed on the bare ground outside the urban environment. His early ideas engaged waves, bubbles, sways, streams, whirlpools, and drops with precise levels of movement that he incorporated into his installations. Water is also not the only material he used in his works when compared to natural and non-organic liquids. Nonetheless, he encompassed water in a broader sense, including rivers, oceans, and underground turbulence. The blowing wind systems he created and carefully integrated in the 1965 installation "Blue Sail," imitated and manipulated liquid and aural sources. The piece of silk waving in the wind in an impulsive manner provides a mutual interaction between the technically elaborated environment and the wholeness of the installation experienced by the viewer in a corporeal manner. The water constructions built by Haacke are difficult to articulate in words due to their original program-oriented

meaning, which is organized as a language to a certain extent. As the non-organic and fluid substance that is most alive, water requires the process to describe its hydrodynamical events and the sequence of these events refers to what we usually encounter as a whole. Haacke noted that despite the environmental and aesthetic aspects of his artistic experience, the “magical” combination derived from process and the quality of things still appears to be surprising. Although he considers the role of the observer to be of high importance, the sense of landscape and the artistic work incorporated into it demand a forming process in the domain of time emerging as a waveform or in the frequency sphere as a spectrum of power that is always ambiguous and always moving. In fact, his works were made with a certain impulse to compose something complex and inseparable with regards to humans and nature. After all, these systems operate apart from what we used to understand as stable objects–merely mechanical equipment that is manipulated by invisible forces. In this sense, the sound art techniques of memory and preservation are opening a new temporal perspective.

The Earth's landscapes are rich in natural systems with a huge variety of processes, atmospheric changes, sonic events, islands, and traces of human activity. The sublime face of nature is revealed through the openness of the symbolic gesture. It is a pure and naive viewpoint that imbues the atmospheric qualities of the environment with a certain sounding innocence that differs greatly from what the Romantics, for example, praised. These natural sites, changed and transformed, have become the center of artistic activities. Then, one might wonder, what is the connection to atmospheres in this context? As long as each work demands a unique approach that celebrates the artist's relationship with the environment, and as long as atmospheres are attached to certain landscapes and seasons, such as thunderstorms, November weather, and spring air, we are dealing with affective atmospheres that are anchored to landscapes or cityscapes with a certain “style,” both, meteorologicaly and affectively. Examples range from the tense atmosphere of a protest parade to the calm or restless atmosphere of a city, all of which emerge as naturally composed events in the open air. Another famous landscape artist, Alan Sonfist, was interested in myths and territorial entropy which led to his spiral-shaped and symbolic art. His aesthetics shaped the attitude between nature and mankind: each site he uses for his artistic move is thoroughly chosen and submerged with the natural peculiarities of place. He finds symbols and places them on the canvas laid out on the ground. Alan Sonfist's “Time Landscape” (1965–1978) is famous and widely recognized as a well-constructed design plan with a certain rhythm and vast acoustic space. Such spatial phenomena exist, even if they are not or hardly taken into account by the classical dogma of emotions encoded in the classic cultural dogma which still dominates the majority of contemporary societies.

## PULSATING TEMPORALITY IN TRANSLATION OF THE RHYTHMOSPHERE

Moving on from the theoretical foundations of Music and Sound Art to the practical assumptions of Hermann Schmitz's New Phenomenology, it is worth noting that the Deleuzian and Guattarian approaches, similar to his idea, are pervasive and

universalizing. In his provocative manner not only does Schmitz go further, exhibiting eight dynamic modalities of the felt-body (Leib), he also provides a non-classical approach to almost every sphere of human and non-human life applying his understanding of atmospheres. The definition of atmospheres, though, remains a conundrum, as Schmitz tends to situate his notion in cases from a dense variety of authors. The only concept that Schmitz uses as a universal one to analyze the state is the island of the body [Leibesinsel]. But even these islands are not located calmly and distinctly, but are constantly moving and floating. The other nine terms in Schmitz's understanding require dynamism: the corporeal state is then a kind of pulsating magnetic field. Along with the dialectics of contraction and expansion, Schmitz uses nine states to navigate the field of the felt-body which he claims to be autonomous from the physical body as it expresses the intense fluidity of the bodily state. The variety of transitions between the individual as well as collective states of the body turns it into a certain kind of sonar for humans and non-humans. As soon as a person is alive, (s)he is always trembling. This is not a pulsation that makes the felt-body resonate but it is the environment with a certain atmosphere attached to the landscape that has a specific rhythm and temporality or duration which I define as a rhythmosphere.

Apart from their definition, the temporalities of atmospheres are hard to approach due to a variety of factors. Of course, the first factor and most common subject of critique is their diffuse character. Secondly, there are some objections claiming the dynamic impossibility of atmospheres (Kinch & Hølund, 2012). Atmospheres reveal temporal dimensions that are hard to neglect with all the suggestive movements they imply along with corporeal stirrings. Here we claim atmospheres to be dynamic by using extracts from the famous debate between Gaston Bachelard and Henri Bergson on rhythm in the context of duration. Of course, rhythm here exemplifies the elaborated relativity of temporal dynamism, requiring bodily and spatial awareness to be phenomenologized. French urban theorist Jean-Paul Thibaud defines atmospheres and ambiences through the notion of resonance that encodes their temporality. They fill the environments with a sense of life by setting a vibrant tonality of places. Tonality, in turn, could be measured as volume and intensity and is something that unites sound and feelings. They would hardly be approached without temporal aspects as both of the components emphasize a fleeting dimension and in-betweenness. As a result, the concept of rhythm not only composes the unique path to felt-bodily interaction with the environment, both human and non-human, but it also enframes the reality of the perceiver and the perceived. One can hardly predict a certain way of sensing the atmosphere but it is certainly possible to observe the effects of how humans and non-humans are founded within certain environments enveloped by the radiance of atmospheres. The sense of temporality derived from an Eastern emphasis on natural cycles of rhythms such as waves or heartbeats that renew with every return could easily be compared to monotonous and repetitive rhythms. Thus, as Lefebvre suggests, "a rhythmic or dynamic atmosphere not ‚placed' inside or outside but in the shifting relation between the interconnected rhythms of the self, the other and the environment" (Lefebvre, 2004). This feature of atmosphere that unites sound and feeling as phenomena through their temporal unfolding also opens the ecological dimension of the body and the environment.

With the analysis of an object that is separate from its source (objet sonore), the founder of Musique Concrete, Pierre Schaeffer, noted that there are a lot of sounds amidst which we usually find ourselves, but not all of them are musically composed and, in a chaotic manner, appear as noise. For him, sounds are separate ontological individuals with particularities. “As soon as the call is in the air,” indicates his follower, entomologist and sound artist Francisco López, it no longer belongs to the frog that produced it (López cf. Cox, 2018). Here, we suppose that both of them miss the fact that these are merely perceived and anticipated temporal events. When it comes to sound, time-based media has altered how we perceive the chain of signification. There is always anticipation as well as appropriation of what we hear, but it's problematized by relational and dialectic relationships.

For the musician and percussionist Jarrod Fowler, such kind of dialectic is rhythmic. Basically his idea is based on two-way relationships between the two elements involved in the interaction. “The interaction of drum skin and stick, for instance, shares important attributes with the interaction of text and voice” (Kim-Cohen, 2009). He conceptualizes rhythm by implying that the beat is fundamental in sound production. Most of the revolutionary movements of twentieth-century music, from Stravinsky to Reich and Cage were experimenting with rhythm and variations of the beat in both minimalist composition and music in the age of technological reproduction. Fowler himself is deeply immersed in postwar musical and artistic practice, citing as influences Cage, Fluxus, minimalism and experimental hip-hop. The two apparently discontiguous areas of experience initially come together for Fowler’s practice in the “systems of field guides, morphology, taxonomy and their translation” (Bolle, 2007). For Fowler’s early work, field guides to trees, birds, insects, and other non-human subjects serve to overcome the existing sonic context and implement something fresh. Dealing with time and space, not only were they inspired by the content itself but also touched fundamental questions of the conditions of experience and existence. These attempts were systematic as well but in the course of his research Fowler came upon the question of the translation of rhythm (see Fowler’s (2006) CD Translation as, especially the track named “Wittgenstein to Fowler,” that encodes the ordering of remarks in Wittgenstein’s Tractatus Logico-Philosophicus and translates it into a rhythmic structure), its typology and morphology. What Fowler literally does with the “Tractatus” is that he translates it into a sequence of clicks:

> ”Each section is represented by a silent duration equal in seconds to its number (e.g., section 1.12 is 1.12 seconds long). The start of each section is denoted by a click. The result is a sequence of clicks, moving farther and farther apart in time. “‘So you literally think of those numbers [of the Tractatus] stacked up against each other. So you have click, click . . . click . . . . . click . . . . . click.’” (Kim-Cohen, 2009, p. 233, quoting Fowler).

When it comes to rhythm, Schmitz implies not only pulsation but the dialectical intensity emerging out of the durational process. Bachelard sticks to nearly the same view by noting that it is not the melody that determines duration but the rhythm (Rutgeerts, 2019). Thus, rhythm is not limited by naturalistic exemplifications such as heartbeat or

breathing but by the pulsating fluctuations that we experience in pain or pleasure (see Soentgen, 1998). Rhythm, according to Schmitz, is one of the forms of suggestive movement that manifests itself as a gripping force and imposes itself through Gestalt-progressions (Gestaltverlauf). Half-things are thus the sound gestures from which sonic events, motifs, affective themes, and melodies are constructed with their bridging function for corporeal communication. Interestingly, he also includes disturbing noises such as intrusive voices, whistles, and the dripping of the faucet (Schmitz, 2005). Their immediacy makes sounds and feelings impossible to distance themselves from.

When Schmitz unfolds his notion of the felt-body, it should be stated that he is not concerned with a living body (corps vivant) as opposed to the scientific notion of the body but with the felt-body (Leib). The phrase 'living body' though, refers to the idea of the organism as objectified by natural sciences and modern medicine. Such a body incorporates most of the things that are known to be human behavior, such as expressive behavior that is controlled by feelings and intentions, behavior in talking and thinking, etc. Merleau-Ponty (2002) and, more recently, Thomas Fuchs made imilar attempts to conceptualize the 'whole person' as a "living organism" and objectified natural body, raising understanding of human experience to the level of existential psychology. The idea of the living organism, or corps vivant, goes back to the above mentioned split of the human being into body and soul and lies in the attempt of the natural-scientific worldview to dominate human behavior, which includes affective and sonic agency. Schmitz, on the other hand, insists on the fallacy of antiquity: It is incompatible with the corresponding characteristics of the physical body to posit sensations in one's own body. That means to posit the use of the five senses before physical action or to posit a body schema not derived from one's life experience, including the nine felt-bodily states mentioned (such as hunger, thirst, pain, lust, freshness, and fatigue). This is why the living organism cannot be introduced as the 'inside' of the body being scientifically investigated, as Merleau-Ponty did, because the opposite side must at least coincide with the outside. Such an understanding of the body is "like an attempt to impersonate a song (in the dimensionless space of sound) as the inverted voice of the singer (in the body space that contains the surface) out of which it emerges" (Schmitz, 2017)[1]

Instead, the body (Leib) is to be examined partly in conjunction with the physical body (Körper) in specific localities. This perceptive body deserves to be examined because of its indispensable significance in relation to subjectivity, where its potential to be affected serves as a resonance board (Resonanzboden) for the affective essence (affektive Betroffensein). It is the basis for all contacts in corporeal communication (leiblicher Kommunikation). Thus, according to Schmitz, the subject floats in an ocean of feelings, sounding like a swimmer.

My starting point for speaking of "rhythmosphere" is the concept of non-pulsed time (Aeon) derived from Deleuze and Guattari's "A Thousand Plateaus." Their definition of time differs from the understanding of "territorialized" or pulsed time, it thus differs from Chronos marking time merely by the repetitive rhythm of a narrative or musical

[1] My translation of: „[…] als umgedrehter Körper dem Versuch gleicht, einen Gesang (im flächenlosen Raum des Schalls) als umgedrehten Stimmapparat des Sängers (im flächenhaltigen Raum des Körpers) auszugeben, weil er aus diesem hervorgeht."

composition. Rather it follows a concept of time which Deleuze also defines as Bildungsroman time, marking the formation of a subject (Deleuze & Guattari, 1987). Non-pulsed time (Aeon) is a developing process reminding the listeners of the territorialization of space with its intrinsic properties and velocity, whereas pulsed time is more about a clear sense of chronological time. In this way, pulsed time is also a musical time with its unique sonorous characteristics and spatial, performative, and aesthetic possibilities of becoming. Although the noises we usually hear have no harmonic properties, they do, of course, have the potential for such. Apart from Cage, the first one who made a remarkable investigation into the non-musical sounding world was Max Neuhaus with his work "LISTEN" (1966), as he tended to the sound and affective qualities of the work outside the concert hall in order to examine the environmental qualities of sound. He labeled the hands of participants with the eponymous word "Listen," inviting them to walk outside and experience what they hear, allowing the massiveness of urban noises to be blended and perceived in a precise manner. His focal point in sound installations was the work "Drive-In Music" (1967), in which the sounds were free of any burdens imposed by a visual arts framework. These practical assumptions, without doubt, shared in Cage's rebellious understanding of temporality and duration, as well as processes and becoming. In his highly influential essay "Art and Objecthood" (1967) Michael Fried drew a distinct line between sound installations requiring the intentional participation of the audience and the works that suppose physical presence and agency, including the epiphany of the aesthetic. This is what Böhme would term as the "anesthetization of reality" (Böhme & Thibaud, 2017). The unity that modernist painting and sculpture achieve, as Fried suggests, are complete in the banality of their wholeness. By contrast, theatrical works demanding physical presence of the spectators focus on the materialistic conditions and capture the visitor's way of finding oneself within a certain space. Spatio-temporal relationships of such contemplation are in-between and atmospheric. Indeed, in his book Cox notices a specific detail in Fried's research that emerges from an account of night drive to New Brunswick by sculptor Tony Smith. He emphasizes the movement through the changing landscape and the road which is artificial and yet the process itself is revealing:

> At first I didn't know what it was, but its effect was to liberate me from many of the views I had had about art. It seemed that there had been a reality there that had not found any expression in art. The experience on the road was something mapped out but not socially recognized. I thought to myself, ‚It ought to be clear that's the end of art.' Most painting looks pretty pictorial after that. (Fried, 1967 cf. Cox, 2018)

Indeed, just as the lived experience of a road over a certain duration has its effect, so does the atmosphere perceived in the openness of a pre-dimensional character, mainly through the resonance and vastness [*prostor*]. This evokes the distinction between spatio-temporal concepts as traced by Schmitz: There is space as an Aristotelians topos and there is measurable space as conceived by Descartes. The space that is not measurable physically is also not geographically located and, at the same time, requires corporeal dynamics of the felt body–rhythmical pulsations of contraction and expansion dependent

on a certain atmosphere. Needless to say, atmospheres are not simply available through the efforts of human beings and material culture. They have temporal dimension changing in accordance to the material or, to be more certain, physical features of the environment. This leads to the conclusion that atmospheres themselves require multi-dimensionality including the temporal tensions.

Apart from Brian Kane, the critique of the ontological turn does not arise from Schmitz's and Böhme's notions of atmosphere. I add to this that despite Schmitz's systematic approach the ambiguity of his „atmospheres" is hard to be grasped even after thorough analysis of the whole work. At the same time, atmospheres are a semantically wide and adaptable tool that is not conceptualized to be universally used. Interestingly, Schmitz also suggests that atmospheres are captivating and temporal, ensuring a certain continuity and duration as well. In the separate volume of his intellectual endeavor devoted to perception (Der Wahrnehmung) excavates the felt-body (Leib) not only to emphasize its role in arts and psychology but also in spatial navigation within chaotically changing world (Schmitz, 2019).

When it comes to perception there are several meanings and one of them could be stated as directionless space. Apart from atmospheres there is also the felt-body turning into a "sounding board" (Slaby & von Scheve, 2019) or naturally elaborated and sonar. Always being in a certain disposition and communication through rhythmical pulsations, namely contractions and expansions, this body forms not only a subjective rhythmosphere but also allows the subject to navigate the chaotic world of fluxes by attuning it to different environments. This does not involve cognitive process at the specific moment of affectation especially when it is amplified by artistic practices. In this sense Schmitz regards rhythm not as something similar to the heart beating but quite eccentric and including the pulsation movements known from being in pleasure of pain. From scientific perspective it is the tympanic movement transferred in the air to liquid, so that the pressure in air that fluctuates turns to oscillating flow, a movement of a fluid. Thus, in simple words hearing of terrestrial vertebrates happens underwater through the contact of hairs and nerve cells transducing sound into nerve impulses (Wiley, 2015).

This apparatus does not amplify the energy of the sound. It instead transforms fluctuations of pressure in the air to movements of fluids in the inner ear. Yet this change greatly improves the mechanical efficiency of bending the tiny hairs that trigger action potentials in the in the sensory cells. It is another elaborate system of impedance matching

At this point, Kane's notion of the fallacy and the confusion in sound studies of embodied experience and exemplification opens another dimension and mode of temporality. On the one hand, one is able to navigate the noisy world with the help of the felt-body due to its existential qualities of finding oneself somewhere. These felt-bodily states and dispositions play a crucial role in perception for Schmitz, besides, these are always subjective. On the other hand, Sonic Flux autonomised by Cox is like an ocean for sounding potencies. In order to navigate a drastically changing world, one needs a method, and in the artistic realm needs something more than such an oceanic or aquarian description. Here, the New Phenomenology has the potential to provide access to the phenomenon. There are, however, several things that I see as problematic in the

understanding developed by Schmitz and his followers of the felt-body and physical body and their temporality.

In his analysis of Schmitz's System of Philosophy Jens Soentgen (1998) mentions a tendency to autonomise and separate the felt-body from the physical body and, what is more, to empower it with forces beyond any phenomena at all. However, as we learned from Heidegger and Merleau-Ponty, the physical body (Körper) is always present and placed in the noisy and chaotic world. Barely anyone can deny that it is impossible to ignore the noise. Just like atmosphere, noise has a certain temporality, intensity, and duration. All three components are united by rhythmical progressions. For the following reasons this is important when it comes to bodily, felt-bodily processes and sonic experience. First, as noted before, noise and density of affective patterns are imprinted through an all-encompassing condensed figure-background pulsation available in the process and amplified emerging through instants with a certain duration. Despite the wide range of metaphors associated with rhythm and duration, Bergson chooses melody to draw attention to the first component. The second reason concerns the relation of ‚outside' and ‚inside' perspectives. It is not only about *Nomos* regarded as a melody or a custom, a law, a habit or even a tradition. There is the domain of the 'outside' perspective that reveals the whole affective architecture that is possible to undertake relating to distance itself. The "calling" is more than the Greek *Nomos*, it is a sound constellation that regulates animals, insects and other creatures in the environment and world (Umwelt) and makes the landscape unique. This opens the perspective we got use to as quite anthropocentric with the skin (both human and non-human) may be regarded as a huge membrane being faster to receive the environmental stimuli than thoughts that are processed cognitively (see Massumi, 2019). Due to the constant spatial pressure on the membranes of the human body (from the inside), the fluctuations in forms of a sound waves on the outside stimulate vibrations that reach the membrane of eardrum. Animals and insects are also able to convert sounds and wave frequencies to nervous impulses involving cell membranes of their neurons. For example, the bugs and the bees have membranes that cover enclosed spaces in the wall-like area of the thorax, abdomen, or legs.

The human skin turns out to be a huge membrane, a 'macro' version compared to what we have in our ears, then the 'surfaceless' space without distance' that Schmitz compares to anocean or pool in micro/macro scales can navigate by 'inner' sonar, namely the felt-body tha is encoded with a certain disposition. The elasticity of the rhythmosphere, which is available at a wide human and non-human range, solves anthropocentrism and the subsequent cultural or historical narrowness that arises here.

In Western cultures visual perception is endowed with a dominant epistemological value. Ocular-centrism usually leads to biases and ignorance of the things that are ambiguous, untamed, always in-between and in-becoming. The best examples are sound, weather, and feelings. As John Cage noted, "sounds invade areas where nothing's definite (areas – micro/macro – adjacent the one we know in). […] It'll sound like what we hear when we're not hearing music, just hearing what we happen to be" (Cage, 1993). The transient and all-encompassing qualities of sound and feeling allow as to provide a clear definition of our feelings or to detect the source of sound only when it is already gone and

we have seen evidence of its existence. All of the other cases seem to be visually representative and 'flat' in the sense of reference to experience. Italian futurist Luigi Russolo (1986) was intimidated by the phenomena of noise. He investigated the noisy world within the Futurist movement right after the significant inventions of Edison and managed to invent new noisy instruments (intonarumori) to capture large-scaled sound. These instruments had orientations for glissando, a continuous slide of pitches. That is why "enharmonic notation" consisted of "continuous lines rather than discrete points" (Cox, 2018, p. 326). As one of the main figures of experimental music of the 1970s Chris Cutler conceptualized noise differently than Jacques Attali. While Attali regarded noise as a system of codes, Cutler (1992) embraced the idea of noise as a "memory system." Interestingly, atmospheres similarly carry placeless and intangible memorial pieces of information available for a perception without focusing.

Later on, Pierre Schaeffer started experimenting with the new dimensions of sound that became available through the phonograph and the manipulation of fragmented and concrete sounds. The main purpose was to investigate noise as isolated from its form in order to reveal sound matter as such. Another influential male figure was Christian Marclay who attempted to explore the full potential of sound through turntabling (scratching) techniques, by interacting with improvisational montages of sound collages, by creating new configurations and sets of records. The idea of temporality, understood as the longest distance between two points, would definitely not be supported by him. Instead, he used turntabling techniques to create a temporal structure that was discontinuous and nonlinear. This neglects the historical and cultural features of the sonic materials, although they crucially matter in sonic and urban design.

Finally, when one speaks of sound in terms of the ontological turn (Cox, Heindge, and Goodman) and of these sound artists one is constantly referencing experience, whether human-oriented or constrained by correlationist frameworks. The ontology proposed by such authors and the pursuit of innovative listening implies a Promethean attitude and depends on a predetermined setup that is already set upon a "more" or "hyper," often purely instrumental and aimed at regulating and modifying sound through technology and software techniques. In contrast to the work, for example, by Marianne Amacher, the pulsation of such tuned and natural flows has an autonomous temporality that already occurs in relation to the one who perceives them and is often violent at its core.

## CONCLUSION

By examining the subjective disposition of the felt-body (Leib), always in communication, it is possible to register the residing of sound and sensory events according to predispositions and personal rhythms that change according to the environment, space, or collective in which subjects reveal themselves. Thus, I argue, sound artists operate in terms of different branches of materialism within an aquarian environment that is structurally encoded with the sets of rhythms reproduced by the subjects. Their experimental ways of accessing the senses and sound per se through various ways of compressing, capturing, and manipulating these elements reduce them to

an element of the private, subjective, and diffusely experienced within a particular ontology – which is described in the terms from which these theorists derive their critique, such as dialectic or Cartesian dualism. Ultimately, the integrity of the autonomous modus of sound and the climactic properties of the sensuous are perforated by intense attempts to overcome the above terms, the use of which is provoked by the conceptual foundations of the material processes of expression, constrained by such loops of signification.

All along, technologies and various ways of capturing sound open up a new political dimension that enables the manipulation of the locations of the auditory and the sensual, alienating the spheres of corporealized sensations from subjects following deterministic routes not only in the affective modalities of the sensual but as part of the urban setting. Thus, the intensity of sound and sensuality that is not grounded nevertheless has a material character, often demonstrated in sound and art installations, but in a private way, as it sets a certain temporality and affective modality expressed in a spatial flow that affects the behavior and well-being of subjects but is not fixed in place. However, the movement of flows of sound and energies within the natural world is often overlooked by most materialistic art, despite the broad framework of site-specific art and urban installation subjects. Phenomenological inquiry based on the practical assumptions of Hermann Schmitz's System of Philosophy and the results derived from the artistic and scientific investigations of a wide range of researchers, designers, and authors allows one to “focus without focusing,” in other words, to non-intentionally become attuned to dynamic phenomena and to find oneself amidst the forests and sonic worlds of intangible architecture of affect available with certain rhythmospheres formed in the chaotic realm of the contemporary world.

Although the sensory qualities of sound and feeling can change, we have considered instances of continuity and focused on environmental rhythms that are formed in the various cleavages of the temporality of different spaces. Due to the variety of bodily states, one is unstable within such temporal articulations of an intense continuum. The radical shift in the conception of temporality towards duration and becoming, noted by theorists of auditory culture that are influenced by the philosophy of Bergson, Whitehead and Deleuze, fuels experimental sound art practices and installations by artists such as Max Neuhaus, art historian Michael Fried, and others, demonstrating the diffusive spatiality of temporal markers of feeling and sound. These practices and installations involve the manipulation by computer programs, preceded by civil and ceremonial practices of marking time, including the quantitative capture of time by mechanical clocks. Such mechanical markup of equidistant sequences of equivalent and impersonal moments resonates with those singularities of memorable moments that were characteristic of the concrete life of a community that has its own rhythms distinct from the scientific approach to time. Chronological time subordinates spatiality, but does not take into account that it passes and lasts. In this regard the merging of rhythm and atmosphere reveals a new affective and sounding domain: the political dimension of eternal becoming.

## REFERENCES

Amacher, M. (1994). *Synaptic Islands: A Psybertonal Topology / Architecture as Translation of Music* (E. Martin, Ed.). Princeton Architectural Press.

Augoyard, J-F. & Torgue, H. (2005). *Sonic Experience: A Guide to Everyday Sounds.* McGill-Queen's University Press.

Baudrillard, J. (2006). *Simulacra and Simulation*. The University of Michigan Press.

Böhme, G. and Thibaud, J. P. (2017). *The Aesthetics of Atmospheres*. Routledge.

Bolle, S. (2007). *An Interview with Jarrod Fowler. Rare Frequency Web page*. WZBC radio. www.rarefrequency.com/2007/07/jarrod_fowler.html

Cage, J. (1961). *Experimental Music // Silence: Lectures and Writings*. Wesleyan University Press.

Cage, J. (1993). Art and Technology. In R. Kostelanetz (Ed.), *Cage J: Writer* (pp. 111-113). Limelight Editions.

Chladni, E. (1787). *Entdeckungen über die Theorie des Klanges* [Discoveries on the theory of sound]. Bey Weidmanns erben und Reich

Cox, C. (2018). *Sonic Flux: Sound, Art, and Metaphysics*. University of Chicago Press.

Cutler, C. (1992). *Necessity and Choice in Musical Forms*. Autonomedia.

Delanda, M. (2000). *A Thousand Years of Non-Linear History*. Griffero, T., & Tedeschini, M. (2019). *Atmosphere and Aesthetics: A Plural Perspective*. Palagrave Macmillan.

Deleuze, G & Guattari, F. (1987). *A Thousand Plateaus. Capitalism and Schizophrenia*. University of Minnesota Press.

Fried, M. (1967). *Art and Objecthood: Essays and Reviews.* University of Chicago Press.

Fuchs, T. (2019). The Uncanny as Atmosphere. In T. Griffero & G. Francesetti (Eds.), *Psychopathology and Atmospheres* (pp. 101–118). Cambridge Scholar, Newcastle upon Tyne.

Fowler, J. (2006). Translation as Rhythm [Album]. Errant Bodies Press

Goodman, S. (2010). *Sonic Warfare: Sound, Affect, and the Ecology of Fear*. MIT Press.

Kim-Cohen, S. (2009). *In a Blink of an Ear. Toward a Non-Cochlear Sonic Art*. Continuum.

Kittler, F. (2009). *Gramophone, Film, Typewriter* (G. Winthrop-Young and M. Wutz, Trans.) (pp. 15–17; 22–24). Standford University Press. (Original work published 1999)

Kinch, S., & Højlund, M. K. (2012). Designing Dynamic Atmospheres – Highlighting Temporality as Design Concern within Interaction Design. In *Ambiances in action / Ambiances en acte(s)* (pp. 229–234). International Congress on Ambiances.

LaBelle, B. (2006). *Background Noise: Perspectives on Sound Art.* Bloomsbury Academic.

Lynch, K. (1960). *The Image of the City.* MIT Press.

Merleau-Ponty, M. (1947). *Sense and Non-Sense* (H. L. Dreyfus and P. Allen Dreyfus, Trans.). Illinois Northwestern University Press.

Merleau-Ponty, M. (2002). *Phenomenology of Perception*. (C. Smith, Trans.). Routledge.

Massumi, B. (2019). *Architectures of the Unforeseen: Essays in the Occurrent Arts.* University of Minnesota Press.

Massumi, B. (2021). *Parables for the Virtual: Movement, Affect, Sensation* (12th ed.). Duke University Press.

Oliveros, P. (2010). *Sounding the Margins: Collected Writings 1992–2009*. Deep Listening Publications.

Oznobikhina, I. (2022). Space, Rhythm and Architecture: Atmospheres in Works of Iannis Xenakis. In A. Georgaki & M. Solomos (Eds.), *Proceedings for Xenakis 22: Cetenary International Symposium* (pp. 320-327). Spyridon Kostarakis. https://xenakis2022.uoa.gr/proceedings/

Relph, E. (1976). *Place and Placelessness*. Pion.

Relph, E. (1981). *Rational Landscapes and Humanistic Geography*. Barnes & Noble.

Russolo, L. (1986). *The Noises of Nature and Life (Timbres and Rhythms*). Pendragon.

Rutgeerts, J. (2019). Revisiting Rhythmanalysis: How Rhythm Operates in the Work of Gaston Bachelard and Henri Bergson, *Parrhesia*, *31*, 85–102.

Schmitz, H. (2005). *System der Philosophie: Band III. Der Raum: Teil 2. Der Gefühlsraum* [System of Philosophy: Volume III. The Room: Part 2. The Sensorying Space]. Bouvier.

Schmitz, H. (2011). Emotions outside of the box–the new phenomenology of Feeling and corporeality. *Phenomenology and the Cognitive Sciences*, *10* (2), 241–259. https://doi.org/10.1007/s11097-011-9195-1

Schmitz, H. (2012). *Atmosphärische Räume* [Atmospheric Spaces]. In R. Goetz & S. Graupner (Eds.), *Atmosphäre(n) II. Interdisziplinäre Annäherungen an einen unscharfen Begriff* (pp. 17–30). Kopaed.

Schmitz, H. (2017). *Zur Epigenese der Person* [On the Epigenesis of the Person]. Verlag Karl Alber Freiburg.

Schmitz, H. (2019). *System der Philosophie: Band III. Der Raum: Teil 5. Der Wahrnehmung* [System of Philosophy: Volume III. The Room: Part 2. The Perception]. Bouvier.

Slaby, J. & von Scheve, C. (Eds.). (2019). *Affective Societies: Key Concepts.* Routledge.

Soentgen, J. (1998). *Die verdeckte Wirklichkeit. Einführung in die Neue Phänomenologie von Hermann Schmitz* [The Hidden Reality. Introduction to the New Phenomenology by Hermann Schmitz]. Bouvier.

Trigg, D. (2020). The Role of Atmosphere in Shared Emotion. *Space and Society*, *35*(2), 100658. https://doi.org/10.1016/j.emospa.2020.100658

Voegelin, S. (2010). *Listening to the Noise and Silence. Towards a Philosophy of Sound Art.* Continuum.

Voegelin, S. (2018). *The Political Possibility of Sound. Fragments of Listening.* Bloomsbury Publishing.

Watsuji, T. (1961). *Climate and Culture: A Philosophical Study.* Ministry of Education.

**СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR**

Ирина Игоревна Ознобихина
reneozanam@gmail.com
ORCID 0000-0001-5363-4515

Irina Oznobikhina
reneozanam@gmail.com
ORCID 0000-0001-5363-4515

Статья поступила 9 октября 2022
одобрена после рецензирования 15 декабря 2022
принята к публикации 25 декабря 2022

Received: 09 October 2022
Revised: 15 December 2022
Accepted 25 декабря 2022

https://doi.org/10.48417/technolang.2022.04.09
Research article

# The Composition of Saint Petersburg Scents: Smellwalks for Urban Exploration

Elizaveta Redko (✉) and Maria Bogatyrenko
[1] Peter the Great St.Petersburg Polytechnic University, Polytechnicheskaya, 29, St.Petersburg, 195251, Russia
redko.ev@edu.spbstu.ru; bogatyrenko.mv@edu.spbstu.ru

## Abstract

Smells are an integral part of the perception of space, but also one of the most difficult aspects to investigate. This article presents the image of St. Petersburg through his composition of smells. As a result of the analysis of the smell paths described by respondents (N=81), noting all the smells and the associations that arise long their route of movement around the city, several visual representations of the composition of smells of St. Petersburg were developed, fixing different aspects. The first method of visualization is a classic circle of smells, that will form a general idea of their composition, which directly presents the main categories (food, city, nature), each of which in turn is divided into independent elements and their sources. The second method of visualization is the correlation of the emotional assessment of smells, with their frequency of occurrence during a walk in the form of spheres of different colors and sizes. The third visualization is a generalized "route of smells," on which possible smells and their sources are marked on a fragment of the city map from the metro station "Ploshchad Muzhestva" to the Benois Garden. The fourth type of visualization is a representation of the same urban route, but according to the individual compositions of each respondent, noting the frequency with which an individual perceives a certain smell and the set of smells that are detected. The variations in representing smells shown in the study allow us to see many different approaches to the problem of composition, which can be both a generalized scheme and a map of the area, taking into account the emotional component, as well as individual characteristics.

**Keywords**: Smell; Smellwork; Composition; Association; Petersburg

**Acknowledgment:** We express our gratitude to Elizaveta Solomatova for assistance in writing and editing the research article, Anastasia Mikhailova, Ivan Starostin and Vicroria. Halfina. for assistance in developing diagrams and diagrams to the work data, Sofia Orunova, Lilia Bibulatova for translating the article into English, Andrea Gentili for his editorial support and respondents who took an active part in the survey. We also want to express our gratitude to our research advisor Daria Bylieva for the opportunity to write the research article and for her contribution to this work.

**Citation:** Redko, E., & Bogatyrenko, M. (2022). The Composition of Saint Petersburg Scents: Smellwalks for Urban Exploration. *Technology and Language*, *3*(4), 125-142. https://doi.org/10.48417/technolang.2022.04.09

УДК 159.933:71
https://doi.org/10.48417/technolang.2022.04.09
Научная статья

# Композиция запахов Санкт-Петербурга: Исследование города через маршруты ароматов

Елизавета Редько (✉) и Мария Богатыренко
Санкт-Петербургский политехнический университет Петра Великого, ул. Политехническая, д. 29, Санкт-Петербург, 195251, Россия
redko.ev@edu.spbstu.ru; bogatyrenko.mv@edu.spbstu.ru

**Аннотация**
Запахи составляют важную часть восприятия пространства, однако запах – один из самых сложных для фиксации аспектов пространства. В данной статье представлен образ города Санкт-Петербурга через композицию запахов. В результате анализа описаний маршрутов с фиксацией запахов и ассоциаций респондентов (N=81), было разработано несколько визуализаций композиции запахов Санкт-Петербурга, отражающих разные аспекты. Первый способ визуализации представляет собой классический круг запахов для формирования общего представления о композиции запахов, в котором представлены непосредственно основные категории (еда, город, природа, специфические запахи), каждая из которых в свою очередь подразделяется на самостоятельные запахи и их источники. Второй способ визуализации представляет собой соотнесение эмоциональной оценки запахов с их частотой появления в ходе прогулки в форме сфер разного цвета и размера. Третья визуализация – это обобщенный “маршрут запахов”, на котором отмечены возможные запахи и их источники, на фрагменте городской карты от станции метро “Площадь Мужества” до сада Бенуа. Четвертый тип визуализации – это представление о том же городском маршруте, но уже в виде индивидуальных композиций каждого респондента, где видна как частота упоминания отдельных запахов, так и специфичность совокупности запахов для отдельного человека. Представленные в исследовании варианты репрезентации запахов позволяют увидеть разнообразие возможных подходов к проблеме композиции, которая может представлять собой как обобщенную схему, так и карту местности, учитывать эмоциональную составляющую, а также индивидуальные особенности.

**Ключевые слова:** Запах; Карта запахов; Композиция; Ассоциация; Петербург

**Благодарность:** Хотим поблагодарить Е. Соломатову за помощь в написании и редактировании научной исследовательской статьи; А. Михайлову, И. Старостина и В. Халфину за помощь в разработке диаграмм и схем к данным работы; С. Орунову, Л. Бибулатову за перевод статьи на английский язык; Андреа Джентили за его редакторскую поддержку и респондентов, принявших активное участие в опросе для статьи. Также мы хотим выразить благодарность нашему руководителю Д.С. Быльевой за предоставленную возможность в написании научно-исследовательской статьи и за внесенный вклад в данную работу.

**Для цитирования:** Redko, E., & Bogatyrenko, M. The Composition of Saint Petersburg Scents: Smellwalks for Urban Exploration // Technology and Language. 2022. № 3(4). P. 125-142. https://doi.org/10.48417/technolang.2022.04.09

## INTRODUCTION

We tend to associate the dimension of remembrance with that of imagery. When we think of a place or an event, we recollect a more or less distinct picture of it. And yet, it is not only the visual organ that dominates in memory. Smells play a major role in a human's life because they make it possible to form the memory of an object or phenomenon, without the figurative component of the picture. The olfactory sense has direct access to parts of the brain that remained mostly unchanged in recent evolution, governing the regulation of hormones, emotions and memory (Palukhova et al., 2017). Furthermore, smell is a crucial component of space perception. When we see, feel and hear the city, we inhale its aromas. The whole composition of smells in the air can be called the *smell landscape* and is a very strong influence in the perception of an individual's urban environment. Although the concept of *smellscape* was proposed by Porteous as an analogue of the *soundscape* in 1985 (Song, & Wu, 2022), sensory urbanism has become popular only since the 2000s, and contemporary researchers have delved into the practical study of the smells of cities, mapping, and studying the influence of smells on various aspects of urban life (Allen, 2021; Gao et al., 2022; He et al., 2022; Song & Wu, 2022; Xiao et al., 2021).

The image of the city is formed in the composition of all distinctive smells and aromas of his landscape. Every city can not only be seen, heard, and touched, but also smelled. St. Petersburg is filled with the spicy aromas of confectioneries and sharp odors from the factories, the sweet fragrance of flowers in front gardens and the seaweed smell from the port district. The smell forms a holistic perception of an object, and, in this composition, it conveys his uniqueness.

However, smell is one of the most difficult aspects of space to convey out of individual experience, as opposed to the auditory and visual components, that are nowadays easy to recorder within a technical high-fidelity support. The problem lies not only in repeatability and the lack of "smell-recording equipment," but also in the fact that the vocabulary of words describing smells is poor and imprecise.

The purpose of this research is to present the composition of smells across St. Petersburg by analyzing the variations of itineraries and smells that occur along the way and what associations they evoke in the partecipants.

## LITERATURE REVIEW

Smells may be spatially ordered or place-related. Individual cities, even urban types, may be distinguished by smell (Porteous, 1985). Smells play an important role in rhythm analysis, as indicators and markers for other urban rhythms (McLean, 2020). The role of smell in our city experience is deeply connected with the specific focus on personal links formed among smell, location, and emotion (McLean, 2014). In the book *The Foul and the Fragrant: Odor and the French Social Imagination*, Alain Corbin (1986) talks about how the concept of *bel air*, compared with today's meaning, meant something very different in the 1750. It was identified as a source of contagious and incurable diseases such as pestilence. The "stench of the city" was considered a major threat to the health of

all inhabitants, regardless of their social class or fortune. We see the city, we hear the city, but above all: we smell the city (Henshaw, 2013).

In addition, many authors who have researched this topic notice that each person perceives smells differently. Therefore, some smells that are barely perceived by someone will have a profound meaning for someone else (Porteous, 1985). Although all persons are likely to judge an unfamiliar smell as unpleasant, the same smell may be familiar and pleasant to one individual but unfamiliar and unpleasant to another person (Porteous, 1985). That is because already known smells are unconsciously processed by people, while only unfamiliar or strong smells are brought to people’s attention (Quercia, 2021). Most Russians would not recognize the scents of bubble gum, cheddar cheese, clove, coconut, dill pickle, fruit punch, gingerbread, licorice, lime, mint, peanuts, pizza, pumpkin pie, root beer, and wintergreen (Doty et al., 1996). The association of smells with a place linked to one's past experiences offer an intimacy between the individual and the place, which creates place attachment (Xiao et al., 2018). The smell has an advantage over other senses, because it is directly linked to the limbic system in the brain and immediately stimulates an emotional response (Paluchová, et al., 2017). The composition of the perceived *smellscape* has a huge impact on human behavior, attitudes and health. Further studies have proposed a systematic exploration of various odors in urban green environments and offered novel insights into the design of *smellscape*, by unveiling spatial-temporal odor distribution patterns (He et al, 2022). In urban and architectural studies, *smellscape* research takes qualitative approaches to consider the social and psychological impacts of diverse smells from *in situ* experiences or recalled memories. Methods such as *smellwalks*, interviews, observations and the scale rating of perceptual factors (i.e., like/dislike, familiar-unfamiliar) are commonly employed to collect data on people's experiences and subjective evaluations of the olfactory environment in real contexts (Xiao, et al., 2021). Some of the results included visualizations, to indicate multi-scalar scent-temporalities of a city, polyrhythmic relationships between the situated human body and a range of smells, and a series of projective mappings that rendered visible olfactory-sensed information. All those instruments serve to examine relationships between smells and space, smells and time, and smells and people (McLean, 2020).

Many of those scholars mention that often the perception of odors depends on a person's past experience and memories. Many of the smells that a person encounters in everyday life, in most cases, are associated with childhood. Smells can be memory releasers for the reconstruction of one's childhood (Porteous, 1985). Smell is also a great emotional trigger, so it may enhance the overall experience of places. Because the olfactory interpretation can be different from individual to individual, sharing different people’s sensations has the potential to make understandable the olfactory experiences of the place. The olfactory identities of places are not smell inventories in themselves, but ways in which these smells are met and interpreted in these specific places and types of places (Balez, 2021). *Smellwalks* require a “reorientation” of the senses to temporarily emphasize the information received from the nose. During a walk, the researcher employs an active form of smelling to examine their environment and what of it is divergent from usual smell perception (Allen, 2021). In the book *Noises, Smells and Colours*, John F. Runciman (1915) says that people in different cultures employ olfactory constructs to

help make sense of the world and their place within it. Cities worldwide are linked through individual experiences rekindled through smell memories (McLean, 2014). An individual citizen's odor perception may consist of exposure to one or more odorants (McGinley et al., 2000). The reaction of pleasure or aversion to a smell is more closely related to the relationship between the individual and the circumstances or environment than with any other sense. The ability to relate past to present perception – smell memory – and the gradations of odor impact are discussed, as well as the engaging effects of fragrances on behavior, odors and sexuality, mother-infant bonding, and pollution (Engen, 1991). A particular smell makes us unknowingly re-enter a space completely forgotten by the retinal memory; the nostrils awaken a forgotten perception, and we are enticed to enter a vivid daydream. The nose makes the eyes remember (Pallasmaa, 2005). Smell and long-term memory are closely related and, more importantly, smell associations are retained for much longer time periods than visual images (Quercia, 2021). Smell, more than any other sense, can trigger nostalgia (Henshaw et al., 2016).

Some authors have worked in the direction of tracing the uniqueness of a city by studying his smells. Smells play an important role in rhythm analysis, as indicators and markers for other urban rhythms (McLean, 2021). It has unique qualities: ubiquity, persistence, and an unparalleled connection to memory, yet it has gone overlooked in discussions of sensory design (Henshaw, 2013). Studies on olfactory apprehension of places are currently too few, but they nonetheless show the importance of this sense in forming the peculiarity of a place (Balez, 2021). In this way, colors, sounds and smells are important sensorial components of places that give them unique characteristics (Ranazanova & Vaz de Freitas, 2021). Smells contribute to a place's own identity (Quercia, 2021).

In Vienna, during 2011, the philosopher Madalina Diaconuran directed a project exploring the meanings and associations of the tactile and olfactory qualities of the city (Diaconu, 2011). The sense of smell is highlighted as a sociocultural construction that establishes social identity, objectifying them, and by doing so it reproduces social differences (Paluchová, et al., 2017). In the book *Urban Smellscapes* British researcher Victoria Henshaw conducted a study based on *smellwalks* on the streets and the relevant points of Doncaster (England), ended by drawing a smell map of the city (Henshaw, 2013). Other researchers focused on the data analysis of smells via social media platforms on the Internet (Quercia et al., 2021). A team of German scholars led by Rossano Schifanella has conducted a *smell landscape* research through online posts in London, Barcelona, and New York, while McLean (2021) has connected the traced sources of smell with the visual representation of Kiev. Chinese researchers presented a *smell map* of the central urban area of Guangzhou (China) (Gao et al., 2022). According to Gao, the smell of a space is inseparable from the sustainable development of the living environment. The research on olfactory perception and smell landscape has a positive effect on landscape design and urban planning and contributes to the formation and design optimization of unique urban memory.

## METHODOLOGY OF THE SURVEY

The study used a methodology known as *smellwalks*. *Smellwalks* are a method which require a reorientation of the senses to temporarily emphasize the information received from the nose (Allen, 2021). The research was conducted among students of Peter the Great St. Petersburg Polytechnic University, inquiring what smells they feel while traveling around St. Petersburg. Eighty-one people were interviewed, among which 57 (70.4%) were males and 24 (29.6%) females. The age of the respondents is 17-19 years old. All respondents agreed to the use and publication of their answers for scientific purposes. The surveyed had to describe their itinerary through St. Petersburg, pointing "the places and smells of the city" that accompanied them and the associations that emerged when perceiving a particular fragrance. To this description, made in a free form, was necessary to attach a map of movement. Due to the specificity of the subject of research, which does not allow a strict fixation, different approaches to the visualization of smells, which enabled the composition of smells of the city to be revealed, were used in the work.

## CATEGORIES OF SMELLS

In analyzing the results of the survey, one can trace the most pervasive smells in St. Petersburg and figure out what associations and thoughts they evoke. The information that was obtained from the respondents enables the sources of the smells to be divided into 3 major categories. These categories include the smells of food, the smells of the city and the smells of nature (Figure 1).

### Food

*The smells from fast-food restaurants* are often associated with a quick and delicious meal, friendly service and the atmosphere of warmth and comfort. The participants of the survey are "very fond of the aroma of food-courts that increases appetite" and the smell of fries which "drives them crazy."

The majority of respondents claims that *the smell of pastry* evokes associations with a new day, tenderness, coziness and family circle. This smell induces pleasant emotions since it's soothing and relaxing. Although many people like the smell of pastry, some of them admit that it "makes them to move faster" because "tasty smells cause their stomach to rumble."

*The smell of chocolate* is synonymous with childhood and winter nights. This smell improves the respondents' mood because it brings back memories of "New Year sweet gifts brought by their parents."

*The smells of vegetables and berries* are associated with vigor and freshness which are generally connected with warm seasons. "This bouquet of aromas gives to understand that summer has genuinely arrived" and "brings back some memories of gardening with parents in the countryside."

*The smell of popcorn* evokes associations with cinemas, huge queues and "a unique smell of seats which accompanies every film show."


**Figure 1**. Categories of smells

*The smell of coffee* is associated with the dawn of a new day and creates a pleasant sense of warmth. The participants of the survey point out that the smell of coffee beans brought them a small but required dose of happiness. They say that this aroma invigorated in the morning and gave them confidence. The respondents also note that the smell of coffee reminded them of "the school morning routine, the love for a girl and a date with her, and the atmosphere of warmth and coziness."

*The smell of shawarma* (a popular Middle Eastern dish) and "fresh roasted meat" meets people when they are leaving the metro. This smell is associated with student life and youth.

*The smell of fish* seems to be unpleasant to the majority of respondents. This smell "is rather disgusting" and strong. It "causes burning in the nose" and it is associated with something filthy and fetid.

*The smell of alcohol* is mostly associated with revelries, upcoming holidays and with several famous streets, because "in addition to the historical cultural component, St. Petersburg is also a city of rebellious subcultures and parties. Only in St. Petersburg you will find special streets with nightclubs, restaurants and bars for every taste. They are called Rubinstein Street and Dumskaya Street. Consequently, it can be understood that the smell of alcoholic beverages is a crucial component of the "smell map of St. Petersburg."

**Nature**

For some people *the smell of freshness* causes nostalgia for childhood and promotes feeling of relaxation. The others have a charge of vivacity for the whole day due to this smell (“Nature smelled fresh, the sun came out;” “After leaving home, I felt a cold smell of freshness;” “During the May period, grass always smells fresh in Esenin Park. The steam is quite thick, so I have time to enjoy the freshness, feel vivacity and a burst of energy”).

*Freshly cut grass* is associated with a summer cottage, a native home, pleasant freshness, and for most people the smell of grass is connected with joy and peace (“The wind brings the smell of growing grass nearby. This smell makes your head spin, freshness hits your nose, and you are filled with strength for the coming day;” “Walking in the park, I noticed that the lawns were recently mowed and the smell there was very pleasant, it was the smell of freshly mown grass”).

*The smell of trees* is associated with the freedom of childhood, the ease of a summer spent with a grandmother in the countryside. The smell of trees embodies pleasure and relaxation (“I can feel the smell of trees in the park. This pleasant aroma evokes memories of the countryside where I’ve spent a lot of time with my grandmother;” “The scent of flowering trees is a real smell of spring. This smell is very pleasant and improves my mood immediately”).

*The smell of flowers* reminds people of spring, life, happiness, and strolls (“And here is the smell I was looking for – the smell of flowers, very delicate and fragrant. The smell of flowers in wildlife is especially pleasant, it’s always pleasing to the eye and nose;” “On the way to Grazhdansky Avenue there is a flower shop which smell fascinates me very much. It’s incredibly hard not to love the smell of flowers”).

The majority of respondents associates *the smell of dampness* with something attractive (“The subway smells damp because it was raining last night. This smell does not cause me any distinctive negative emotions, I like it;” “Pleasant smell of dampness from the fountain, grass and trees has already begun to prevail in the shade near the first building;” “I was approaching the house when it started to rain. I was going to walk faster in order not to freeze, but the smell of wet asphalt made me stand still and enjoy the atmosphere”).

*The smell of rain* evokes a pleasurable feeling of freshness (“It has rained recently and now you can feel the smell of rain on the street. You can feel freshness inhaling this smell;” “Rain makes me feel positive emotions, there is a feeling of new life”).

*The smell of greenery* is associated with a nice walk with a grandmother, pleasure, and freshness (“I’m passing through an alley where various trees, bushes and flowers grow in flowerbeds and I can feel a pleasant and fresh smell of greenery;” “Walking through the Kolpinsky city park, I enjoyed the smell of young trees, flowers and fresh greenery”).

*The smell of the Neva River* is associated with a sea breeze, a desire to go to the river in the countryside, and fishing. (“A strong spring wind blows from the Neva and water smells fresh. I like this smell combined with the coolness of the wind;” “Only on the Liteyny Bridge I have felt the breeze and the smell of the Neva again and this smell

was very similar to the smell of the sea;" "The smell of water and freshness began to be felt more clearly on the approach to the cruiser Aurora").

**City**

*The smell of exhausted car fumes* often provokes disgust and the desire to hide from it as quickly as possible. However, many people got so used to this odor that sometimes it reminds them of their childhood. The smell of gases is a part of the urban environment.

*The smell of cigarettes* is also very common on the streets of the city. Many people find this smell unpleasant and disgusting, but among the respondents there were some people who get positive emotions from the smell of tobacco: "I light up, my friends also smoke nearby. The smell of tobacco always makes me feel warm in the spring. There is no need to hurry anywhere at the time of a smoke break, you can drop all the burdens and worries for a moment."

*The smell of dust* is a *"routine"* for the citizens, few people dislike it because of its habituality.

*The smell of engine oil*, surprisingly, is pleasant to many participants of the survey. It evokes nostalgia for childhood ("childhood memories of helping in the garage," "I wanted to become a driver," "since childhood I have been fond of various kinds of equipment").

*Various smells of buildings* (plaster, paint, concrete) are associated with renovation ("recollections of the process of building the house with my parents").

There is a wide variety of *smells in the metro*: "tar soap," "the smell of creosote from soaked sleepers… for many people it may seem harsh and unnatural, but this smell is pleasant to me, because it resembles numerous railway journeys," "a mixture of smells of old stone and clothes of numerous people." This raises many associations, for example, childhood trips, peace and tranquility, lightness of mind and the beginning or end of the day.

*The smell of sewage*, of course, causes only disgust for everyone. ("My favorite Griboedov Canal: berths, boats, yachts, bridges. Ugh! Why does it always stink like sewage here?").

*The smell of asphalt*, particularly wet, is associated with freshness and cleanliness ("I do not know people who would not like the freshness of the air after rain. When you breathe this fresh air, it feels like you have extra moral and physical strength").

*The smell of petrol* as well as the smell of engine oil brings back memories of childhood ("The gas station is one of the few places where petrol smells as pleasant as in childhood," "memories of my father's work").

*The smell of sweat* reminds people of dirt. It is also associated with sports.

*The smell of litter* is associated with staleness and ordinariness.

*The smell of rubber* reminds people of the underground and trips ("I walked in a small courtyard. There are smells of warm car tires, rubber, as if some of the cars had just stopped to rest after a long trip"). It is pleasant enough, but the smell of burnt rubber is disgusting ("There is a tire shop right behind the bridge. I can feel the smells of burnt old rubber and a variety of lubricants which are not the most pleasant smells for me").

*The smell of wood* is associated with the countryside and childhood memories. It evokes warm emotions of a distant past.

The diagram below (Figure 2) highlights unpleasant, neutral and pleasant odors of St. Petersburg in terms of perception. The smells of cigarettes, dust, exhaust gases, metro and petrol are the most unpleasant ("but more than anything the smell of exhaust gases from cars perhaps is felt. Unfortunately, this is what the reality of life in a major city is. The city gives you a lot of opportunities, but sometimes brings a lot of harm;" "on the opposite bank of the canal I felt unpleasant smell of cigarettes;" "dust and exhaust gases created an unbearably disgusting mixture of smells;" "the smell of the St. Petersburg metro is the smell of oiled machines and engine oil"). The category of neutral smells consists in that of water, dampness, humidity, fruits, vegetables, and *shawarma*. According to the diagram, pleasant smells are the aromas of coffee, trees and flowers, rain, freshness ("out on Zvenigorodskaya Street it was impossible not to smell blooming trees and flowers in the flowerbeds. Even the grass heated by the morning sun smells in a triple size which caused my head to spin. Nevertheless, I had easily overcame this sweet dizziness and went on;" "almost reaching Ploshchad' Muzhestva, I smelled flowers from a small stall near the road. It was very pleasant to be near the stall because of the smell of flowers which made other smells almost imperceptible;" "after leaving the house, I smelled cold freshness, and felt a surge of vivacity and energy for the whole day"), coffee ("the smell of coffee beans brings me a small but required dose of happiness in the morning, invigorates in the afternoon and gives fantom confidence in every undertaking"), and the smell of perfume which refers to specific scents ("you can catch completely different perfume aromas due to the fact that public transport is crowded. There are sweet and tart women's perfumes and brutal men's perfumes;" "the smell of perfume coming from a passing girl brought me to the Earth. I felt the flavors of rose and chocolate. I have never seen such a combination in perfume, and I really enjoyed it"). The diagram illustrates the frequency of occurrence of each scent. The size of the circle depends on the prevalence of a particular smell. The most common are the smells of metro, exhaust fumes, dust, cigarettes, pastry, and coffee. The smells of paint, deodorant, popcorn, and chocolate are mentioned less frequently. Every circle in the diagram has its own specific color which shows a particular category of smells (food, city, nature) it belongs to. Green circles (trees, water, grass, and rain) refer to the *Nature* category, blue circles (dust, sweat, cigarettes, exhaust gases and the subway) refer to the *City* category, and orange circles (coffee, pastries, fast food, vegetables, fruits) refer to the *Food* category. The purple circles represent the category of "specific odors" which includes the smell of human suffering, sickness, drunkenness, sweat; the cozy smell of the room; the smell of palm paraffin candles and the smell of the sun.

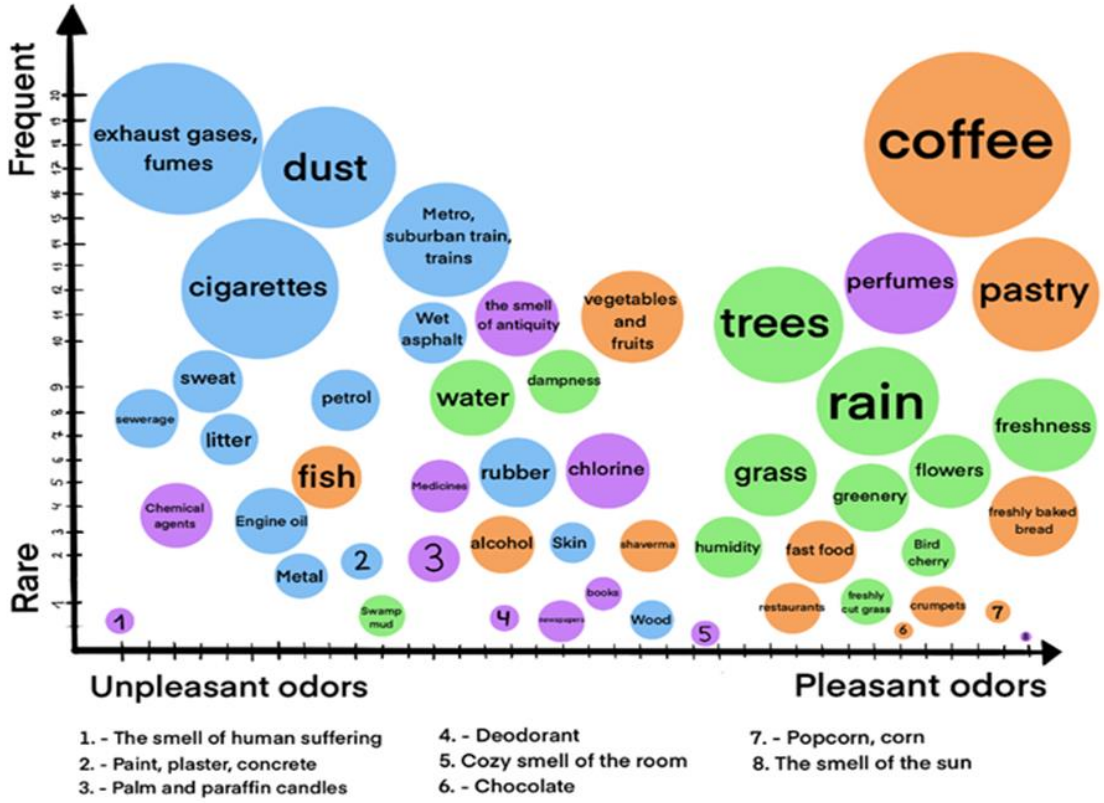



**Figure 2.** Pleasant, unpleasant, and neutral odors and their frequency

Thus, we can see that urban smells are most often perceived as unpleasant, although there are exceptions ("I like the smell of the metro since my childhood, that is why I wanted to become a machinist when I was a child;" "the road on the waterfront is being repaired, it smells of dust. I like such mechanical smells because I am fond of machinery and often face with them;" "there is a crowd of students at the entrance. They are smoke electronic cigarettes and the air around them is saturated with artificial flavors of strawberries, coconut and mint. I like to pass by them and although I feel that these smells are factory-like, they seem to be attractive for me"), and the smells of nature mostly are predominantly delightful, at least almost not annoying. Even the smell of rain which is one of the characteristic features of St. Petersburg is perceived positively ("I do not know if there are people who do not like the freshness of the air after the rain. When you inhale this fresh air, it feels like you have extra moral and physical strength"; "the rain starts and brings new freshness and I simultaneously feel the mood of change. When such weather begins, all other smells seem to recede and give an advantage to the smell of rainwater and dampness"). The smell of food is also located between the neutral and positive spectrum of odors. It is also worth mentioning that the smell of coffee is both very popular and greatly appreciated.

## THE SMELL ROUTE OF ST. PETERSBURG

The city of St. Petersburg is full of various smells. Therefore, it can be assumed that the image of the city is ambiguous, and its flavors emphasize this inconsistency. Smells form associations, and the image of a city in a person's mind is built from associations. After analyzing the data, we compiled one route of the smells, that we present as summarized data on a map (Figure 3). The journey starts from the Ploshchad’ Muzhestva metro station and ends with the Benoit Garden (which, being in close proximity to the university campus, is quite popular among students).


**Figure 3.** The smell route of St. Petersburg

The itinerary starts from the metro station Ploshchad’ Muzhestva, from Polytechnic Street. Here respondents described “the smell of creosote from rail trains,” “the smell of hot dust, iron and tunnel dampness,” as well as “a mixture of smells of old stone, clothes of numerous people and perfumes.” According to the majority, this smell is “sharp and unnatural,” but at the same time “it resembles numerous railway trips and adventures, children's trips.” The perfume aroma is pleasant for many people in the palette of scents

of the metro: “it is pleasant, floral and reminds me of my mother's perfume.” Since public transport is crowded, the respondents distinguish different perfumes: “there are sweet, tart women's perfumes, and brutal men’s.”

Near the metro station, on 17 Politechnicheskaya Street, the aroma of coffee and fresh bakery is immediately felt. Going further towards Nepokorennykh Avenue, half of the respondents noted the aroma of fast and delicious food, which is associated with warmth and affability. Further down the street Polytechnic 17, the smell of vegetables and fruits emanating from market stalls can be traced. According to the description of the surveyed, this smell is associated with freshness, cheerfulness and a warm season, “this bouquet of smells makes it clear that summer has really come,” “mentally returns consciousness to the dacha, where we brought in the harvest on the kitchen-garden with parents, pleasant memories arise.”

In the direction of the Polytechnic metro station, the smell of trees (maples, birches, oaks) prevails, associated with freedom, ease and summer. There is a smell of flowering trees in the park. This smell brings back memories of the village where many people “spent a lot of time with grandmother.” There is a feeling of freshness and a charge of vivacity: “nature smelled fresh, the sun was out.” During the May period, the park always smells of grass, “the park is quite wide, so people have time to enjoy the freshness, cheerfulness and a burst of energy.” According to the description of the respondents, the park is quiet enough, calm, and atmospheric, “the world of nature, especially in autumn, simply fascinates with its beauty and splendor.”

The metro station “Polytechnic” is one of the key places on the route, it is a source of different smells. There is often a “pungent smell of electronic cigarettes and strawberry gum.” Most have complex associations: on the one hand, the smell of gum is associated with school years, and on the other cigarette smoke repels and irritates. The smell of tobacco prevails along the Polytechnic Street. Then it is replaced by the smell of daisies and orchids from the window of a flower shop. People associate floral scents with the warm season, most often with spring.

On the other side of the street smells of fresh bread and apple pies. As the survey data showed, this smell reminds respondents of the house where grandma once “baked charlotte in the oven according to an old recipe.”

There is a smell of wet asphalt near the road, it seems pleasant to most of the respondents: “the smell is very pleasant, breathing it, you feel fresh;” “a feeling of new life immediately appears.” The trees smell damp, the smell is associated with “freshness and new breath,” Along Tikhoretsky Avenue smells of “freshly brought bananas and frozen fish” at the store. This smell is not repugnant to most of the respondents, but for some it causes “rejection and a desire to move on as soon as possible.”

From the building located on Tikhoretsky Prospekt, 7 k1, the aromas of freshly made coffee and pastries come again. Most of these smells are associated with awakening, comfort, and also cause pleasant emotions, soothe and relax. Further along Tikhoretsky Avenue, the smell of dust and car tires is felt. As you know, these are not the most pleasant aromas, but many city dwellers no longer pay attention to them, considering it “commonplace.” It is worth noting that the smell of cars is associated with travel: “I

turned into a small courtyard, there smells of warm car tires, rubber, as if some of the cars had just stopped to rest after a long trip.”

Along the way, there are several more grocery stores with the smells of vegetables, fruits and other food. At the intersection of Tikhoretsky Avenue and Nauki Avenue, there is a pleasant aroma of new printed publications, various magazines and newspapers. This smell evokes warm emotions for many, is associated with cozy evenings spent reading your favorite book. On the other side of the street, you can smell exhaust gases, gasoline and asphalt. These scents often cause disgust and a desire to hide from their sources as quickly as possible, but for some these are already familiar smells that suggest nostalgia for childhood, “memories of my father's work”: “the gas station is one of the few places where gasoline still smells as pleasant as in childhood.” These smells are part of the urban environment. The final point of the route is the Benoit Garden. Here you can feel various scents of nature: foliage, flowers, trees, pond. The smells encountered on the way have a calming effect. According to many respondents, the smell of trees “lifts the mood and fills us with romantic feelings.”

The route we have laid out concentrates a lot of smells. Starting from the square of Courage, the flavors smoothly replace each other, which makes our subconscious work. Associations and memories are built up in our head right up to childhood. However, this composition consists of smells, the combination of which is quite difficult to imagine. Fresh bread, sweet pastries and the aroma of hot coffee contrast with the smell of fish near the subway, exhaust fumes and pollen. Cigarette smoke irritates many, arising the wish to escape from this smell. An opposite example is the fruit shop, that one likes to stay nearby, because his smell reminds of summer and the carefree times spent in the town. The range of associations is quite wide. The aromas of rain and flowering trees are associated with freshness, positive emotions: “very pleasant, inhaling it, you feel fresh;” “a feeling of new life immediately appears,” and the smell of cars is associated with travel: “I turned into a small courtyard, there smells of warm car tires, rubber, like some kind of the car has just stopped to rest after a long trip.”

As soon as someone walk along this route, imagination will begin to generate a lot of images. This is a great opportunity to walk not only through the sights of the city, but also through the corners of consciousness.

The diagram Figure 4 reflects the composition of smells which was encountered on the same path by particular individuals. The colors of rectangles presented in the diagram demonstrate their belonging to one of the groups of smells (*Food*, *Nature*, *City* and others), and the length of the rectangles represents the frequency of the occurrence of listed scents. It can be seen that the majority of respondents considers various scents of nature (flowers, trees, grass), the smell of cigarettes, the subway and baking as the most wide-spread, and the smells of alcohol, asphalt and popcorn as the rarest. This diagram clearly shows the variability of the combinations of smells which depends on a person’s perception capacity and individual preferences. The horizontal segments in each column of the diagram reflects the number of respondents who encounter a particular smell on their way. Each such strip has its own specific color that refers to a person (for example, green – 1st respondent, orange – 2nd respondent, blue – 3rd respondent and so on). Nevertheless, there may be objective reasons related to changes in the sources of smells

over time, but in this case subjective factors play the biggest role. Moreover, one of the most important factors is the life experience of a person. One can pay attention to the smell because it seems familiar and evokes certain associations, the arrival of the blooming season, a different beginning, and joyful events.


**Figure 4**. Individual compositions of smells

We also noticed that some smells are found in almost all the respondents' answers, such as coffee, flowers, fresh bread, rain, perfume, and the subway. But there are also rare smells: deodorant, popcorn, alcohol, and fish. This may be due to the specifics of the city's infrastructure, because certain sources of smell may be more than others. For example, there are a lot of coffee shops and restaurants in St. Petersburg, but there are much fewer fish shops. Smells can vary in intensity and "coverage area." It is also possible that the majority of respondents just wanted to remember more pleasant smells, while they do not want to focus on the smells that they find repellent or were associated with negative memories.

## CONCLUSIONS

St. Petersburg is a concentration of an incredible amount of smells, which can be divided into basic categories. This richness is reflected in the possibilities of combination. This city is revealed in completely different ways for every person. Smells from various categories will be encountered throughout the itinerary and evoke opposite emotions and associations. For each person, this city reveals itself in completely different ways. Along any possible route there will be smells from different categories that will provoke opposite emotions and associations, therefore, a complex and multifaceted image of St. Petersburg will be formed.

Based on the information obtained during the study and presented in the diagrams, we came to the following conclusions:

- All the smells obtained during the survey can be divided into several categories: *Food, Nature, City* are the three more characteristic and wide. A fourth, special category includes all the smells that "stand apart," not belonging to any of the other, but playing a key role in shaping the portrait of St. Petersburg, including rare smells and details that create the atmosphere of the entire composition as a whole;
- The same smell often forms different associations among respondents, mainly due to the difference in previous experience and the unique perception of every single person (for example: the smell of alcohol may be associated with "adverse events in life and with disorder," and may be associated with "rest after a hard day, with stress relief and a pleasant evening");
- The regularity in the frequency of odors encountered has been established. So we see that the most frequent smells indicated among the respondents are: fresh pastries, coffee, dust, food, perfume, and subway. On the opposite side of the spectrum, the rarest smells are that of deodorant, popcorn, and fish. As it was noted earlier, such a quantitative difference arose as a result of the specific infrastructure of the city, because some sources are more frequent than others;
- The *smell route*, compiled on the basis of the conducted research, consists of important and main sources of some smells that will provoke various, even opposite associations and emotions, that will help, in turn, in forming a more holistic and multifaceted image of St. Petersburg for each person.

The variants of the representation of odors presented in the study allow us to see a variety of possible approaches to the problem of composition, which can be both a generalized scheme and a map of the area, taking into account the emotional component, as well as individual characteristics.

## REFERENCES

Allen, L. (2021). The smell of lockdown: Smellwalks as sensuous methodology. *Qualitative Research*. https://doi.org/10.1177/14687941211007663

Balez, S. (2021). Smell Walks. Experiential Walks for Urban Design. In B.E.A. Piga, D. Siret, & JP. Thibaud, (Eds), *Experiential Walks for Urban Design*. *Springer Tracts in Civil Engineering* (pp. 93–114). Springer. https://doi.org/10.1007/978-3-030-76694-8_6

Corbin, A. (1986). *The Foul and the Fragrant: Odor and the French Social Imagination* Harvard University Press,

Diaconu, M. (2011). *Senses and the City: An Interdisciplinary Approach to Urban Sensescapes*. LIT Verlag.

Doty, R. L., Marcus, A., & William Lee, W. (1996). Development of the 12-Item Cross-Cultural Smell Identification Test (CC-SIT). *The Laryngoscope*, *106*(3), 353–356. https://doi.org/10.1097/00005537-199603000-00021

Engen, T. (1991). *Odor Sensation and Memory*. Greenwood Publishing Group.

Gao, Y-J, Wang, C-L, Huang, M-L, & Guo, W. (2022). A New Perspective of Sustainable Perception: Research on the Smellscape of Urban Block Space. *Sustainability. 14*(15), 9184. https://doi.org/10.3390/su14159184

He, J., Hao, Z., Li, L., Ye, T., Sun, B., Wu, R., & Pei, N. (2022). Sniff the urban park: Unveiling Odor Features and Landscape Effect on Smellscape in Guangzhou, China. *Urban Forestry & Urban Greening*, *78*, 1-4. https://doi.org/10.1016/j.ufug.2022.127764

Henshaw, V. (2013). *Urban Smellscapes: Understanding*. Routledge. https://doi.org/10.4324/9780203072776

Henshaw, V., Medway, D., Warnaby, G., & Perkins, C. (2016). Marketing the 'city of smells.' *Marketing Theory, 16*(2), 153–170. https://doi.org/10.1177/1470593115619970

McGinley C. M., St P., McGinley M. A., & McGinley D. L. (2000, June 6). "Odor Basics," Understanding and Using Odor Testing [Conference presentation]. 22nd Annual Hawaii Water Environment Association Conference. Honolulu. https://www.fivesenses.com/Documents/Library/33%20%20Odor%20Basics.pdf

McLean, K. (2014). Smell Map Narratives of Place – Paris. *New American Notes Online*. https://nanocrit.com/issues/issue6/smell-map-narratives-place-paris

McLean, K. (2020). Temporalities of the Smellscape: Creative Mapping as Visual. In D. Edler, C. Jenal, & O. Kühne, (Eds.), *Modern Approaches to the Visualization of Landscapes. RaumFragen: Stadt – Region – Landschaft* (pp. 217-245). Springer VS. https://doi.org/10.1007/978-3-658-30956-5_12

Mondry, H. (2014). Smell and Memory as Jewish Archives: the Case of Russian Jewish writers. *Jewish Culture and History*, *15*(1-2), 43-54. https://doi.org/10.1080/1462169X.2014.898491

Pallasmaa, J. (2005). *The Eyes of the Skin. Architecture and the Senses*. Willey-Academy. https://arts.berkeley.edu/wp-content/uploads/2016/01/Pallasmaa_The-Eyes-of-the-Skin.pdf

Paluchová, J., Berčík, J., & Horská, E. (2017). The Sense of Smell. In E. Sendra-Nadal & Á. A. Carbonell-Barrachina (Eds.), *Sensory and Aroma Marketing* (p. 33). Wageningen Academic Publishers.

Porteous, J. D. (1985). Smellscape. *Progress in Physical Geography: Earth and Environment*, *9*(3), 356–378. https://doi.org/10.1177/030913338500900303

Quercia, D. S. (2021). Smelly Maps: The Digital Life of Urban Smellscapes. *Proceedings of the International AAAI Conference on Web and Social Media, 9*(1), 327-336. https://doi.org/10.1609/icwsm.v9i1.14621

Ranazanova, M. & Vaz de Freitas, I. (2021). Landscape smells and Intangible Heridge: The Porto City. In P. M. Cândida Silva (Ed.), *Conference Proceedings of 4th International Conference on Tourism Research. ICTR 2021* (pp. 453-454). Academic Conferences International.

Runciman, J. F. (1915). Noises, Smells and Colours. *The Musical Quarterly*, *1*(2), 149–161. http://www.jstor.org/stable/737841

Song, X., & Wu, Q. (2022). Study on Smellscape Perception and Landscape Application of Fragrant Plants. *Urban Forestry & Urban Greening*, *67*, 1-7. https://doi.org/10.1016/j.ufug.2021.127429

Xiao, J., Tait, M., & Kang, J. (2018). A Perceptual Model of Smellscape Pleasantness. *Cities*, *76*, 105–115. https://doi.org/10.1016/j.cities.2018.01.013

Xiao, J.; Aletta, F.; Radicchi, A.; McLean, K.; Shiner, L.E.; & Verbeek, C. (2021). Recent Advances in Smellscape Research for the Built Environment. *Frontiers in Psychology*, *12*, 1-5. https://doi.org/10.3389/fpsyg.2021.700514

СВЕДЕНИЯ ОБ АВТОРАХ / THE AUTHORS

Мария Владимировна Богатыренко,
bogatyrenko.mv@edu.spbstu.ru
ORCID: 0000-0001-8558-6247

Maria Bogatyrenko,
bogatyrenko.mv@edu.spbstu.ru
ORCID: 0000-0001-8558-6247

Елизавета Владиславовна Редько,
redko.ev@edu.spbstu.ru
ORCID: 0000-0002-7454-4620

Elizaveta Redko,
redko.ev@edu.spbstu.ru
ORCID: 0000-0002-7454-4620

Статья поступила 14 октября 2022
одобрена после рецензирования 15 декабря 2022
принята к публикации 20 декабря 2022

Received: 14 October 2022
Revised: 15 December 2022
Accepted: 20 December 2022

https://doi.org/10.48417/technolang.2022.04.10
Research article

# Philosophy of Biorobotics: Translating and Composing Bio-hybrid Forms[1]

Marco Tamborini (✉)
Darmstadt Technical University, Residenzschloss 1, Darmstadt, 64283, Germany
Marco.tamborini@tu-darmstadt.de

## Abstract

In this paper, I explore how bio-hybrid forms can be created and combined when starting out from organic forms. The thesis I advance here is epistemological: the combinatorial practice of bionics, biomimetics, biorobotics, and all design strategies inspired by nature is based not on biomimetic inspiration (i.e., on a kind of imitation of nature) but on a practice of translation. To develop this thesis, I focus on the practices of contemporary biorobotics. I examine the practice of translating natural forms into technical artifacts, as developed by Raoul Heinrich Francé during the early 20th century. I then analyze the making of robots capable of replicating complex systems of locomotion. Finally, I investigate the interaction between robots and living organisms (fish). In the concluding part of the paper, I reflect on the philosophical payoff and broader conditions of possibility for this translational practice. I discuss when and to what extent a translation of biological forms into biotechnical ones is acceptable, and also highlight the conception of form that underlies this practice. I additionally seek to draw attention to the need to philosophically investigate what happens between different domains of knowledge – especially between science and technology. Thus, this article invites philosophers to develop a philosophy in the interstices of knowledge production.

**Keywords:** Form; Biorobotics; Organism; Philosophy of science and technology; Biomimetics; Technoscience

**Acknowledgment:** This article was written as part of the DFG project „Hybrid Systems, Bionics, and the circulation of morphological knowledge in the second half of the 20th and the first years of the 21st century.“ DFG project number 491776489. I would like to thank Kathleen Cross for her translation into English of the manuscript.

**Citation:** Tamborini, M. (2022). Philosophy of Biorobotics: Translating and Composing Bio-hybrid Forms. *Technology and Language, 3*(4), 143-159. https://doi.org/10.48417/technolang.2022.04.10



[1] This paper is an abridged version of my article in press in German in the *Deutsche Zeitschrift für Philosophie* (Tamborini, in press).

УДК 130.2:62
https://doi.org/10.48417/technolang.2022.04.10
Научная статья

# Философия биоробототехники: Перевод и композиция биогибридных форм[2]

Марко Тамборини (✉)
Дармштадтский технический университет, Каролиненплац, 5, Дармштадт, 64289, Германия
Marco.tamborini@tu-darmstadt.de

**Аннотация**

В данной статье я исследую, как можно создавать и комбинировать биогибридные формы, начиная с органических форм. Тезис, который я здесь выдвигаю, – эпистемологический: комбинаторная практика бионики, биомиметики, биоробототехники и всех стратегий дизайна, вдохновленных природой, основана не на биомиметическом вдохновении (т.е. на подражании природе), а на практике перевода. Чтобы развить этот тезис, я сосредоточусь на практиках современной биоробототехники. Я исследую практику перевода природных форм в технические артефакты, разработанную Раулем Генрихом Франсе в начале 20 века. Затем я анализирую создание роботов, способных воспроизводить сложные системы передвижения. В итоге я исследую взаимодействие между роботами и живыми организмами (рыбами). В заключительной части статьи я рассуждаю над философским значением и более широкими возможностями для этой практики перевода. Я обсуждаю, когда и до какой степени перевод биологических форм в биотехнические приемлем, и также выделяю концепцию формы, лежащей в основе этой практики. Кроме того, я стремлюсь привлечь внимание к необходимости философского исследования происходящего между различными областями знаний – особенно между наукой и техникой. Таким образом, данная статья предлагает развитие философии в пробелах преумножения знаний.

**Ключевые слова:** Форма; Биоробототехника; Организм; Философия науки и техники; Биомиметика; Технонаука

**Благодарность:** Статья написана в рамках проекта DFG “Hybrid Systems, Bionics, and the circulation of morphological knowledge in the second half of the 20th and the first years of the 21st century”. Номер проекта DFG 491776489. Я хотел бы поблагодарить Кэтлин Кросс за перевод рукописи на английский язык.

**Для цитирования:** Tamborini, M. Philosophy of Biorobotics: Translating and Composing Bio-hybrid Forms // Technology and Language. 2022. № 3(4). P. 143-159. https://doi.org/10.48417/technolang.2022.04.10



[2] Статья представляет собой сокращенную версию работы на немецком языке в *Deutsche Zeitschrift für Philosophie* (Tamborini, in press).

## INTRODUCTION

In *Le vite de' piu eccellenti pittori, scultori, et architettori* (1568) [The lives of the most eminent painters, sculptors and architects] Giorgio Vasari described the life and work of the great artists, sculptors and architects. Having examined the life of Leon Battista Alberti, Botticelli, Perugino and others in the first volume, Vasari began the second by discussing the life of a painter *sui generis*: Leonardo da Vinci.[3] As is well known, unlike many other figures described by Vasari, Leonardo da Vinci used a combination of technical and artistic procedures to investigate nature and ultimately to master it by means of technology. I would like to quote just a few emblematic statements from Vasari's description which are useful for the thesis presented in this paper.

Vasari tells us that Leonardo came into possession of a kind of little wheel. Once he had polished and smoothed it, he decided to use it to paint something new, a "fabulous monster" (Vasari, 1886, p. 195). To this end, as Vasari tells it, Leonardo stepped into a particular room, "which nobody apart from him ever entered, with all kinds of lizards, crickets, snakes, locusts, moths, bats and similar repulsive creatures, and made out of this whole pile a truly hideous monster" (Vasari, 2020, p. 380). "From all these many creatures", writes Vasari, "which Leonardo had combined in different ways, he created a truly dreadful and fearsome animal whose breath poisoned the air and turned it into fire" (Vasari, 1886, p. 195).

Leonardo attempted, then, to form and present a new animal. In other words, it was Leonardo's intention to compose organic forms in a different way. Doing so, as Vasari wrote, brought "constant pain", so much so that the "sickness of the dead animals was too gruesome, but this sickness was not perceived by Leonardo, on account of the great love he felt for art" (Vasari, 1886, p. 195).

This anecdote recounted by Vasari is quite telling, as it relates to the issue of the potential composition of natural and artificial forms: Leonardo was indeed experimenting with the possibility of creating a new composition in the animal world. As is well known, Leonardo attempted not only to compose new organisms out of natural forms but also to create biotechnical forms through a combination of biologically inspired artifacts and functional principles. The 'ornithopter', for example, was Leonardo's famous design of a possible bio-inspired air machine: in terms of form and function it was a precise copy of a bird in flight (Innocenzi, 2018; Moon, 2007).

Leonardo's key lines of inquiry are basically the same ones that characterize a particular engineering practice in relation to nature, as found nowadays in the fields of bionics, biomimicry and biorobotics.[4] These scientific practices require fundamental philosophical reflection if we are to better understand the significance and limitations of – and conditions for – these activities.

How can forms be composed? How does nature itself compose? Can the composition of nature be mimicked in order to create new forms? How can a living

[3] See e.g. (Bredekamp, 2001; Fehrenbach, 2019; Franzini, 1987; Moon, 2007).
[4] See (Cordeschi, 2002; Datteri, 2020; Datteri and Tamburrini, 2007; Tamborini, 2021, 2022a; Tamborini and Datteri, 2023).

organism be created? What conception of form underlies this practice? How do we compose natural forms using technical artifacts to obtain bio-hybrid systems?

In this essay I shall address these questions from a very specific perspective. I will not ask how nature itself combines forms to create living beings[5], neither will I address the issue of how the transfer of natural forms into technical forms is possible in terms of ontology. Instead, I will ask *how new bio-hybrid forms can be created out of organic forms and can be combined*. The thesis I am advancing, then, is an epistemological one: the combinatorial praxis of bionics, biomimetics and biorobotics – that is, of all design strategies inspired by nature[6] – is based not on a kind of biomimetic inspiration (i.e., on a kind of imitation of nature[7]) but rather on a practice of translation.

In addition, by inquiring into the conditions for a possible translation from one domain to another, I seek to draw attention programmatically to the necessity of examining philosophically what happens *between* different domains of knowledge – in particular, *between* science and technology. This article is thus an invitation to philosophers to develop *a philosophy in the interstices of knowledge*.[8]

To develop my thesis, I will focus on the practices of contemporary biorobotics. In doing so I will apply the broader methodological paradigm of the philosophy of science *in practice*.[9] In the following, therefore, I would like to offer a brief account of three case studies. The first, based on 21st century biorobotics, relates to the practices of turning natural forms into technical artifacts, practices developed in the early 20th century by Raoul Heinrich Francé. The second case study is based on the manufacture of robots capable of reproducing complex systems of locomotion through space, while the third is based on the interaction between robots and living organisms (fish). To begin, however, I offer a brief excursus about the emergence of forms in nature.

## THE THEORY OF THE COMPOSITION OF NATURAL FORMS

As already mentioned, I will not concern myself with the conditions of possibility for the composition of natural forms. However, given that natural forms constitute the starting point for the practice of composing biotechnical forms – engineering scientists use the organic forms found in nature as points of departure for their technical composition capabilities – a brief excursus on the mechanisms of composition in nature is necessary.

The main mechanisms of the formation of forms were established by Charles Darwin in his 1859 book *On the Origin of Species* and were expanded upon in the course of the modern synthesis of evolutionary theory, that is, the synthesis of Darwin's theory of evolution and Mendelian genetics.[10] Put succinctly, new forms arise through a process

[5] On this, see (Benyus, 2002; Dicks, 2016; Gutmann, 2017).
[6] See (Bensaude-Vincent, 2019; Knippers and Speck, 2012; Mazzolai et. al., 2014; Tamborini, 2021; 2022b).
[7] For this, see e.g. (Dicks; 2016; Drack et al., 2017; Hood, 2004).
[8] For this, see (Tamborini, 2022a).
[9] Cf. (Chang, 2012, 2011; Leonelli, 2016; Tamborini, 2022a).
[10] See (Corning, 2020; Huneman, 2019; Huneman and Walsh, 2017).

of random mutation of DNA and of natural selection. This explanation, heavily influenced by genetics and microevolutionary thinking, was joined in the 1960s and 1970s by a view that emphasized the macroevolutionary and interspecific structures of evolution. I would like to mention in particular the dynamics and structures of mass extinction, which can reverse microevolutionary mechanisms.[11] Additionally, a view has developed since the 1960s (brought about by a synthesis and circulation of knowledge and practices from architecture to evolutionary theory and *vice versa*) that has culminated in today's "extended evolutionary synthesis:"[12] there are certain form constraints which only particular evolutionary paths enable and others do not.[13] The contextual link between constraints and evolvability is emphasized more strongly in current evolutionary research. These constraints should no longer be understood as factors that limit the power of natural selection but rather as "enabling factors inherent in the process of development during morphological evolution." As biologist Gerhard Müller reminds us, nowadays these elements are the most important points of access for grappling with the problem of evolution: "The nature of the determinants and rules for the organization of design elements constitutes one of the greatest unsolved problems in the scientific explanation of the form displayed by organisms" (Müller & Newman, 2003, p. 5). Hence, constraints, evolvability, phenotypical plasticity and niche construction are the key mechanisms for the emergence of natural forms.

## BIOROBOTICS

After this brief excursus I can now pose my main question: *How can* new forms be created, or rather, *how can* biological and technical forms be combined in order to obtain bio-hybrid forms?

As we can see, the question has a definite Kantian flavor to it[14]. Viewed in Kantian terms this possibility is given on two levels: *de facto* and *de jure*. *De facto* there are certain disciplines that are following "the secure course of a science" (Kant 1998, B VII). These disciplines are no longer "merely groping about" (Kant 1998, B VII), rather they are in a position to produce knowledge.

Indeed, in the 20th century especially, knowledge and practices were codified with regard to the potential production of biotechnical forms, and this has led to the production of functioning bio-inspired artifacts and automatons. As mentioned at the start of this essay, ideas about the possibility of biotechnology (i.e., the possible composition and creation of biotechnical forms) have always been part of the history of Western philosophy of technology (we might think here of Aristotelian ideas about technology as imitating nature, or of Ernst Kapp's notion of organ projection[15]) and of the history of the

[11] Cf. (Eldredge, 2014; Raup and Sepkoski, 1984; Sepkoski, 2020).
[12] See (Pigliucci, 2007; Pigliucci and Müller, 2010).
[13] See (Tamborini, 2023).
[14] It is no coincidence that Chang supports Kantian and neo-Kantian philosophy as a valid instrument for understanding scientific practices. See (Chang, 2011, 2017).
[15] For an overview, see (Liggieri and Müller, 2019; Liggieri and Tamborini, 2021; Müggenburg, 2019; Tamborini, 2022a;).

engineering sciences themselves.[16] In the 18th century, for example, machines were built that imitated organisms, such as the famous automata of French designer Jacques de Vaucanson (the "flute player") and of the Swiss clockmaker family Jaquet-Droz (see the "writer," the "draughtsman" and the "musician") (Riskin, 2003, 2016; Voskuhl, 2013). However, this practice and the implicit knowledge it entailed were not codified until the early years of the 20th century.

In his books *Die technischen Leistungen der Pflanzen* ("The technical achievements of plants," 1919) and *Die Pflanze als Erfinder* ("Plants as inventors," 1920), Austro-Hungarian botanist, microbiologist, scientist and philosopher Raoul Heinrich Francé outlined a theory of "biotechnology" as a synthesis between biology and technology. This was a program involving the deliberate imitation of the "technical forms" of nature. For Francé all natural forms are technical to the extent that they perform a function completely. That is why, wrote Francé, "there is no form of technology which cannot be inferred from the forms of nature" (Francé, 1920, p. 20). Long before humans lived on the Earth, says Francé, plants had already anticipated humans' tools, machines and architecture."[17].With our simple constructions, we limited human beings are unconsciously mimicking the forms that plants have designed in such a flawless way that they are at once more rational, more sustainable and aesthetically more pleasing than our own. Francé's books contain comparisons between underwater algae and torpedoes, pine pollen and hot air balloons, tree roots and water pipes, and between liverwort and a Taylorist factory. When we look closely at the plant, the botanist says, "*the plant* turns out to be *a veritable industrial city"* (Francé, 1920, p. 51). In the industrial city of plants there are "drawworks here and tubular coolers there" in operation. Thus, Francé notes, "the more expert knowledge one has, the more one comes across technical terms in this domain" (p. 51).

Since the research findings from cybernetics, bionics, biomimetics and artificial intelligence that reached a high point during the 1960s and 1980s, Francé's biotechnology has now developed into biorobotics. Biorobotics practices are many and varied.[18] Here I shall highlight just one area of biorobotics studies and practices, namely, the production of bio-inspired robots.

One of the most pressing problems in biorobotics and biology is trying to understand the mechanisms of locomotion. The "movements of animals are extremely hard to analyse and imitate because locomotion is the outcome of a complex interplay among many different components: the central and peripheral nervous system, the musculoskeletal system and the environment" (Ijspeert, 2014, p. 196).[19] In a groundbreaking study Auke Jan Ijspeert and colleagues chose a robot strategy to understand locomotion and realize it. Their strategy involved taking the salamander as a model animal and recombining matter and form in order to obtain a new organism. To achieve this, the scientists devised a numerical model of the salamander's spinal cord.

[16] See for example (Drux, 1994; Heßler, 2015).
[17] See (Tamborini, 2020a; Vollgraff, 2021).
[18] See (Datteri and Schiaffonati, 2019; Datteri, 2021).
[19] See also (Nyakatura et al., 2019; Tamborini, 2021).

They then implemented and tested it using a salamander-like robot that can swim and walk (Ijspeert et al., 2007).

**Figure 1**. The robot developed by Auke Jan Ijspeert and colleagues, which walks and swims like a salamander. Credits: Kostas Karakasiliotis, Biorobotics Laboratory, EPFL, Lausanne.

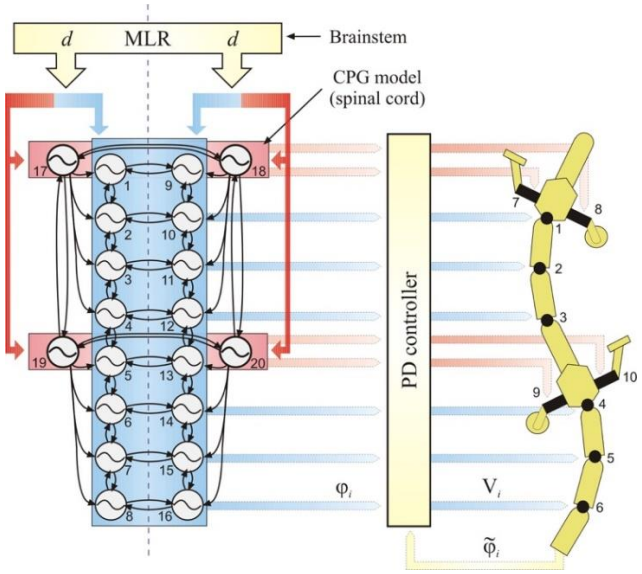



**Figure 2**. Implementation o the salamander model into a salamander robot. Figure by A. Ijspeert, courtesy Biorobotics Laboratory EPEL, Lausanne.

Another example: Scientists Donato Romano and Cesare Stefanini took the shoaling fish *Paracheirodon innesi* as an example to study the dynamics of social distancing toward potentially infected members of the same species. To study this issue in more depth they developed "a robotic replica of a fish that simulates a healthy P. innesi subject, and another that simulates P. innesi with morphological and/or mobility anomalies" (Romano and Stefanini, 2021, p. 1). What they found was that "P. innesi individuals were attracted by the healthy fish replica, whereas they avoided the replica with morphological anomalies, just as they did the replica with an intact appearance but mobility anomalies" (p. 1).

What is the theoretical basis of this practice of composing using forms from nature? In 21st-century biorobotics, as in the 18th and early 20th century, a function of an organism is isolated, defined and re-assembled in a different scenario. But what are the

differences between these practices? And, in particular, which epistemological principle underlies them? In the section that follows, I shall make the transition from a *de facto* to a *de jure* study of biotechnology.

## FROM COMPOSITION TO COMPOSING AND TRANSLATING

As already mentioned, my response to the questions just articulated will be an epistemological one. I will not look in detail at what nature itself is or what makes this shift towards biorobotics possible, but rather how we human beings manipulate and compose nature and can thus control it to an extent. This is not simply a return to Kant but a way of using Kant to think beyond him – in other words, for me it is not "composition" per se that is interesting, but rather how *we* are able to *compose* it. The focus here is on the verb, on the "activity" of composing, rather than on the end product, as is argued in the *Philosophy of Science in Practice*.[20]

On one level, this major shift was made possible by a change in the more general heuristic and metaphysical principles that guide biotechnological research. Francé – and then, increasingly, 1960s bionics and 1980s biorobotics – no longer asked whether organisms should be regarded in some way as machines.[21] During the first half of the twentieth century biology as a whole had been geared towards either denying or affirming a potential analogy between machine and organism. In contrast to this, the key metaphysical question underlying the new, biotechnological perspective on nature is about exploring the very converse of the previous approach. The question is no longer whether organisms are machines but whether machines are organisms. In his well-known publication "Machine and Organism", French philosopher Georges Canguilhem identified this transformative shift as the main reason for the new biotechnological research program pursued in 20th-century biology. He sums up this transformation in the following sentence: "Technology must be regarded as a universal biological phenomenon, and not just as an intellectual human pursuit". "As a result," wrote Canguilhem (2007), "we can inscribe the mechanical onto the organic" (p. 206). "Of course" he continued, "the question is now no longer to what extent the organism can or must be regarded as a machine, be it with regard to its structure or its functions" (p. 206).

On another level, this process by which the mechanical is inscribed onto the organic is a work of composition. The latter, in turn, takes shape through a very specific practice, namely, the practice of translation. The purpose of this practice is to transform something into something else. This involves transferring a meaning and a designation from one domain to another in order make it accessible to people with no access to the first domain. The practice of translation transfers, for example, the complexity of a salamander's locomotion into the artificial structures of a robot. The process of socialization and of social distancing in fish is translated using a robot; the shape of a poppy seed capsule is translated into a salt shaker, etc. In the course of this process of translation – as with any translation – some elements are retained, others are changed, others simplified, others circumscribed and others left out completely. When transferring the salamander organism

[20] See (Ankeny et al., 2011; Chang, 2011; 2012; Dresow, 2020; Soler et al., 2014).
[21] Cf. (Baedke, 2019; Esposito, 2016; Nicholson, 2014; Nicholson and Gawne, 2015; Tamborini, 2023).

to the salamander robot, for example, a number of morphological, social and environmental elements are left out in order to concentrate on a single element, namely, the form-function complex responsible for locomotion. This is isolated, disassembled, and reassembled in the robot.

We can identify three possible translation processes and practices within this practice of isolation, bracketing out and re-assembling: 1) Only function is translated (we might think of the "Canard Digérateur" machine, which simulates the digestive process of ducks); 2) Only form is translated (many experiments conducted by Leonardo da Vinci and by Francé were mere re-assemblages of natural forms); 3) The form-function complex is translated (as in the example of the salamander and the robot fish). This last translation exercise is emblematic because in this case the mere act of translating and reassembling form or function provides a complete picture of the complexity and meaning of the original organism. The function, for example, has been re-worked and rendered in mathematical terms so that a potential mathematical conversion schema emerges. This schema is very important because it enables the engineer in his or her role as translator to find elements that enable them to read nature in line with their conceptual schema.[22] As Canguilhem would say, however, the point of studying and of thus mastering the problem of locomotion is to "create" the craftsman – in other words, to convert function into potential (technological) form.

This practice of composing and translating, then, is based on regarding the forms of nature as *a complex language* and developing tools for translating this language into other forms.

Since the reassembling of biotechnological forms is a translation practice, the additional question arises whether there is any one translation that is better than another. A translation is better than another if it enables me to switch between two languages '*salva veritate*' (i.e., with unharmed truth). This process can even lead to a certain identity. As Leibniz famously wrote: "*Eadem sunt quorum unum in alteris locum substitui posset, salva veritate, ut Triangulum et Trilaterum, Quadrangulum et Quadrilaterum"* (Leibniz, 1890, 7:219) ["Those are the same of which one could take the place of the other, with truth unharmed, such as triangle and three-sided figure, quadrangle and four-sided figure"].

Two expressions are the same[23] if they can be mutually substituted without prejudice to the truth, such as "triangle" and "trilateral figure", "four-sided figure" and "quadrangle". Albeit this presupposes another step: the principle of reversibility. A given text A, in German, for example, is translated into text B (Italian). In order to check whether it is a good translation, I can translate text B back into text A (without knowing it in advance) and end up with another text C. If this text C is sufficiently similar to text A *salva veritate*, then it is a good translation.[24]

[22] On this issue see (Quine, 1960).

[23] It is important to note that what we have here is the identity of two expressions, i.e., the issue is how we perceive and categorize the world rather than one of an identity of the same thing, as Leibniz believed. To put it differently (and as I will show in the conclusion) the practice of translation is based on an epistemic and not on an ontological foundation.

[24] Cf. (Eco, 2016). See also (Baker, 2003).

I can change the words (or the materials and the physical appearance in the case of biorobotics), but reversibility must still be given. A joke, a turn of phrase or a tongue-twister must be capable of being translated back into the original with no loss of meaning. One example of this is Alessandro Manzoni's famous historical novel *I promessi sposi* [*The Betrothed*] (1840–1842), in which the author describes the events surrounding the betrothed couple Renzo and Lucia. At the end of the book the author spells out the message of the story by calling it the "sugo della storia", "sugo of the story." The Italian word "sugo" means "sauce". Manzoni uses this word to convey even more effectively his message of divine providence to the poor and uneducated classes in Italian society in the second half of the 19th century. Just as the sauce spread over pasta gives the dish its flavor and rounds it off, so the sauce of the story is the meaning that gives the whole story its flavor and meaning. In some translations we now read:

- "Questa conclusione, benchè trovata da povera gente, c'è parsa così giusta, che abbiam pensato di metterla qui, come il **sugo di tutta la storia**" (Manzoni, 1997, p. 558)**.**
- English translation: "Although this was said by poor peasants, it appears to us so just, that we offer it here as the **moral of our story**" (Manzoni, 1856, p.452).
- German translation: „Dieser Schluß, obwohl von einfachen Leuten gefunden, hat uns so richtig geschienen, daß wir ihn als den **Kern der ganzen Geschichte** hierher zu setzen gedacht haben" (Manzoni, 1879, p. 320).
- Spanish translation: "Esta conclusión, aunque hallada por pobre gente, nos ha parecido tan justa, que hemos pensado en ponerla aquí, como **el jugo de toda la historia**" (Manzoni, 2015).

All three translations are very good, but in my opinion the Spanish one is the best, because although the English and German versions capture the meaning of the words (i.e. the overarching lesson the author seeks to convey), they fail to put over the visual aspect. By using the word 'jugo', i.e. 'juice', the translator gets very close to the Italian word 'sugo', as he gives the reader a visual impression of the meaning of the expression in a *possible world* that is comparable to the original world given in the text.

To return to the salamander, clearly I cannot translate the salamander robot back and recombine it to obtain a living organism again. What remains, though, is the complex form and function of the salamander organism. In order to check whether the translation is correct, we just have to insert the robot into the salamander 'life form' and see whether it moves exactly the same in a possible environment.

The case of fish (i.e. in the case of so-called interactive biorobotics) is even more symbolically laden. Here, the robots enter into cooperation and connection with the life form fish, which proves that the translation is correct, as it allows me to study another life form which would be unknown to me without the translation and practice of composition.

## OUTLOOK

In the practice of composing and constructing, then, a conceptual plan of a form comes about as an emergent arrangement of various factors, an arrangement perhaps better understood in terms of a construction.[25] This realization is of both historical and theoretical significance. It suggests a further genealogy of the Kantian-Romantic paradigm of morphology. This paradigm which has privileged, among others, the concept of gestalt and the intrinsic properties of form, was taken up by the 20th-century organic movement.[26]

In this case, however, the point at issue is not the actual properties of matter but rather the emphasis on (and translation of) the elements that connect and hold together the parts of the original form. The composition is thus based on a *translation practice*[27] that takes into account what is to be translated. In other words, the point of departure is Francé's definition of the organism:

"The meaning of the term organism and organisation is nothing other than the *law-based unification of parts* [...] Accordingly, no function exists on its own but rather always in interaction with others. An organ effects other organs, their functions interlock with one another like the teeth in a cogwheel and all of them together are regulated by the whole to which they belong" (Francé, 1928, p. 262).

The key question is how both this "*law-based unification"* as well as the "parts" that form a whole can be translated and composed. It is on this basis that engineers negotiate and make decisions by *hermeneutically interpreting*[28] nature and categorizing the forms of nature into possible worlds of interpretation, in order to extrapolate from there what needs to be varied. In accepting this perspective, my study has established a connection and an encounter with linguistic studies in the philosophy of technology as represented, for example, by Mark Coeckelbergh and Alfred Nordmann.[29]

In addition, this case study brings us face to face with the famous problem articulated by Quine (1960, 1969), namely, that of radical translation.[30] Here too a profound indeterminacy and determinacy of translation becomes apparent. In a translation manual consisting of words and options used by engineers, we are entirely determined. To the outside, this translation remains utterly indeterminate. If we accept this conclusion, we can also extend it to the understanding of the relation between nature and technology. The approach I have put forward and developed in this article rejects any identity or

[25] On this, see (Tamborini, 2022a, 2020b).
[26] Cf. (Friedman and Krauthausen, 2022; Tamborini, 2022a, 2022b).
[27] Although it is not the aim of this article to do so, I would like to remark that the emphasis on the translation practice of engineers implies drawing attention to an ontological difference between nature and technology, a different that is bridged epistemologically. On this topic see ( Speck et al., 2022; Tamborini, 2022a).
[28] On this see (Grunwald, 2015; Sand, 2019; Schmidt, 2021).
[29] See (Coeckelbergh, 2011, 2017a, 2017b; Nordmann, 2002).
[30] The solution to this dilemma lies in the principle of relativity: "reference is nonsense except relative to a coordinate system". Accordingly, Goodman (1978) writes, "not *what* is given but *how* it is *given*" is key (p. 6). Or, as Cassirer (2000) noted from a different perspective: "We thus do not recognize ‹objects' — as if they were already previously and independently determined and given as objects —, but rather we recognize objectively by creating certain demarcations within the uniform course of a set of experiences and fix in place certain lasting elements and contexts of interconnection" (p. 403).

dichotomy between nature and technology. On the contrary, by placing the emphasis on translation practices, we can see the significance of a holistic treatment of both domains which, as Quine himself observed, highlights the background theories, nature and technology, which are connected only by the network of acts of translation (ontological relativity), which in turn are based on principles that are always capable of being revised and (re-)negotiated.

By concentrating on this practice of translation from one domain to another, I am ultimately drawing attention to the need to study philosophically what happens *between different scientific domains* and especially *between science and technology*. Given that this process is not simply about some kind of takeover, a solid philosophy of the technosciences should be developed in order to understand what is happening with these cross-cutting movements. This paper therefore throws down the challenge to philosophers to develop a philosophy of knowledge in the interstices.[31]

The compositional practice of biorobotics is thus not biomimicry (i.e., a mere mimetic copying of the forms of nature), but a *translation practice* based on the general metaphysical paradigm of an inscription of the mechanical onto the organic. As a result, within this practice, the scientist becomes *homo translator* for they shifts between different media of representation to express the biological into the mechanical and vice versa.

## REFERENCES

Ankeny, R., Hasok C., Marcel B., & Mieke B. (2011). Introduction: Philosophy of Science in Practice. *European Journal for Philosophy of Science, 1*(3), 303-307. https://doi.org/10.1007/s13194-011-0036-4

Baedke, J. (2019). O Organism, Where Art Thou? Old and New Challenges for Organism-Centered Biology. *Journal of the History of Biology, 52*(2), 293–324. https://doi.org/10.1007/s10739-018-9549-4

Baker, M. (Ed.). (2003). *Routledge Encyclopedia of Translation Studies*. Routledge.

Bensaude-Vincent, B. (2019). Bio-Informed Emerging Technologies and Their Relation to the Sustainability Aims of Biomimicry. *Environmental Values, 28*(5), 551–571. https://doi.org/10.3197/096327119X15579936382392

Benyus, J. M. (2002). *Biomimicry: Innovation Inspired by Nature*. Harper Perennial.

Bredekamp, H. (2001). Gazing Hands and Blind Spots: Galileo as Draftsman. *Science in Context, 14*(s1), 153. https://doi.org/10.1017/s0269889701000333

Canguilhem, G. (2007). Maschine Und Organismus [Machine and Organism]. In D. Gugerli, M. Hagner, M. Hampe, B. Orland, P. Sarasin, and J. Tanner (Eds.), *Zürcher Jahrbuch Für Wissensgeschichte, 3* (pp. 185–211). Diaphanes.

Cassirer, E. (2000). *Substanzbegriff Und Funktionsbegriff; Untersuchungen Über Die Grundfragen Der Erkenntniskritik* [Concept of Substance and Concept of Function; Studies on the Basic Questions of Epistemology]. Meiner.

[31] See on this (Tamborini, 2022a, 2020b).

Chang, H. (2011). The Philosophical Grammar of Scientific Practice. *International Studies in the Philosophy of Science, 25*(3), 205–221. https://doi.org/10.1080/02698595.2011.605244

Chang, H. (2012). *Is Water $H_2O$?: Evidence, Realism and Pluralism.* Springer Netherlands.

Chang, H. (2017). Is Pluralism Compatible with Scientific Realism? In J. Saatsi (Ed.), *The Routledge Handbook of Scientific Realism* (pp. 176–186). Routledge. https://doi.org/10.4324/9780203712498-15

Coeckelbergh, M. (2011). You, Robot: On the Linguistic Construction of Artificial Others. *AI & Society 26*(1), 61–69. https://doi.org/10.1007/s00146-010-0289-z

Coeckelbergh, M. (2017a). Language and Technology: Maps, Bridges, and Pathways. *AI & Society, 32*(2), 175–189. https://doi.org/10.1007/s00146-015-0604-9

Coeckelbergh, M. (2017b). *Using Words and Things: Language and Philosophy of Technology*. Routledge.

Cordeschi, R. (2002). *The Discovery of the Artificial: Behavior, Mind and Machines before and beyond Cybernetics*. Springer Science & Business Media.

Corning, P. A. (2020). Beyond the Modern Synthesis: A Framework for a More Inclusive Biological Synthesis. *Progress in Biophysics and Molecular Biology 153*, 5–12. https://doi.org/10.1016/j.pbiomolbio.2020.02.002

Datteri, E. (2020). The Logic of Interactive Biorobotics. *Frontiers in Bioengineering and Biotechnology, 8*. https://doi.org/10.3389/fbioe.2020.00637

Datteri, E. (2021). Interactive Biorobotics. *Synthese, 198*(22), 7577–7595. https://doi.org/10.1007/s11229-020-02533-2

Datteri, E., & Schiaffonati, V. (2019). Robotic Simulations, Simulations of Robots. *Minds and Machines, 29*(1), 109–25.

Datteri, E., & Tamburrini, G. (2007). Biorobotic Experiments for the Discovery of Biological Mechanisms. *Philosophy of Science, 74*(3), 409–430. https://doi.org/10.1086/522095

Dicks, H. (2016). The Philosophy of Biomimicry. *Philosophy & Technology, 29*(3), 223–243. https://doi.org/10.1007/s13347-015-0210-2

Drack, M., Limpinsel, M., de Bruyn, G., Nebelsick, J. H., & Betz, O. (2017). Towards a Theoretical Clarification of Biomimetics Using Conceptual Tools from Engineering Design. *Bioinspiration & Biomimetics, 13*(1), 016007. https://doi.org/10.1088/1748-3190/aa967c

Dresow, M. (2020). History and Philosophy of Science after the Practice-Turn: From Inherent Tension to Local Integration. *Studies in History and Philosophy of Science, Part A, 82*, 57–65. https://doi.org/10.1016/j.shpsa.2020.01.001

Drux, R. (Ed.) (1994). *Die Geschöpfe Des Prometheus – Der Künstliche Mensch von Der Antike Bis Zur Gegenwar* [The Creatures of Prometheus – The Artificial Man from Antiquity to The Present]. Kerber.

Eco, U. (2016). *Dire Quasi La Stessa Cosa* [Say Almost the Same Thing]. Bompiani.

Eldredge, N. (2014). *Extinction and Evolution: What Fossils Reveal About the History of Life*. Firefly books.

Esposito, M. (2016). *Romantic Biology, 1890-1945*. Routledge.

Fehrenbach, F. (2019). *Leonardo Da Vinci: Der Impetus Der Bilder* [Leonardo Da Vinci: The Impetus of Images]. Matthes & Seitz.

Francé, R. H. (1920). *Die Pflanze Als Erfinder* [Plants as Inventors]. Kosmos, Gesellschaft der Naturfreunde.

Francé, R. H. (1928). *Der Organismus: Organisation Und Leben Der Zelle* [The Organism: Organization and Life of the Cell.]. Drei Masken-Verlag.

Franzini, E. (1987). *Il Mito Di Leonardo* [The Myth of Leonardo]. Unicopli.

Friedman, M., & Krauthausen, K. (2022). Materials Matter: Introduction. In P. Fratzl, M. Friedman, K. Krauthausen, & W. Schäffner (Eds.), *Active Materials* (pp. 1-36). De Gruyter. https://doi.org/10.1515/9783110562064-001

Goodman, N. (1978). *Ways of Worldmaking*. Harvester Press.

Grunwald, A. (2015). Die Hermeneutische Erweiterung Der Technikfolgenabschätzung [The Hermeneutic Extension of Technology Assessment]. *TATuP-Zeitschrift Für Technikfolgenabschätzung in Theorie Und Praxis, 24*(2), 65–69. https://doi.org/10.14512/tatup.24.2.65

Gutmann, M. (2017). *Leben Und Form: Zur Technischen Form Des Wissens Vom Lebendigen* [Life and Form: On the Technical Form of Knowledge of the Living]. Springer. https://doi.org/10.1007/978-3-658-17438-5

Heßler, M. (2015). Die Ersetzung Des Menschen? Die Debatte Um Das Mensch-Maschinen-Verhältnis Im Automatisierungsdiskurs [The Replacement of Man? The Debate about the Human-machine Relationship in the automaTion Discourse]. *Technikgeschichte, 82*(2), 109–136.

Hood, E. (2004). RoboLobsters: The Beauty of Biomimetics. *Environmental Health Perspectives, 112*(8), A486–489. https://doi.org/10.1289/ehp.112-a486

Huneman, P. (2019). Special Issue Editor’s Introduction:‘Revisiting the Modern Synthesis.’ *Journal of the History of Biology, 52*, 509–518 (2019). https://doi.org/10.1007/s10739-019-09585-2

Huneman, P. & Walsh, D. M. (2017). *Challenging the Modern Synthesis: Adaptation, Development, and Inheritance*. Oxford University Press.

Ijspeert, A. J. (2014). Biorobotics: Using Robots to Emulate and Investigate Agile Locomotion. *Science, 346*(6206), 196–203.

Ijspeert, A. J., Crespi, A., Ryczko, D. & Cabelguen, J.-M. (2007). From Swimming to Walking with a Salamander Robot Driven by a Spinal Cord Model. *Science, 315* (5817), 1416–1420. https://doi.org/10.1126/science.1138353

Innocenzi, P. (2018). *The Innovators behind Leonardo: The True Story of the Scientific and Technological Renaissance*. Springer.

Kant, I. (1998). *Kritik Der Reinen Vernunft* [Critique of Pure Reason]. Meiner Verlag.

Knippers, J., & Speck, T. (2012). Design and Construction Principles in Nature and Architecture. *Bioinspiration & Biomimetics, 7*(1), 015002. https://doi.org/10.1088/1748-3182/7/1/015002

Leibniz, G. W. (1890). *Die Philosophischen Schriften von Gottfried Wilhelm Leibniz* [The Philosophical Writings of Gottfried Wilhelm Leibniz]. Weidmann.

Leonelli, S. (2016). *Data-Centric Biology: A Philosophical Study*. University of Chicago Press.

Liggieri, K., & Müller, O. (2019). *Mensch-Maschine-Interaktion. Handbuch zu Geschichte–Kultur–Ethik* [Human-Machine Interaction. History-Culture-Ethics Handbook]. Metzler.

Liggieri, K., & Tamborini, M. (Eds.) (2021). *Organismus Und Technik. Anthologie Zu Einem Produktiven Und Problematischen Wechselverhältnis* [Organism and Technology. Anthology on a Productive and Problematic Interrelationship]. Wbg.

Manzoni, A. (1856). *I Promessi Sposi, or, The Betrothed*. Lambert.

Manzoni, A. (1879). *Die Verlobten* [The Betrothed]. Bibliographisches Institut.

Manzoni, A. (1997). *I Promessi Sposi*. Hoepli.

Manzoni, A. (2015). *Los Novios* [The Betrothed]. Akal.

Mazzolai, B., Beccai, L. & Mattoli, V. (2014). Plants as Model in Biomimetics and Biorobotics: New Perspectives. *Frontiers in Bioengineering and Biotechnology, 30*. https://doi.org/10.3389/fbioe.2014.00002

Moon, Francis C. (2007). *The Machines of Leonardo Da Vinci and Franz Reuleaux: Kinematics of Machines from the Renaissance to the 20th Century*. Springer.

Müggenburg, J. (2019). Bionik [Bionics]. In K. Liggieri and O. Müller (Eds.), *Mensch-Maschine-Interaktion Handbuch Zu Geschichte – Kultur – Ethik* (pp. 241–243). Springer.

Müller, G. B.; & Stuart N. A. (Eds.) (2003). *Origination of Organismal Form: Beyond the Gene in Developmental and Evolutionary Biology*. Cambridge: MIT Press.

Nicholson, D. J. (2014). The Return of the Organism as a Fundamental Explanatory Concept in Biology. *Philosophy Compass, 9*(5), 347–359. https://doi.org/10.1111/phc3.12128

Nicholson, D. J, & Gawne, R. (2015). Neither Logical Empiricism nor Vitalism, but Organicism: What the Philosophy of Biology Was. *History and Philosophy of the Life Sciences, 37*(4), 345–381. https://doi.org/10.1007/s40656-015-0085-7

Nordmann, A. (2002). Another New Wittgenstein: The Scientific and Engineering Background of the Tractatus. *Perspectives on Science, 10*(3), 356–384. https://doi.org/10.1162/106361402321899087

Nyakatura, J. A, Mduelo, K., Horvat, T., Karakasiliotis, K., Allen, V. R., Andikfar, A., Andrada, E., Arnold, P., Lauströer, J., Hutchinson, J. R., Fischer, M. S., & Ijspeert, A. J. (2019). Reverse-Engineering the Locomotion of a Stem Amniote. *Nature, 565*(7739), 351. https://doi.org/10.1162/10.1038/s41586-018-0851-2

Pigliucci, M. (2007). Do We Need an Extended Evolutionary Synthesis? *Evolution: International Journal of Organic Evolution, 61*(12), 2743–2749. https://doi.org/10.1111/j.1558-5646.2007.00246.x

Pigliucci, M., & Gerhard M. (Eds.) (2010). *Evolution–The Extended Synthesis*. MIT Press.

Quine, W. V. O. (1960). *Word and Object*. MIT University Press.

Quine, W. V. O. (1969). *Ontological Relativity and Other Essays*. Columbia University Press.

Raup, D. M., & Sepkoski J. J. Jr. (1984). Periodicity of Extinctions in the Geologic Past. *Proceedings of the National Academy of Sciences USA, 81*(3), 801-805. https://doi.org/10.1073/pnas.81.3.801

Riskin, J. (2003). Eighteenth-Century Wetware. *Representations, 83*(1), 97–125. https://doi.org/10.1525/rep.2003.83.1.97

Riskin, J. (2016). *The Restless Clock: A History of the Centuries-Long Argument over What Makes Living Things Tick*. University of Chicago Press.

Romano, D., & Stefanini, C. (2021). Unveiling Social Distancing Mechanisms via a Fish-Robot Hybrid Interaction. *Biological Cybernetics, 115*, 565–573. https://doi.org/10.1007/s00422-021-00867-9

Sand, M. (2019). On ‘Not Having a Future.’ *Futures, 107*, 98–106. https://doi.org/10.1016/j.futures.2019.01.002

Schmidt, J. C. (2021). TA Und Unterschiedliche Formen Des Wissens [TA and Different Forms of Knowledge.]. In S. Böschen, A. Grunwald, B.-J. Krings, and C. Rösch (Eds.), *Technikfolgenabschätzung: Handbuch Für Wissenschaft Und Praxis* (pp. 191–208). Nomos.

Sepkoski, D. (2020). *Catastrophic Thinking: Extinction and the Value of Diversity from Darwin to the Anthropocene*. University of Chicago Press.

Soler, L., Zwart, S., Lynch, M. & Israel-Jost, V. (Eds.) (2014). *Science after the Practice Turn in the Philosophy, History, and Social Studies of Science*. Routledge.

Speck, T., Poppinga, S., Speck, O. & Tauber, F. (2022). Bio-Inspired Life-like Motile Materials Systems: Changing the Boundaries between Living and Technical Systems in the Anthropocene. *The Anthropocene Review, 9*(2), 237–256. https://doi.org/10.1177/20530196211039275

Tamborini, M. (2020a). Technische Form Und Konstruktion [Technical Form and construction]. *Deutsche Zeitschrift Für Philosophie, 68*(5), 712–733. https://doi.org/10.1515/dzph-2020-0049

Tamborini, M. (2020b). Technoscientific Approaches to Deep Time. *Studies in History and Philosophy of Science, Part A, 79*(1), 57–67. https://doi.org/10.1016/j.shpsa.2019.03.002

Tamborini, M. (2021). The Material Turn in The Study of Form: From Bio-Inspired Robots to Robotics-Inspired Morphology. *Perspectives on Science, 29*(5), 643–65. https://doi.org/10.1162/posc_a_00388

Tamborini, M. (2022a). *Entgrenzung. Die Biologisierung Der Technik Und Die Technisierung Der Biologie* [Delimitation. The Biologization of Technology and the Mechanization of Biology]. Meiner.

Tamborini, M.. (2022b). The Circulation of Morphological Knowledge: Understanding ‘Form’ across Disciplines in the Twentieth and Twenty-First Centuries. *Isis, 4* (113). https://doi.org/10.1086/722439

Tamborini, M. (2023). *The Architecture of Evolution: The Science of Form in Twentieth-Century Evolutionary Biology*. University of Pittsburgh Press.

Tamborini, M. (in press). Philosophie Der Bionik: Das Komponieren von Bio-Robotischen Formen [Philosophy of Bionics: the Composing of Bio-Robotic Forms]. *Deutsche Zeitschrift Für Philosophie*.

Tamborini, M., & Datteri, E. (2023). Is Biorobotics Science? Some Theoretical Reflections. *Bioinspiration & Biomimetics, 18*(1), 015005. https://doi.org/10.1088/1748-3190/aca24b

Vasari, G. (1886). *Le Vite de Più Eccellenti Pittori, Scultori e Architetti* [The Lives of the Most Excellent Painters, Sculptors and Architects]. Barbera.

Vasari, G. (2020). *Lebensläufe Der Berühmtesten Maler, Bildhauer Und Architekten* [The Lives of the Most Excellent Painters, Sculptors and Architects]. Manesse Verlag.

Vollgraff, M. (2021). The Library of Life. Biological Connections in Mies's Collection. In S. Martin and J. Wallner (Eds.), *Lehmbruck – Kolbe – Mies Van Der Rohe: Künstliche Biotope / Artificial Biotopes* (pp. 195-207). Hirmer Verlag.

Voskuhl, A. (2013). *Androids in the Enlightenment*. University of Chicago Press.

**СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR**

Марко Тамборини,
marco.tamborini@tu-darmstadt.de,
ORCID 0000-0001-7102-7479

Marco Tamborini,
marco.tamborini@tu-darmstadt.de,
ORCID 0000-0001-7102-7479

Статья поступила 18 октября
одобрена после рецензирования 19 декабря
принята к публикации 20 декабря

Received: 18 October 2022
Revised: 19 December 2022
Accepted 20 December 2022

https://doi.org/10.48417/technolang.2022.04.11
Research article

# Composing and Combining: Opposing Constructive Principles?

Astrid Schwarz (✉)
Brandenburgische Technische Universität Cottbus – Senftenberg, Erich-Weinert-Str. 1, 03046 Cottbus, Germany
schwarza@b-tu.de

## Abstract

The distinction between the constructive principles of combining and composing is discussed in terms of works of art, nature, and technology. How is the work that emerges from these different principles ultimately constituted and perceived as a definable entity and how is this important for the philosophy of technology? In contrast to composition, combining is presented as a strategy to give more importance to the processual, to the various spatial and temporal couplings and decoupling of the components of a work, to their relationship to their surroundings and also to the relatedness of the observer to the work. Gardenworks can stand for principles of combination as well as principles of composition. They are nature-culture hybrid forms, examples are discussed referring to 17th and 18th-century pleasure gardens. The emphasis on the principle of combination in the case of the English landscape garden ultimately produced a model for a sociotechnical handling with nature-culture constellations based on a policy of democratic principles. This combinational play in the garden can also be seen as a suitable heuristic for dealing with the comprehensive transformation processes occurring in the Anthropocene and for practicing corresponding forms of action.

**Keywords:** Principles of combination; Gardenwork; Art work; Garden history; Homo hortensis; Rauschenberg; Pleasure gardens; Principles of composition; Anthropocene; Technoscience

**Acknowledgment:** I would like to thank Kathleen Cross for her translation into English of the manuscript.

**Citation:** Schwarz, A. (2022). Composing and Combining: Opposing Constructive Principles? *Technology and Language*, *3*(4), 160-174. https://doi.org/10.48417/technolang.2022.04.11

УДК 130.2
https://doi.org/10.48417/technolang.2022.04.11
Научная статья

# Композиция и комбинация: Противоречащие конструктивные принципы?

Астрид Шварц (✉)
Бранденбургский технический университет Котбуса – Зенфтенберг, Эрих-Вейнерт. 1, 03046 Котбус, Германия
schwarza@b-tu.de

**Аннотация**
Различие между конструктивными принципами соединения и композиции обсуждается с точки зрения произведений искусства, природы и техники. Как работа, возникающая из этих различных принципов, в конечном счете конституируется и воспринимается как определяемая сущность, и насколько это важно для философии техники? В отличие от композиции, комбинирование представлено как стратегия придания большего значения процессуальному, различным пространственным и временным связям и разъединениям компонентов произведения, их взаимосвязи с окружением, а также взаимосвязи наблюдателя с работой. Садовые работы могут означать как принципы сочетания, так и принципы композиции. Они гибридные формы природы и культуры, рассматриваемые примеры относятся к садам удовольствий 17 и 18 веков. Акцент на принципе комбинирования в случае с английским пейзажным садом в конечном итоге привел к созданию модели социотехнического обращения с сочетаниями природы и культуры, основанном на политике демократических принципов. Эту комбинационную игру в саду можно также рассматривать как подходящую эвристику для рассмотрения всеобъемлющих процессов трансформации, происходящих в антропоцене, и для опыта соответствующих форм действия.

**Ключевые слова:** Принципы комбинации; Садовые работы; Художественная работа; История садоводства; Человек гортензия; Раушенберг; Сады удовольствий; Принципы композиции; Антропоцен; Технология

**Благодарность:** Я хотела бы поблагодарить Кэтлин Кросс за перевод рукописи на английский язык.

.

**Для цитирования:** Schwarz, A. Composing and Combining: Opposing Constructive Principles? // Technology and Language. 2022. № 3(4). P. 160-174. https://doi.org/10.48417/technolang.2022.04.11

## INTRODUCTION

In what follows I want to consider the extent to which it is possible to make a distinction between principles of combining and composing when a technological or artistic work is created, preserved and perceived. In what way are individual components assembled to form a work, how are the materials that make up a composed or combined work (be they immaterial signs or material objects) manipulated in the process? Do these principles differ, perhaps, according to the very demands made of the materials used? And how is the work that issues from these – as it is claimed – fundamentally different principles ultimately constituted and perceived as a whole? In other words, can the composing and combining be characterized by reference to different heuristics of collecting and connecting things, which are associated with different practices in each case and which then also lead to different stocks of knowledge and are manifested through the works?

These questions concerning a distinction between principles of composing and combining were prompted by a workshop held in 2016 in Padua entitled “Principles of Composition: Towards a Laocoön for works of technological art”, organized by Alfred Nordmann and Fabio Grigenti.[1] The title reflects their surprise that, conceptually speaking, composition as a principle has remained fairly inconspicuous to date in the philosophy of technology. The thesis put forward for debate at the workshop was that the development of principles of composition belong above all to the world of art and for that reason play no role in the *ars technica*. In seeking to carve an appropriate niche for composition in the philosophy of technology, they asked whether it might not be possible to reverse the usual hermeneutic perspective. What if it were not the work of art that was considered the authorizing object and thus the paradigm for (a) “work” but rather technological clockworks and sewing “works”, machine works and networks of technology? What if, for example, Ernst Kapp’s socio-technological hammer works, Gilbert Simondon’s concept of concrete machines, or the programming rules for software engineers were to be regarded as of equal value as an artwork and its compositional production?

While I was attracted to this idea of reversal, at the same time I also began to feel uneasy about the way it was taken for granted that a work – whether of art or technology – is brought forth by a practice of composing. Isn’t the principle of composing in technology also identified with a homogenizing and predominantly constructive practice, with the notion of a complete(d), “true” work and with a rationalistic order per se? Where would this leave the heuristics of tinkering and improvising in the emergence of a technological work – heuristics much debated in the philosophy of technology and science – and how would it account for the stubbornness of materials and their quality of affording possibilities? And what about the heterogeneity of a technological artifact and the radically open-ended dynamics of constant technological innovation, or at least of changing conditions in the technological and societal environment?

These questions brought up for me the complementary principle of combining and also a return to the question of how the emergence of a work of art and its significance as

[1] https://laocoon-conference.blogspot.com

such is to be understood when viewed from the principle of combining as opposed to the principle of composing. Would this principle steer our attention more towards the *process* of acting and thinking, to the different spatial and temporal couplings and de-couplings of the component parts of a work, to the "dance of agency" (Pickering, 2008, p. 1) involving non-human and human agents?

My initial spontaneous impression, then, was that composing is one of those activities used by philosophers to claim that structures and processes are fundamentally posited anew, that this is a one-sided process, and that the condition for it to occur is a homogenously formed material – musical notes, for example – which, when a rational set of rules are applied to it (the theory of harmony) – lead to a work that is complete in itself according to certain criteria. In pumping stations, for example, the composition of the countless individual components – pipes, valves, shafts – and the rules of hydraulics would, by analogy, be conceived as a composing activity represented by the "finished product" of a fully functioning pumping station.

With both forms of composing, other factors come into play as well, including iterative processes during the building of the work, as well as rules, adjustments and changes made during its operation. In a musical work these would be the performance practice, in a pumping station, by analogy, the ongoing maintenance – all of which clearly raises the question of how they are to be incorporated within the principle of composition. What also appeared to me to be problematic about this perspective is that in the act of composing, the author is putting him- or herself at a clear distance to the work, supported by the use of the relevant notation systems available. This seems to leave little room for the materials to manifest a "life of their own" or their potential for relation, whether it be sounds or pipes: they are tied into the principle of rational assembling on a two-dimensional medium, namely, paper.

In contrast to this, so the idea goes, a principle of combining would shift the emphasis more towards the materiality of the individual work pieces, towards the singularity of their contribution to the whole, with spontaneity and happy coincidence also being granted more space. Only through the willfulness of the material and perhaps a surprising resonance between individual parts can a musical work come into being – as expressed, for example, in mid-20th century Aria by John Cage.[2] Not explicitly named although similarly effective, the combinational principle can also be seen at work in an 18th-century pumping station located by the Notre Dame bridge in Paris – a gigantic, assembled water machine.

[2] https://youtu.be/USJBhk9Rzfw

**Figure 1**. Pumping station Notre Dame, Paris; start of construction in the 18th century.[3]

So much for a somewhat historical reconstruction of initial ideas around the complementarity of composition and combination. I won't deny in retrospect that this involved a rather over-simplified understanding of composing. In the following I want to make a further attempt to render the two principles of composing and combining more clear-cut, using examples from art – still in somewhat sketchy manner, but hopefully illustrating the key arguments. I will then discuss the two principles using examples from the art of landscape gardening, where the garden proves to be an artifact of both art *and* technology.

## COMPOSING

The entry "compositio/Komposition" in the German-language standard work HmT *Handwörterbuch der musikalischen Terminologie* (Pocket dictionary of musical terminology) offers highly varied historical conceptions of composing, from the 11th century to the present day. My tendency to mistrust composing is reflected in definitions such as those described for the early 18th century. Composing here is understood as a science, backed up by attempts to provide evidence from physics; spontaneous and improvised procedures are ruled out explicitly. Johann Wolfgang von Goethe was a

[3] https://commons.wikimedia.org/wiki/File:Charles_Meryon,_La_Pompe_Notre-Dame,_Paris_(The_Notre-Dame_Pump),_1852,_NGA_35110.jpg

vigorous critic of such an understanding, arguing against composition as a "mean word" exclaiming: "How can anyone say that Mozart composed his 'Don Juan'! – Composition! – As if it were a piece of cake or a biscuit mixed together out of eggs, flour and sugar!"[4] Composing in this sense can be understood as a procedure that follows certain numerical rules by means of which the material is normalized and transformed into an abstract, functional order. To this extent, then, composing is a deduction-oriented method, offered as a process that functions hierarchically and is aimed at the most complete control possible over the objects created.

In the 19th and to some extent in the 20th century, too, composing is claimed to be a mechanical procedure of construction that can be explained rationally (Bandur, 1996). At the same time, however, the binding rules of composition are lost at the start of the 20th century as atonality comes in; the term composition itself is used much less frequently. John Cage notes: "Construction in music consists in its being able to be divided up into movements, periods and phrases. […] We describe as method the ensemble of means of controlling the continuity from one note to the next one. The materials of music are sound and silence. Composing brings material, construction and form together with the help of method."[5] This understanding of bringing-together as a method in which material, construction and form are all considered equally surely comes closer to the principle of combining considered here.

In the visual arts, pictures by Josef Albers and Piet Mondrian celebrate a rational proceeding in Cartesian spaces. They are abstract representations whose constructive process is celebrated; the process of production itself remains secondary, the materials coming from a passive world of availabilities. Andrew Pickering has demonstrated that, in relation to abstractness, the pictures of Willem de Kooning are in no way inferior to those of Piet Mondrian; however, de Kooning's pictures differ essentially in that the interaction between present impressions and the painting process becomes apparent in them, "leading in an open-ended fashion to canvasses that no one, including the artist himself, could ever have planned or anticipated in advance. […] And if Mondrian's works couple this detachment with the asymmetric human domination of passive matter, then de Kooning's emphasize a much more symmetric interplay of the human and the nonhuman." (Pickering, 2008, p. 2)[6]

[4] „Es ist ein ganz niederträchtiges Wort," erwiderte Goethe, „das wir den Franzosen zu danken haben und das wir sobald wie möglich wieder los zu werden suchen sollten. Wie kann man sagen, Mozart habe seinen 'Don Juan' komponiert! – Komposition! – Als ob es ein Stück Kuchen oder Biskuit wäre, das man aus Eiern, Mehl und Zucker zusammenrührt!" (Eckermann, 1831) https://www.projekt-gutenberg.org/eckerman/gesprche/gsp3109.html

[5] „La construction en musique est sa divisibilité en mouvements, périodes et phrases. […] Nous appelereons méthode l'ensemble des moyens de controler la continuité d'une note à l'autre. Le matériau de la musique est le son et la silence. Composer, c'est mettre en rapport matériau, construction et forme à l'aide de la méthode." (John Cage in Bandur, 1996, p. 13).

[6] Pickering furthermore points out that "(o)ne cannot imagine a de Kooning as the translation of a preconceived mental image into paint on canvas. One has to think of them along the lines in which they were, in fact, executed." (Pickering, 2008, p. 2)

## COMBINING

In the 20th century collage brought a procedure into play that came to be a favored method of bringing together the most varied materials and processes, especially in the fine arts and photography. Dripping splashes of paint, photographs, traffic signs, stuffed animals, or "[a] pair of socks", as Robert Rauschenberg stressed, "are no less suited to making a painting than wood, nails, turpentine, oil and fabric" (Craft, 2013, p. 5). This combinational feast of materials became a new type of artistic work: "Combines" were born. The straight-lined, experimental technique of these combinations had profound and far-reaching consequences for both the creation and the perception of works of art. Works of art, even in a museum, no longer had to remain rigid and immutable: colors, surfaces and the position of component parts were allowed to change – even the audience was to be allowed to physically intervene. Rauschenberg's repeated credo was that it was important to work with and not against the ever-changing nature of one's surroundings. Accordingly, Combines are packed full of objects from the surroundings in which Rauschenberg lived and worked. This notion of the necessity of a relationship to one's surroundings, represented and performed in the work of art, is something Rauschenberg passed on to his viewers not only through the Combines.

He also exhibited installations ("Black Market" for example) from which the viewer could take objects away with them or leave their own (which he documented using drawings) (Rauschenberg, 2006). The degree of freedom displayed by the Combines is fascinating in itself, as objects and materials are arranged on a receptive surface with no regard for conventional hierarchies of form or theme. This way of working was also described as "flatbed-picture plane" (Craft, 2013, p. 48), in a reference to the flatbed printing machine – so that (just in passing) a technological work became a model for an artistic technique.

To sum up, then, we can note that the principle of combining in Rauschenberg's work is realized through material, sensory and conceptual relations between the work and its surroundings. Work and surroundings exist in mutual interaction, they shape and influence each other, forming a kind of ecosystem. Material, construction and form are brought together, the method is experimental and playful, while bricolage and trial and error procedures are the rule. On no account is this principle of combination deductive, and neither is it normative in relation to the materials used.

What is interesting here is the emphasis on surroundings, which are actively included, looked at as a part of the work, either materially in the work itself (such as the socks worked in) or through what the work offers its viewers – the invitation to add a component or take one away, which obviously raises the much-discussed questions: will "Black Market" still be Rauschenberg's work when (how many of?) its parts have been swapped in or out, or is it being collectivized? What will become of it then? Will the idea of the work continue to exist independently of its physical realization and, if so, how will this be apparent? These questions are doubtless of concern to the art market, but more interesting here is above all the question as to the relationship between the parts of a work and the artwork as a whole.


**Figure 2.** Combine at Kunstmuseum Basel (Photo Daniel Cenci)

It was in Lessing's treatise Laocoön that this question as to the whole of a work was first posed. The concept is referenced in the subtitle ("Towards a Laocoön for Works of Technological Art") of the workshop mentioned above, "The Principles of Composition",

which in turn goes back to a series of lectures titled "Laocoön" organized by Alfred Nordmann at Darmstadt during the winter semester 2014/15.[7]

## VIA THE LAOCOÖN TO GARDENWORKS

For Lessing, a thing in space can be known on the basis of viewing alternately its parts, their connections, and the whole. In order to generate the impression of this whole, the mutual reference of the two schemas to each other seems indispensable: painting stands for the art of recognizing and working with all that co-exists, poetry, by contrast, for all that is consecutive, and music similarly. A thing in space can only be seen as a whole in the context of its existing alongside other things, but to be aware of this wholeness at all, insists Lessing, we need the rational mind (Todorov, 1984, p. 16). However, co-existing bodies can refer beyond themselves – and this is where gardenworks come into play: a curving path and an alley of trees that ends at the horizon can be read as random signs, with garden design, the plan of a garden, telling us something about the course they take. They engender certain expectations that allow them to be interpreted as a continuous line in space and as a continuation in time: we know – provided the plan (or experience) says so – that the garden will continue behind the horizon in this or that way and we think in terms of this continuation with the constituting idea of landscaped gardenworks as a whole. In this way – with a consecutive reading of the garden in space, a constant updating of its mutually referencing natural and arbitrary signs and of the borders on the planting plan, of our perception of proximity and distance and the construction of vistas – the idea of the whole is not just stabilized but is rendered available to experience in the first place.

Gardenworks, then, are a product of people's activities and ideas, a well-defined artifact that must constantly be tended and simultaneously re-interpreted time and again. Gardens, like technology, testify to migration, domestication, colonization, to settlement models and economic systems. Yet gardens are also products of nature; their visible structures are, as a rule, overwhelmingly plant-based, but they are also visited, used and even constituted – usually invisibly – by animals, fungi and microorganisms.

Thus, a garden is neither art nor nature. It is art-and-nature: "In a special way the garden is dependent on the cooperation of nature", notes David Cooper in his philosophy of the garden (Cooper, 2006, p. I). Since the 18th century, gardenworks have also been a topic of philosophy explicitly; in gardenworks there is discussion about how they should be arranged, what techniques are needed to design them, why they are valuable, and what expectations and emotions they evoke.[8] Gardens appear to be ideal objects to explore the issue of the principles governing combinational and compositional techniques. In conceptual terms, gardens exist at the boundary, they are nature and culture, 'evolved' and 'crafted', contain animated and non-animated elements, refer to historical and current symbolic worlds. Thus, gardens can be examined as works of art and equally well as

[7] https://www.philosophie.tu-darmstadt.de/media/institut_fuer_philosophie/pdf/ringvorlesungen_1/Programm_RV_Laokoon.pdf

[8] Of course, the garden was already present before as a place and object of philosophical reflection. Damon Young (2020), for example, begins his book "Philosophy in the Garden" with an Aristotelian "Philosophy Alfresco".

technological works – they embody scientific, technological and artistic knowledge all at the same time. Accordingly, gardenworks do not fit intuitively into the usual model of a "technical work" such as a machine, for example. Despite this, they can symbolically signify a high degree of order – a prime example of this being the formal gardens of the Baroque, but also garden landscapes that help nature to spread out freely and are at the same time thoroughly artificial works, such as the famous Branitz Park laid out by Prince Pückler near Cottbus.[9]

As a result, gardenworks can be used as a design principle of composing as well as of combining. Gardenworks and their socio-technical practices seem more than suitable candidates for more general philosophical consideration: "Gardening is a human activity that engages with core philosophical questions considering, among other ideals, human wellbeing, wisdom, the nature of time, political power, and ideals, home, aesthetic experience, metaphysics, and religion" (O'Brien, 2010, p. 1). In specific connection with techno-philosophical ideas, I have developed the figure of Homo hortensis to address environmental action in the Anthropocene as a socio-technological way of life (Schwarz, 2019, pp. 116-117), taking my lead from Hannah Arendt's (1985) action theory ideas in her political philosophy, which she develops in relation to the figures of Animal laborans, Homo faber and Zoon politicon.[10] Here, the garden is conceived of as a real-life laboratory in which humans, either as gardeners or as ambling spectators, have to position themselves anew, over and over, in relation to their environment, to things and to living beings, and can thus learn to adjust to changes such as those posed by recent transformative processes.

## COMPOSITIONAL PRINCIPLE – THE FORMAL GARDEN

In the second half of the 18th century the garden was a veritable battlefield of new aesthetic as well as political forms in Europe: theories about the art of gardening, aesthetic concepts and also economic prosperity were in the air. In some ways, gardens were the nexus at which debates about natural history, art history, science, politics and colonialism coincided. The French Baroque gardens at Versailles and Vaux-le-Vicomte were an expression of a radically new cultural and economic change; they served as a stage not only for dramatic works but for the presentation of courtly society per se. The wealth of powerful families and thus simultaneously of the state's political order were put on display, manifesting also in the domination of nature *qua* geometry. The global dimension of this order was displayed by means of exotic artifacts, plants or animals as well as – usually unwillingly – dislocated humans from the colonies overseas. The garden became a stage of increasingly widespread trade relations and of things whose value was actualized through the exercise of power.[11]

All this is part of the program of improving nature and has occurred through a planning strategy that is effectively a principle of mimesis, aimed at surpassing and

[9] https://www.pueckler-museum.de/en/park-palace/branitz-park/
[10] first published in English, The Human Condition, Chicago University Press
[11] Mukerji (2002) for the French Baroque gardens, a similar argument was put forward by Wise & Wise (2002) for the English Gardens in Germany (e.g. Peacock Island, Sanssouci or Babelsberg).

improving natural givens by means of technology in the garden (Hunt, 2000). The garden order was additionally in a relation of direct exchange with orangeries, menageries and so-called acclimatization gardens, which were the first to provide the technological environment for maintaining the exotic exhibits, their current and potential capitalization. The gigantic "water machine" in Marly, for example, did not come about in the context of supplying potable water, as did the pumping station in Paris, but rather was built for the purpose of facilitating the elaborate fountains at Versailles (Epple, 2008, pp. 472-473).

Thus, drawing up plans had become enormously important, both for the theory and the practice of gardening – a kind of "flatbed-picture plane" *avant la lettre*. It was in the garden that new landscaping as well as urban construction / town planning techniques were invented. French landscape gardener André Le Nôtre became an icon for the development of a theoretical corpus of garden art, one which laid the basis for the professionalization of later landscape gardeners. He was the „Dessinateur des plantes et parterres de tous les jardins de Sa Majesté" (Schweizer, 2013, p. 21), thereby reframing the craftmansship gardening into an art of designing, based on theoretical and practical knowledge. Since he left practically no written documents behind, Antoine-Joseph Dézallier d'Argenville took on the role of chronicler. The subsequent book on the theory and practice of gardening became a bestseller and established itself as a reference work in 18th century Europe (Dézallier d'Argenville, 1709). The "bible of Baroque gardens" (Ernest de Ganay) was renowned for its detailed and high-quality drawings and plans, while Dézallier's plans were used even in the 19th and 20th centuries for most reconstructions of Baroque parterres. In the editions that followed, Dézallier updated his book constantly. Whereas initially it was almost exclusively gardens designed by Le Nôtre that were printed, from the 10th edition onwards the avant garde of landscape gardening increasingly acquired prominence: the English landscape garden.

It is this compendium that stabilized the professionalization of landscape gardening and in which explicit rules were drawn up regarding which elements go to make up a garden, how they are to be combined – and also what kind of design is suited to improve the natural features on a given site: "If one wishes to lay out a garden, it is important to bear in mind that one must stay closer to nature than to art" (Dézaillier, 1712, p. 16 as cited in Turner, 2000, p. 190).). In the Baroque garden a key concern is to display the "nature of the world" materially, as British garden historian Tom Turner (2004) put it (p. 190). The mastery of the laws of nature is demonstrated by laying out intricate ornamental patterns and symmetries in the garden; the compositional principle is celebrated excessively in the parterres and is put into practice in ever new variations throughout Europe. There is a fairly widespread theory that these formal gardens may not have come about if paper technologies had not been available: it is only on paper that the typical symmetries of formal gardens can be realized, and only thus were the complex calculations governing proportions and standards possible. The French garden is a composed garden when seen from a bird's-eye view, and from this perspective its beauty becomes manifest, the references to classical allegories visible.

This kind of "plannability" of formal garden in Baroque is demonstrated with intriguing clarity in relation to the key importance of parterres. If these rules are applied

properly, the harmony of the geometric proportions is perfect, the God-given laws of nature become manifest, and the garden is felt to be beautiful. It embodies the order of nature; consequently, theoretical debates on geometry and mechanics took place not only in the course of constructing standard clockworks or music clocks but also when working on the design of Baroque gardens.

In the 18th century gardens acquired ever greater significance as objects of intellectual culture. Signs of the impending Enlightenment became apparent in continual changes in the theory and practice of landscape gardening, especially in the transformation of the notion of the principle of imitating nature. The garden is no longer regarded as a work based on the idea of representing the nature of the world. Instead, the garden should show how the world of nature unfolds; it should demonstrate the special features of the *genius loci*, its inherent logic and autonomy, and not any universal lawfulness (Turner, 2004, p. 190). It then became the task of the landscape gardener to support the special features of individual plants and other design elements, to perceive individual imperfections or irregularities, in other words, to bring nature "home" in a sense. Out of this came the English landscape garden, which revealed its first theoretical and practical results during Le Nôtre's lifetime.

## COMBINATIONAL PRINCIPLE – THE ENGLISH GARDEN

This was the start of a new combinational language in landscape architecture, which in turn brought forth new garden elements with surprising vistas and the staging of individuality and particularity, such as garden paths shaped as a meandering line instead of tree-lined avenues drawn with a ruler, or ditches that functioned as invisible fences and enabled a seamless transition between carefully planted flower beds and a lawn dotted with trees or a cricket pitch. The English landscape garden, then, was based not only on a different theory of mimesis but also on different techniques. German garden theorist Christian Cay Lorenz Hirschfeld criticized Le Nôtre's "dreary, symmetrical gardens" (Hirschfeld, 1779, p. 157), highlighting in contrast the qualities of the English garden as a sequence of scenarios, as an aesthetic experience which enables specific emotional responses. Groups of dark spruce trees with an artificial graveyard evoke melancholy, while isolated trees with light green foliage on an open meadow evoke serenity. The Romantic gardens are a celebration of the interplay between autonomous entities, a combination of surprising constellations and pleasing objects. According to Hirschfeld the landscape gardeners have the freedom to fit together the many components – trees, lawn, ornamental flowers, watercourses and mounds – into a "harmonious whole," respecting diversity and contingency as they do so. The scenarios of the garden become apparent only gradually and provide longer lasting enjoyment than the most beautiful landscape painting, which the eyes can quickly apprehend. Moreover, in the garden one can "really feel" movement, not just in the sense of visual perception but also through the activation of other senses (Hirschfeld, 1779, p. 157). In the garden, movement – for example that of a watercourse – can be experienced intuitively and not merely through objects arranged next to one another on a canvas or an artistically elaborate parterre. These gardenworks, as Hirschfeld stresses, can also be perceived without any special

education or explanation required. It is only when a person strolls through the garden that the natural and artificial objects are seen to exist in relation to one another, only then that an ongoing narrative arises; in this way the gardenworks are combined by means of the choice of sight lines, views and even of noises and smells.

The idea of these new gardens as works of art is consequently also closely associated with the viewer’s own movement, as she has to actively construct the order in which the objects occur and can only thus perceive the interconnections between the signs in the garden, how they exist alongside one another and in relation to one another. It is the practice of strolling through the garden at different speeds and experimenting with viewing things closer up or farther off that makes it possible to recombine the signs to make a recognizable whole, a complete gardenwork. One important, if not indispensable, aspect of experiencing an English garden as a work of art, then, consists in adopting different positions and viewing angles, allowing oneself to be caught up in a movement that is at once intellectual and physical, and to assemble a whole, an edifice or an ensemble out of this – or allow it to happen.

This combinational playfulness in the garden also seems like a suitable heuristic for getting accustomed to processes of transformation as are required in the oft-cited Anthropocene epoch. Gardens invite us in no uncertain terms to find a considered relationship between humans and nature, with Homo hortensis setting itself caringly, enjoyably, angrily, contemplatively and mindfully in relation to the soil and the weather, to ornamental plants and herbs, to weeds and edible plants, by means of various modes of activity. In gardening practice, then the issue is constantly one of how the gardener relates to their object. In the garden, the bio-conservative conceptual figure of an antipodal relationship between technology and nature fails so obviously that there is no way to ignore how it might still be possible in the case of a demarcated, designated nature conservation area, a river floodplain or an Alpine landscape.

It is possible to show from the example of the gardenworks that composing and combining can be characterized by complementary heuristics of gathering and connecting things, and also that different practices are put to use in creating the work. In the formal garden of the Baroque, the material is geometrized and normalized, transformed into a geometric, functional order, while the design of the work follows compositional principles based on numerical rules. Through the gardenworks, the “nature of the world” is brought forth and staged/presented, the objects of the garden are represented in hierarchical patterns of relationship that also dominate the relations of the political order. The English landscape garden – albeit following a compositional plan – relies on combinational principles of design with which the “world of nature” is to be brought to itself (Turner, 2004, p. 190). Priority is given to the inherent logic and autonomy of the individual design elements, with irregularities, wavy lines and branching paths the correspondingly preferred design elements. With the transformation of the concept of mimesis it is no longer a matter of generating natural regularities by gardening means but rather of staging nature in its disorder, displaying the specific and individual aspects of nature. Above all, the visitor’s own movement is crucial for any encounter with gardenworks: the combined garden ensemble and the material obstinacy of its elements reveal themselves itself only in the on-going narrative; resonances become established

between the individual sub-components, patterns of individual perception and the story of the garden design as an ensemble are placed in relation to one another. The fact that the English garden – especially Cobham's Garden in Stowe with its Temple of British Worthies (Richardson, 2007) – has become a travel guide of democratic principles that has positioned reason against passion, citizen's duty against vanity, in short democratic virtue against monocratic vice, is an interesting but as yet unresolved issue in relation to the debate about the complementary of compositional and combinational principles in gardenworks from a techno-philosophical perspective. This program has at any rate made the English garden into a successful export product that has been taken up throughout Europe and overseas. After visiting Stowe, Thomas Jefferson noted that he would also like to establish such a gallery in his garden that "stood for liberty and virtue as well as lauding the advances of science, political philosophy and exploration" (Wulf, 2011, p. 53) as a role model for the still young constitutional treaty of the United States of America. In this case, then, the "English Garden" as gardenwork truly becomes the authorizing object and paradigm for the political technology of democratic principles – and at the same time an early testing ground for the figure of Homo hortensis

## REFERENCES


Arendt, H. (1981). *Vita Activa oder vom tätigen Leben* [The Human Condition]. Piper.

Bandur, M. (1996). Compositio/Komposition. In *Handwörterbuch der musikalischen Terminologie*. (pp. 1-34). Franz Steiner Verlag. http://www.musiconn.de/id/hmt/hmt2bsb00070510f49t82/ft/bsb00070510f49t82?page=49&c=solrSearchHmT

Cooper, D.E. (2006). *A Philosophy of Gardens*. Clarendon Press.

Craft, C. (2013). *Robert Rauschenberg*. Phaidon Press

Dézallier d'Argenville, A.-J. (1709). *La Théorie et la Pratique du Jardinage. Où l'on Traite a Fond des Beaux Jardins apellés communément Les Jardins de Propreté* [The Theory and Practice of Gardening. In which one deals thoroughly with the Beautiful Gardens commonly called The Gardens of Orderliness.]. Jean Mariette.

Epple, M. (2008). The Gap between Theory and Practice: Hydrodynamical and Hydraulical Utopias in the 18th Century. In Claus Zittel, Gisela Engel, Romano Nanni, and Nicole C. Karafyllis (Eds.), *Philosophies of Technology. Francis Bacon and his Contemporaries* (pp. 457-494), Brill.

Eckermann, J. P. (1831). *Gespräche mit Goethe in den letzten Jahren seines Lebens . Montag, den 20. Juni 1831*. [Conversations with Goethe in the last years of his life. Monday June 20, 1831]. https://www.projekt-gutenberg.org/eckerman/gesprche/gsp3109.html

Hirschfeld, C. C. L. (1779). *Theorie der Gartenkunst* [Gardening Theory] (Vol.1). Weidmanns Erben und Reich.

Hunt, J. D. (2000). *Greater Perfection: The Practice of Garden Theory*. Thames & Hudson.

Mukerji, C. (2002). Material Practices of Domination: Christian Humanism, the Built Environment, and Techniques of Western Power. *Theory and Society, 31*, 1-34

O’Brien, D. (2010). *Gardening – Philosophy for Everyone: Cultivating Wisdom*. Blackwell.

Pickering, A. (2008). New Ontologies. In: A. Pickering & K .Guzik (Eds.), *The Mangle in Practice: Science, Society and Becoming* (pp. 1-14). Duke University Press 2008, https://doi.org/10.2307/j.ctv11smg5w.4

Rauschenberg, R. (2006). *Combines (1953-1964)*. Editions du Centre Pompidou.

Richardson, T. (2007). *Arcadian Friends*. Bantam Press

Schwarz, A. (2019). From Homo faber to Homo hortensis: A Gardening Technology for the Anthropocene. In: M. P. Diogo, A. D. Rodrigues, A. Simões, & D. Sarso (Eds.), *Gardens and Human Agency in the Anthropocene* (pp. 112-123). Routledge. https://doi.org/10.4324/9781351170246-7

Schweizer, S. (2013). *André le Nôtre und die Erfindung der französischen Gartenkunst* [André le Nôtre and the Invention of French Garden Art.]. Klaus Wagenbach Verlag.

Todorov, T. (1984). Ästhetik und Semiotik im 18. Jahrhundert. G.E. Lessing: Laokoon [Aesthetics and Semiotics in the 18th Century. G.E. Lessing: Laocoön]. In G. Gunter (Ed.), *Das Laokoon-Projekt. Pläne einer semiotischen Ästhetik* (pp. 9-21). Metzler.

Turner, T. (2004). *Garden History: Philosophy and Design 2000BC-2000AD*. Routledge.

Wise, N. M., & Wise, E. M. (2002). Reform in the Garden. *Endeavour, 26*(4), 154-159. https://doi.org/10.1016/S0160-9327(02)01459-X

Wulf, A. (2011). *The Founding Gardeners*. Windmill Books.

Young, D. (2020). *Philosophy in the Garden*. Scribe Publications.

**СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR**

Астрид Шварц
schwarza@b-tu.de

Astrid Schwarz
schwarza@b-tu.de

Статья поступила 9 октября 2022
одобрена после рецензирования 14 декабря 2022
принята к публикации 15 декабря 2022

Received: 09 October 2022
Revised: 14 December 2022
Accepted 15 декабря 2022

https://doi.org/10.48417/technolang.2022.04.12
Research article

# Knowing and Controlling the World through Gardenworks and Biorobots: Discussion of Tamborini and Schwarz

Alfred Nordmann[1](✉), Astrid Schwarz[2], and Marco Tamborini[1]
[1] Technical University of Darmstadt, Residenzschloss 1, 64283 Darmstadt, Germany
[2] Brandenburgische Technische Universität Cottbus – Senftenberg, Erich-Weinert-Str. 1
03046 Cottbus, Germany
nordmann@phil.tu-darmstadt.de

**Abstract**
The papers by Marco Tamborini „Philosophy of Biorobotics: Translating and Composing Biohybrid Forms“ and Astrid Schwarz „Composing and Combining: Opposing Constructive Principles?“ outline different positions on mimesis and composition as the fundamental practices of *homo faber*. A critical commentary seeks to highlight their differences. Tamborini specifies *homo faber* as *homo translator* who moves between different media of presentation and expression. Reproduction in another medium entails a back and forth which defines the work of the translator: a novel is reproduced by a film, the movement of a salamander is reproduced by a machine, an architectural design is reproduced by a physical building. Schwarz promotes *homo hortensis* who practices gardening, widely understood, in different ways – by composing and imposing a plan, or by combining and incorporating the dynamics of physical and biological processes. She foregrounds a creative and constructive act which is profoundly mundane in that it assimilates the world into the works of technology and art. Engineers, designers, architects, and planners are gardeners of sorts in that they are world-makers, tending to works and worlds. This resonates, of course, with ideas of the anthropocene and the epochal role of humans in planetary affairs. – The authors then respond constructively to the critical commentary, seeking common ground among the three positions.

**Keywords:** Composition; Combination; Translation; Gardening; Biomimesis

**Citation:** Nordmann, A., Schwarz, A., & Tamborini, M. (2022). Knowing and Controlling the World through Gardenworks and Biorobots: Discussion of Tamborini and Schwarz. *Technology and Language*, *3*(4), 175-186. https://doi.org/10.48417/technolang.2022.04.12

УДК 130.2:62
https://doi.org/10.48417/technolang.2022.04.12
Научная статья

# Познание и управление миром с помощью садовых работ и биороботов: обсуждение Тамборини и Шварца

Альфред Нордманн[1] (✉), Астрид Шварц[2] и Марко Тамборини[1]
[1]Дармштадтский технический университет, Резидентшлос, 5, Дармштадт, 64283, Германия
[2]Бранденбургский технический университет Котбуса – Зенфтенберг, Эрих-Вейнерт. 1, 03046 Котбус, Германия
nordmann@phil.tu-darmstadt.de

**Аннотация**
В данной статье я исследую, как можно создавать и комбинировать биогибридные формы, начиная с органических форм. Тезис, который я здесь выдвигаю, – эпистемологический: комбинаторная практика бионики, биомиметики, биоробототехники и всех стратегий дизайна, вдохновленных природой, основана не на биомиметическом вдохновении (т.е. на подражании природе), а на практике перевода. Чтобы развить этот тезис, я сосредоточусь на практиках современной биоробототехники. Я исследую практику перевода природных форм в технические артефакты, разработанную Раулем Генрихом Франсе в начале 20 века. Затем я анализирую создание роботов, способных воспроизводить сложные системы передвижения. В итоге я исследую взаимодействие между роботами и живыми организмами (рыбами). В заключительной части статьи я рассуждаю над философским значением и более широкими возможностями для этой практики перевода. Я обсуждаю, когда и до какой степени перевод биологических форм в биотехнические приемлем, и так же выделяю концепцию формы, лежащей в основе этой практики. Кроме того, я стремлюсь привлечь внимание к необходимости философского исследования происходящего между различными областями знаний – особенно между наукой и техникой. Таким образом, данная статья предлагает развитие философии в пробелах преумножения знаний.

**Ключевые слова:** Композиция; Комбинация; Перевод; Садоводство; Биомимезис

**Для цитирования:** Nordmann, A., Schwarz, A., & Tamborini, M. Knowing and Controlling the World through Gardenworks and Biorobots: Discussion of Tamborini and Schwarz // Technology and Language. 2022. № 3(4). P. 175-186. https://doi.org/10.48417/technolang.2022.04.12

## I. COMMENTARY (Alfred Nordmann)

How are natural forms produced, do they follow certain rules of composition? This is a long-standing question in biology and nowadays biotechnology. Marco Tamborini and other historians and philosophers of biology are interested in a related question: Does science discover these rules of composition and engineers then utilize some of them for their own compositional purposes – or do we learn to compose through our technological practice and then, through a process of translation back and forth, we understand nature as a kind of engineer and producer of forms and learn from nature‘s compositions for our own practices and purposes? Marco Tamborini adopts the second of these accounts and therefore gives center stage to *homo translator* (Tamborini, 2022b).

Astrid Schwarz doesn‘t begin with a question that is traditionally associated with science but with the practice of creating works of technology and art, including flower-beds, fields, parks, landscapes. It makes a difference to her whether this practice implements a blue-print or plan by imposing principles of composition on the elements that make up a work – or whether it responds to the recalcitrance and internal dynamics of things, combining them so as to a stimulate a kind of co-production. Accordingly, combining things is not just part of compositional practice but a distinct, complementary activity – if classical music, mechanical engineering, and certain forms of landscaping proceed compositionally, it is also important to acknowledge combinatorial practices in the art of gardening that prompt a reflective way of tending to the world and taking a gardening-attitude towards the interplay of people and things, as does *homo hortensis* (Schwarz, 2022).

Though they differ in terms of emphasis, choice of example, and the need to categorically differentiate ‚composition‘ and ‚combination,‘ both help us understand our engineering ways of working with biological processes and forms. What does it mean to live not only in but with „nature,“ to tune technologies to the conditions and processes of life? This is a question of mimesis, imitation, attunement, or repetition, of working together or being in step. How do routines and patterns get established? On some conceptions of mimesis, it involves the production of likeness, inviting judgements of representational accuracy, with biomimetics yielding a technical copy of a biological original. Both, *homo translator* and *homo hortensis* stand for different approaches that differ also among each other.

### On Marco Tamborini‘s „Philosophy of biorobotics: translating and composing biohybrid forms“

*Homo translator* coordinates words in one language with words in another language. This does not yield mirroring – the two languages remain quite distinct, each has its own requirements, melody, idioms, and yet within the medium of one language one can reproduce claims, associations, feelings from the other language. Reproduction in another medium entails a back and forth which defines the work of the translator: a novel is reproduced by a film, the movement of a salamander is reproduced by a machine, an architectural design is reproduced by a physical building. The main criterion for a successful reproduction is whether it is a good composition here as it is there, that is, whether and how well it works. The successful construction of an analogue or counterpart

cannot be reduced to mere rendering, that is, producing a representation that is more or less „faithful,“ or „true“ to the original (Nordmann, 2021). As one can tell from the famously biomimetic Lotus-effect or Velcro-fastener, it does not even matter whether the well-composed technical reproduction does the same kind of work as does the biological original: While the leaves of the Lotus plant repell water as do their technical counterparts, their function is to pool and collect water on the surface; and while cockleburs effectively attach or fasten themselves to dog‘s hair, they are not about fastening as such but about travelling with the dog and spreading their seed. And yet, Marco Tamborini (2022b) adds a requirements or criterion for what makes a better translation by quoting Leibniz: „Those are the same of which one could take the place of the other, with truth unharmed (*salva veritate*), such as triangle and three-sided figure, quadrangle and four-sided figure” (p. 151). In other words, it is not mimetic practice itself which determines what is preserved and what not. There is a something which needs to be preserved and there are better translations and worse depending on how well they preserve „the truth“ of the original. According to Tamborini, the test of this would be a reverse translation that yields back the original. Now, even his very nice literary example does not pass this test, nor do water and dirt-repellant surfaces, the Velcro-fastener, and the mechanical model of a salamander. Is it really the aim of bio-robotics to produce an artificial fish that will blend in with „real“ fish, or is it the aim to produce machines which can move better by integrating mechanical ideas that are derived from a technical scrutiny of fish? And comparing translations of Shakespeare‘s plays through the ages, we judge them not by literalness but by effectiveness: A most conscientious translation from the 18th century is no longer able to reproduce dramatic effects in the medium of contemporary German or Italian, whereas a quick and dirty translation from the 21st century may well be able to move us.

Literary translator Anne Weber provided a story to of reproductive translation which radically questions any fixed criterion of faith- and truthfulness: „A European tourist once ordered a Coke in India and was served a Sprite. After drawing attention to the mistake, this was the reply to appease him: Same, same. Same – but different!“ (Weber, 2017)

There is a reason, of course, why Tamborini does not settle for such a liberal conception of translation and seeks to tie it back in with standards of truth. He is still committed to science and the underlying question „how are biological forms produced?“ In contrast to other philosophers of science, however, he does not consider the search for an answer a primarily intellectual exercise but believes that human and natural engineering is productive of many things while being, at the same time, a fruitful detour for science (Tamborini and Datteri, 2023). About the efforts of 18th century mechanical artisans to build machines that imitate organisms, such as a „biorobotic“ defecating duck, he notes: „However, this practice and the implicit knowledge it entailed were not codified until the early years of the 20th century“ (Tamborini, 2022b, p. 148). To be sure, the attempt to reproduce biological functions in the medium of clockwork mechanisms expanded and advanced working knowledge, that is, knowledge of how cogwheels, levers, springs can be composed (put together) to produce an effect (Nordmann, 2020). And indeed, this expansion and advance of working knowledge owes to the idea that

organisms are also technical works which produce effects by way of their very own principles of composition. But this does not allow us to conclude, as Tamborini appears to do, that the working knowledge of mechanical artisans somehow elucidates biological principles of composition. There is no such immediacy of transference, and this is, precisely, why Tamborini‘s notion of the translator is so productive and important: The working knowledge of mechanical artisans offers biologists a material vocabulary for translating biological principles of composition into a mechanical idiom. And indeed, we thus arrive at Tamborini’s conclusion: „The compositional practice of biorobotics is thus not biomimicry (i.e. a mere mimetic copying of the forms of nature), but a translation practice based on the general metaphysical paradigm of an inscription of the mechanical onto the organic“ (Tamborini, 2022b, p. 154).

## On Astrid Schwarz‘s „Composing and Combining: Opposing Constructive Principles?“

*Homo hortensis* creates gardenworks which are works neither of nature nor of technology or art. These gardenworks are paradigmatic of technological agency since the entire planet is a place where we make our home by working the land, securing food and shelter, positioning ourselves in a built environment, in landscapes and timescapes, organizing a temporal and working order of people and things. To the extent that in the continuum of technical or gardening practices we can distinguish between composition and combination, different garden designs and gardening practices induce the self-reflexivity of the human gardening engineer.

It does not matter much whether the categorical distinction between composition and combination can be secured or whether we speak of different kinds of composition, as one does in music which serves as an example also for Astrid Schwarz: To be sure, the traditional view of composition posits an author who controls homogenized and modularized material and arranges it willfully according to some principles of composition. But in the case of John Cage and Robert Rauschenberg on the one hand, of Jazz on the other hand, there is a composed openness to the surprising qualities of everyday noise and spontaneous expression. So, the difference between the compositional master-mind behind a Baroque French garden and the combinatorial openness in the design of a Romantic English garden becomes important only when we reflect our own position in the creation of works.

It will be most fruitful to further pursue Schwarz‘s proposal since her juxtaposition of composition and combination invites reflections about the conditions and limits of technical control. What kind of work goes into achievements of control? When artists and engineers control their material or the production of specific effects, they adopt a one-sided mode of composition. It belongs to „those activities used by philosophers to claim that structures and processes are fundamentally posited anew, that this is a one-sided process, and that the condition for it to occur is a homogenously formed material – musical notes, for example – which, when a rational set of rules are applied to it (the theory of harmony) – lead to a work that is complete in itself according to certain criteria“ (Schwarz, 2022, p. 164). The conditions for the controlled creation of radical novelty thus include a strong conception of authorship, a homogeneous substrate of inert and

modularized material, and the formal principle of a closed or bounded work as a limited whole. Whether these conditions are satisfied or not is by no means a given – artists and technicians work to homogenize, stabilize, discretize the material world. They do so conceptually and by way of theory, they also do so practically and by way of ritual or experiment. And they do so with the aim to achieve a form of control that ideally establishes their authorship of our conditions of life. And of course, this is only one mode of compositional practice. Preponderant perhaps are technical works which admit heterogeneity, spontaneity, unpredictability – that are willing to exercise only partial control or surrender it entirely.

*Homo hortensis* is engaged in the reflection of these different modalities which are present equally in the spheres of art and engineering – no translation is required to move between these spheres because they can be treated in their original unity. To make this productive for contemporary discourse is part of Schwarz‘s achievement.

## Mutual Delimitation

Marco Tamborini works with an advanced conception of translation and thereby provides a rich description of the production of mimetic relations and of the production of knowledge in the back and forth between biological and technical idioms. He shows how we learn as technical and biological productions of forms become attuned to one another like two languages that become coordinated through the process of translation. His account is haunted, however, by the elusive idea of an original which is subject to mimicry and translation and which is to be understood.

Astrid Schwarz provides a rich description as well, one which foregrounds a creative and constructive act which is profoundly mundane in that it assimilates the world into the works of technology and art: „ Gardenworks, then, are a product of people’s activities and ideas, a well-defined artifact that must constantly be tended and simultaneously re-interpreted time and again. Gardens, like technology, testify to migration, domestication, colonization, to settlement models and economic systems. Yet gardens are also products of nature; their visible structures are, as a rule, overwhelmingly plant-based, but they are also visited, used and even constituted – usually invisibly – by animals, fungi and microorganisms“ (Schwarz, 2022, p. 169). Accordingly, Schwarz foregrounds the expressive qualities of composition and combination. Taking the „gardenwork“ as her paradigm, she does not need to distinguish biological and technical processes of rendering form, and yet, her approach may well serve to elucidate biorobotic artefacs as well. Engineers, designers, architects, and planners are gardeners of sorts in that they are world-makers, tending to works and worlds that mirror each other. This resonates, of course, with ideas of the anthropocene and the epochal role of humans in planetary affairs. At the same time, and despite Schwarz‘s careful attempt to limit the reach of ‚composition‘ as opposed to ‚combination,‘ her focus on works of technology and art is haunted by the idea of authorship.

If Tamborini is interested primarily in how we learn to know the world through biorobotics, Schwarz is interested primarily in how we exercise technical control of the world through gardenworks. If Tamborini therefore assigns too much importance, perhaps, to an original order of things and a given wealth of forms, Schwarz counters this

by overemphasizing creative authorship – and while the translator and mediator inhabits the modest role of scientist and engineer who seeks attunement to the world in which we find ourselves, the gardenwork forges a unity of biology, technology, and political culture, tending, of course, to the recalcitrance of things, but internalizing all externalities. Drawn to both positions, I have now exaggerated the differences between Tamborini and Schwarz because they limit, qualify, constrain each other in important ways – limiting and constraining also the ambitions of a philosophy of technoscience which valorizes the felicitous interplay and attunement of people and things in a working order.

## II. REPLY (Marco Tamborini)

In my response to these comments, I do not want to point out the mutual limitations, but rather the possibilities that arise from merging the approaches of Astrid Schwarz and my own. To do so, allow me first a brief excursus. In 1940, the Baltic German biologist Jakob Johann von Uexküll published his book *Bedeutungslehre*. One chapter in this book was titled "Compositional Theory of Nature" [*Kompositionslehre der Natur*]. By this, Uexküll meant an epistemological standpoint towards nature, but at the same time his notion of a "compositional theory of nature" contained a strong ontological component. He wrote that "the form formation of living beings will be brought closer to our understanding only when we have succeeded in deriving from it *a composition theory of nature*" (Uexküll, 1940, p. 130). The basic idea of a possible composition[1] was to study how the subject and the world enter into relations of mutual correspondence and organicity, in the same way that two notes tune for a melody. For example, since a subject is always in its surrounding-world [*Umwelt*], the harmonious relations between the subject and the objects that are considered as carriers of meaning must be carefully analyzed. Uexküll explains that these two factors come together, in effect creating meaning beyond their individuality. Through this process, they become a composition of nature. Another quick biological example. Let us consider the octopus as a subject in relation to the object "sea water" as a bearer of meaning. The incompressibility of water constitutes the prerequisite for the construction of a muscular swimming bag. The pumping movements of the swimming bag mechanically act on the incompressible water and push the animal backward: "The rule of meaning connecting point and counterpoint is provided by swimming" (Uexküll, 1940, p. 132). According to Uexküll, the swimming of the octopus is generated by the composition that attunes anatomical structure and the properties of water. In turn, the meaning created in the interaction changes the embryological structure of the octopus. Therefore, concludes the Baltic German biologist, the task of nature's theory of composition is to indicate the rules that emerge from this process and how new meaning is created from this coming together.

Yet, and this is my first point, if we accept this remark as a starting point for a response to Alfred Nordmann, the question to ask is what elements can be included in a theory of nature's composition and how do these elements interact to create new meanings (i.e., new compositions)? The approach thus formulated makes one of Nordmann's

[1] Given the binary structure of the relation conceived by Uexküll it might be more correct to speak of a combination of nature.

criticisms of my approach less effective, namely that I have given "too much importance, perhaps, to an original order of things and a given wealth of forms." Yet an order of things and forms must be always given to understand the rules by which a composition can emerge.[2] What is the starting point of *homo hortensis'* practice if not the forms given by nature? The technical composition of forms in both gardening and bio-robotic practice starts only from the given forms of nature – what we called "facts."

Second, let us put aside for a second the different purposes of the two practices and whether *homo hortensis* and *homo translator* want to understand or dominate phenomena, whether their enterprise can be named "science", "technoscience", etc. Instead, let us focus on the objects (or Uexküll's meanings) that are composed by bringing together different parts – in this case, bioinspired robots and variously designed gardens. What are the compositional rules in this process? On the one hand, as Schwarz notes, there is a difference in compositional and combinatorial practices. This accompanies a change in the mimetic principle and reflects a diverse role of objects and their properties. On the other hand, I observe that this is an exercise in translation since by translating we transport something unfamiliar (what Darwin called the mystery of mysteries) into a language that we can master. Moreover, in translating, we as subjects recognize the various interwoven semantic and synthetic layers of the world and its domains, i.e., what Nordmann called the "cacophonous multilingual environment" (Nordmann, 2020, p. 88). In fact, what Schwarz and myself have exposed is a classic example of multilingualism. The various rules of composition that we have pointed out can in fact be seen as practices that do not compete with each other, but rather mutually inform each other in order to make sense of our being a subject in the midst of a cacophonous environment. Moreover, if we develop Uexküll's idea further, the question that arises is about the properties of what is actually created. What kind of object is produced, and what greater meaning has it acquired for the subject during this composition?

Here lies a common opportunity opened up by the two approaches. In the practice of connecting parts, hybrid objects are created that take on new meanings. For example, *homo hortensis* creates gardens that are neither natural nor technological nor purely artistic, but all of the above. Through a process of translation, *homo translator* designs hybrid versions of natural forms that are both natural and technological. Through these hybrids, *homo translator* is able to re-read nature, in effect composing a new meaning (see also Tamborini, 2022a).

The point I want to make here is about our possible shared focus on the epistemology and ontology of hybridity as a category that emerges from the various practices of merging, assembling, combining, and translating elements. The common question that then arises starts from the rules and practices of composition, but it concerns the status of the composed object itself. In other words, the question that connects Schwarz's and my approach, despite some essential differences, concerns the analysis of the overarching meaning that the composed object has taken on, and the possible effects this has on the subject who composed it. Since we have given up the idea of categorizing

[2] This was precisely the starting point of the Kantian meta-analysis, bracketing off possible metaphysical speculation in the account of knowledge composition.

the world into separate domains and live in a multilingual environment, what can the composed hybrid objects do and what meaning do they have for us as subjects?

## III. REPLY (Astrid Schwarz)

I take this conversation about the three characters *homo translator*, *homo hortensis*, and the socio-technical multilingual *homo faber* (Nordmann, 2020) as an opportunity to engage further in a philosophy of technoscience which devotes special attention to the relational practices and potentials among humans, artificial and non-artifical living entities and things. First of all I want to thank Alfred Nordmann and Marco Tamborini for this exchange when pursuing the following questions: How and in what sense do these encounters between humans, living entities, and things work or fail to work, and what is the consequence of this on the epistemic, ontological and ethical level? Assembling people and things, thus incorporating the environment in an effective context is not simply an artful way of interacting or even a "felicitous interplay and attunement of people and things in a working order" – be it the machines to produce Christmas balls for millions of households, the working area and crew of a lignite mine, or the salamander living in its amphibious habitat. The notion of „success" in these formations is biased and even political and most often refers only to their continuation and given structure. In order to foreground this normative aspect, a number of concepts have been proposed to decenter the interactions between human and thing and also to more strongly emphasize the common ground of materiality. Donna Haraway (1995), for example, has stressed the importance of not relying on a logic of appropriation and taxonomic identification, but rather to learn how to craft a likewise poetic and political unity that is able to persist the rigors of everyday life. Jane Bennett (2010) developed the concept of a shared materiality of all things – she calls this a „positive ontology" – that in her opinion should also enable a fundamental political transformation, including a new environmental sensibility and a restructuring of economic relations. *Homo hortensis* encounters hybrid forms in the garden, be it a domesticated tree, or, conceiving the gardening human in a wider sense, be it a power grid infrastructure in the landscape or urban water management systems. These encounters invite us to engage not so much in the representational patterns and orders but rather in the material and political power of hybrid things. In this sense, the baroque garden and the romantic garden can be considered as crafted entities that have a political dimension on the one hand, and on the other stand more generally for the investigation of hybrid forms and their combinational and compositional genesis and preservation.

This is what Marco Tamborini and myself share. We are both interested in the design of hybrid forms and to better understand their appearances, modes of expression and their potential of re-ordering nature and re-designing built structures in the technosphere. One of the central concerns is how subjects of interest are related to their environment and to question the reciprocal character of this relation. Tamborini refers to Jakob von Uexküll when he explains his translational concept of composition and how an organism and its environment are mutually related to one another, which is to be understood in terms of fitting functions, which in turn makes for a meaningful apparatus.

The upshot is that this adjustment is interpreted as a permanent process of mutual customizing from which novelty can emerge. Understood in this way, compositions in nature and the underlying rules of formations and processes, afford novelty just as technological compositions do. In this context, Tamborini's remark that Uexküll's theory of composition is based on a "binary structure of the relation" and therefore might be understood as a combinatory play of nature, is an invitation for a conversation between the *homo translator* and the *homo hortensis* (Tamborini, 2022b, p. 154). They might want to further elaborate on the relationship of the subject of interest and its environment in terms of binary or rather bidirectional relations, and the consequences for making a difference between a compositional and a combinational strategy of bringing things and people together. This would be all the more interesting because these figures are each based on quite different philosophical interests. While *homo translator* acts in a multilingual world that is full of meanings, *homo hortensis* is rather interested in cultivating socio-technical assemblages committed to a common material basis.

At various points of our conversation it has been pointed out that gardenworks can be looked at as a product of people's activities and imaginations, as well-defined things that permanently need to be maintained and simultaneously reinterpreted time and again, just as works of technology. Gardens are distinct places where things may be connected in a systematic but also completely unexpected way. These things are trees and bushes, waterlines and water basins, colorful flower beds and sheer green turfs, sculptures, garden gnomes and ruins, walls and pathways. Of course, not all of these things are present in every garden, for gardens can be so radically different in terms of forms, features, and intentions that it is rather difficult to find a common denominator. However, it is characteristic of all gardenworks that they create relationships between particularities – the garden can be considered as a model of so-called nested reciprocities. Studying a gardenwork is a pertinent exercise not only to probe concepts of interrelatedness but also to get involved in the study of particular connections and one's own connectedness.

A gardenwork is thus not only a representation of order in the sense of human authorship. In this order the temporalities of plants and animals would structure the life of the gardener, who needs to cultivate them in the right spot at the right time. A gardenwork also structures the experience of visitor-observers. Since they are constantly changing, requiring adaptation to this changeability, gardens offer in a different way an experience of unruliness or outright resistance than machines do. It is therefore not humans that lend an order to the garden, but it is the garden that set limits and define our capacities to transgress them (Schwarz 2019). Working in the garden yields structure and it permanently reminds the gardener of the involvement of other stakeholders. In the garden reciprocity and attention are in a sense two sides of the same coin. Creating and maintaining a gardenwork is dependent in a particular way on the co-operation of nature. Accordingly, *homo hortensis* is precisely not "haunted by the idea of authorship," but enables experiences that make nature perceptible as a counterpart and, in a certain respect, also enforces this reciprocity as it concerns the inherent logic of plant development and needs, meteorological coincidences, the inert physics of the garden soil, and not least the encounters with other animals. The gardener and even, though in a more limited sense, the garden visitor are incorporated in this attunement to the world. It has been argued that

the body of the gardener becomes an archive of the history of the interactions with her garden, she develops a "body knowledge" in the use of her body as a technical means and of tools in interaction with the garden environment. It will be worth exploring how and in what sense this concept of a gardener-engineer's embodied knowledge or body-at-work comes close to Tamborini's concept of "re-reading" nature. After all, whether we interpret them in terms of translation or not, the stories we tell about objects are also stories about our own certainties, our clichés, our affects, and our categories.

## REFERENCES


Bennett, J. (2010). *Vibrant Matter: A Political Ecology of Things*. Duke University Press.

Haraway, D. (1985). A Cyborg Manifesto – Science, Technology, and Socialist-Feminism. https://archive.org/details/anarchy_Cyborg_Manifesto_Harroway

Nordmann, A. (2020). The Grammar of Things. *Technology and Language*, *1*(1), 85–90. https://doi.org/10.48417/technolang.2020.01.18

Nordmann, A. (2021) Biotechnology as Bioparody – Strategies of Salience. *Perspectives on Science 29*(5), 568–582. https://doi.org/10.1162/posc_a_00384

Schwarz, A. (2019). From Homo faber to Homo hortensis: A gardening technology for the Anthropocene. In M. P. Diogo, A. D. Rodrigues, A. Simões, & D. Sarso (Eds.), *Gardens and Human Agency in the Anthropocene* (pp. 112-123). Routledge.

Schwarz, A. (2022). Composing and Combining: Opposing Constructive Principles? *Technology and Language*, *3*(4), 160-174. https://doi.org/10.48417/technolang.2022.04.11

Tamborini, M. (2022a). *Entgrenzung. Die Biologisierung Der Technik Und Die Technisierung Der Biologie* [Delimitation. The Biologization of Technology and the Mechanization of Biology]. Meiner.

Tamborini, M. (2022b). Philosophy of Biorobotics: Translating and Composing Bio-hybrid Forms. *Technology and Language*, *3*(4), 143-159. https://doi.org/10.48417/technolang.2022.04.10

Tamborini, M., & Datteri, E. (2023). Is Biorobotics Science? Some Theoretical Reflections. *Bioinspiration & Biomimetics*, *18*(1), 015005. https://doi.org/10.1088/1748-3190/aca24b

Uexküll, J. von (1940). *Bedeutungslehre* [Doctrine of Meaning]. Verlag von J.A.Barth.

Weber, A. (2017). Voß-Preis und Helmlé-Preis an Anne Weber [Anna Weber is Awarded the Voß-Preis and the Helmlé-Preis]. *Übersetzen*, *51*(1), 3-4. https://zsue.de/beitraege/voss-preis-helmle-anne-weber/

## СВЕДЕНИЯ ОБ АВТОРАХ / THE AUTHORS

Альфред Нордманн,
nordmann@phil.tu-darmstadt.de
ORCID 0000-0002-2173-4084

Астрид Шварц
schwarza@b-tu.de

Марко Тамборини,
marco.tamborini@tu-darmstadt.de,
ORCID 0000-0001-7102-7479

Alfred Nordmann,
nordmann@phil.tu-darmstadt.de
ORCID 0000-0002-2173-4084

Astrid Schwarz
schwarza@b-tu.de

Marco Tamborini,
marco.tamborini@tu-darmstadt.de,
ORCID 0000-0001-7102-7479

Статья поступила 30 ноября 2022
одобрена после рецензирования 15 декабря 2022
принята к публикации 20 декабря 2022

Received: 30 November 2022
Revised: 15 December 2022
Accepted: 20 December 2022

# Содержание

Тема выпуска:
## Мимесис и композиция