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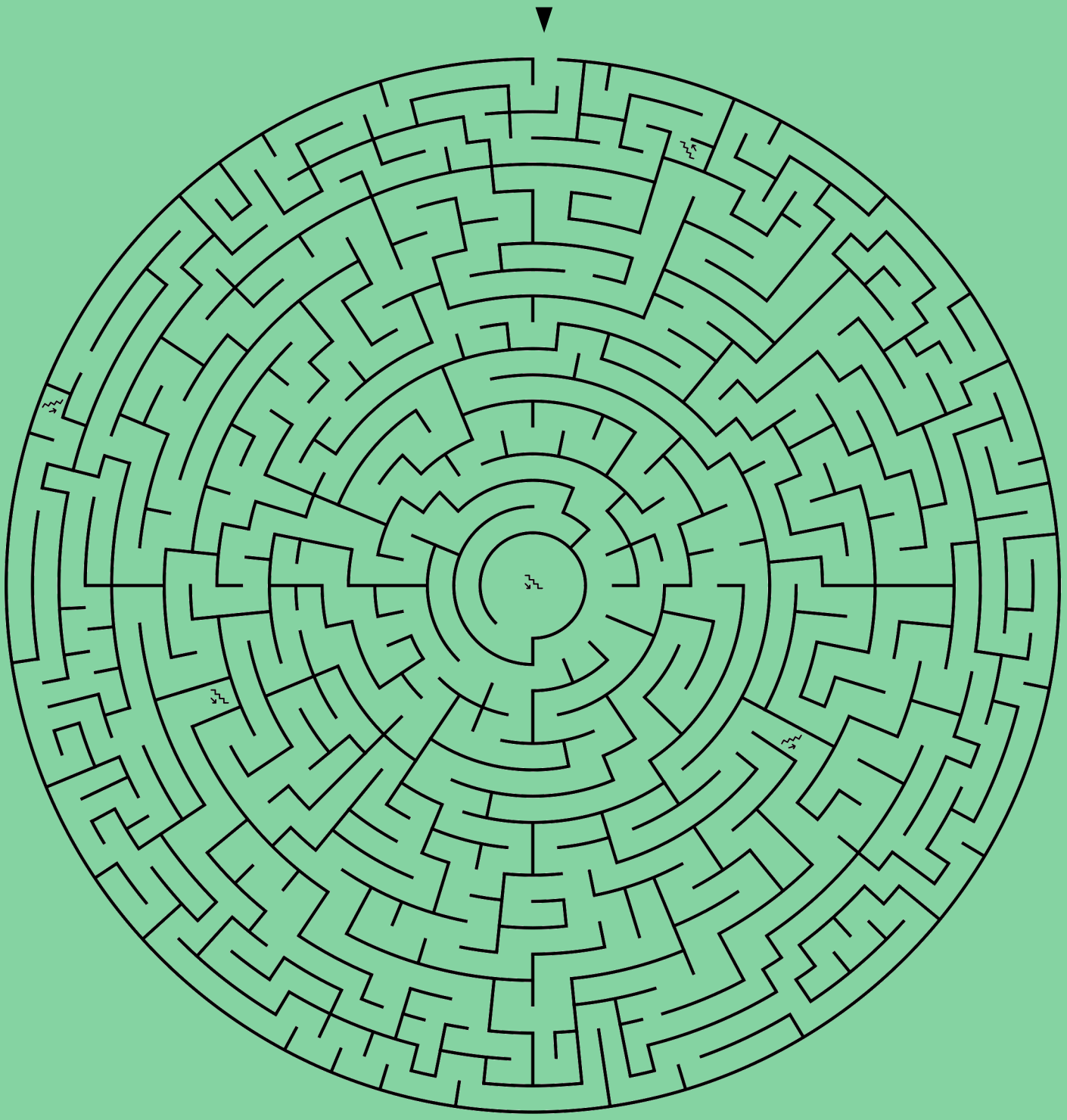

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...In that Empire, the Art of Cartography attained such Perfection that the map of a single Province occupied the entirety of a City, and the map of the Empire, the entirety of a Province. In time, those Unconscionable Maps no longer satisfied, and the Cartographers Guilds struck a Map of the Empire whose size was that of the Empire, and which coincided point for point with it. The following Generations, who were not so fond of the Study of Cartography as their Forebears had been, saw that that vast Map was Useless, and not without some Pitilessness was it, that they delivered it up to the Inclemencies of Sun and Winters. In the Deserts of the West, still today, there are Tattered Ruins of that Map, inhabited by Animals and Beggars; in all the Land there is no other Relic of the Disciplines of Geography.

On Exactitude in Science by ***Jorge Luis Borges***
Collected Fictions, translated by Andrew Hurley

IX | 90^o

Welcome to the 2024 edition of the THINK conference! The writer *Jorge Luis Borges* has famously compared science with a map. Borges' map is so detailed, yet so large, that it became inaccessible and useless. Over the years, the THINK conference has proofed itself as a library of map fragments, which go beyond a mere 2D projection of facts. They embed their scientific content in a multi-dimensional context and build bridges to other disciplines perpendicular to the apparent plain. These fragments fit in every scientists pocket.
The 9th edition of the THINK conference will guide us through wide lands: We begin out journey on a bridge between physics and art (Alissa), venture into the lands of psychology (Daniel) and biochemistry (Matthias). We continue with insect biology (Max, Florian), math (Pepa), networks (Nino), sports and evolution (Simon). For those, who want to join, Sonja will host a Improv Theater Workshop on Thursday Evening. On Friday we start off energetically (Jan), make our way through a web of thoughts (Jana), reaching the apparent borders of science itself (Thomas). Finally, Chiara will host a Climate Fresk Workshop on Saturday afternoon, before we celebrate our collected experiences.

Among the organizers,
Santiago,
Suyin,
Simon,
Rafi,
Tobias,
Daniel,
Katharina,
Sabrina

IX THINK *Perpendicular* Schedule

	Thursday (Arrival)		**Friday (Conference)**		**Saturday (Conference)**	**Sunday (Departure)**
		08:30-09:00	Getting Ready	**08:30-09:00**	Getting Ready	Getting Ready
		09:00-09:50	Breakfast	**09:00-09:50**	Breakfast	
		10:00 - 10:30	Alissa Freilinger - Anecdotes of the Science of Light	**10:00 - 10:30**	Jan Hurt - The Electricity grid of the Past and Future	Breakfast & Tidying up
		10:40 - 11:20	Daniel Gratzer - "But I keep telling you"	**10:40 - 11:20**	Jana Meixner - Transforming the Web of Thoughts	
		11:30 - 12:00	Matthias Hübner - Characterization of LDH	**11:30 - 12:00**	Thomas Zauner - Sceptical Towards Science?	
		12:50-14:30	Lunch Break	**12:50-14:30**	Lunch Break	
		14:40-15:00	Max Aubry - Urban Ecology Meditation	**14:40-15:00**	Max Aubry - Urban Ecology Meditation	
17:30 - 18:00	Arrival	**15:00 - 15:30**	Florian Strahodinsky- The Anthusiasts View	**15:00 - 18:00**	Chiara Cardelli - Climate Fresk (Workshop)	
		15:40 - 16:25	Pepa Tkadlec - Probabilistic Intuition			
18:00	Opening	**16:40 - 17:10**	Nino Lauber - Networks, Networks			
		17:20-18:00	Simon Rella - Survival of the Medalist			
19:00-20:30	Dinner	**19:00-20:30**	Dinner	**19:00-20:30**	Dinner	
	Games		Sonja Schobesberger - Improv Theater		Music Session / Open End	

List of Abstracts

Anecdotes of the Science of Light told by Historical and Contemporary Art

Alissa Freilinger

This talk presents a chronological exploration of artworks that have incorporated scientific knowledge from the field of optics. Join on a journey of glimpses on the story of light science drawn on the canvas of time as depicted in art, beginning in the prescientific period and concluding with works of contemporary scientist-artists.

„But I keep telling you. . . !“
A presentation of some insights into touching hearts.

Daniel Gratzer

Why does telling people to behave better often lead not to their insight but rather to rejection? Why are we not pristinely moral humans when our world is filled with moralistic judgments? And why is it so difficult to achieve social change?

In psychology, the derogation of others perceived as morally superior is called Do-Gooder-Derogation (DGD). It occurs to protect the derogator's moral self-view. What, then, would happen if we did not think and communicate via moralistic (self-) judgments? I propose the construct of moralistic judgment (consisting of harshness, individualism, and identification) as a possible cause of DGD.

In my talk, I will present the study I conducted to test this assumption. We will explore moralistic judgment, its alternatives, whether non-judgmental messages can be persuasive, and what all this has to do with democracy and the climate crisis.

Extraction and Characterisation of LDH

Matthias Hubner

This talk focuses on the characterization and production of the enzyme lactate dehydrogenase (LDH). LDH is an important enzyme in metabolism that catalyzes the conversion of pyruvate into lactate and vice versa. This reaction plays a central role in the anaerobic metabolism of cells.
The reaction rate of the enzyme was determined by measuring the decrease in absorbance at 340 nm, as only NADH has a maximum absorbance at this wavelength. The results were plotted in Michaels-Menten diagrams to determine the kinetic parameters such as the Michaels-Menten constant and the maximum reaction rate. Lineweaver-Burk diagrams, Hannes plots and Eadie-Hofstee equations were also used for further analysis. In addition, the optimum pH for LDH from pig heart in acidic and alkaline solutions was determined. For size determination, electrophoretic techniques such as SDS-PAGE and Native PAGE were used to separate LDH from different meat extracts (chicken, turkey, pork, beef) by molecular weight and compared with pure protein standards such as bovine serum albumin (BSA) and serum albumin porcinum (PSA). Fractional precipitation and the chromatographic IEC method were used to extract LDH from animal tissues. The first step enabled coarse precipitation of the proteins from the raw material, in this case bovine heart. Subsequently, the IEC allowed a finer separation, specifically tailored to the desired protein. Each step was accompanied by activity measurements to verify the purification success. The collected data was documented in a protein purification scheme. Lastly, the fractions were analyzed by gel electrophoresis and Western blot to visualize them as specific bands

See the City through Minuscule Eyes - Urban Ecology Meditation

Max Aubry

Humans have deeply impacted Earth ecological systems worldwide, to the point where we have to take on the role of gardeners to preserve life's richness, everywhere. It is hard to say if "wild nature" is found everywhere, or nowhere. At every moment and in every space, biodiversity is important. It is both a treasure and a tool for our survival. The insects who are born in our cities, and live their whole lives, cannot tell how different they are from the primary forests, the Mediterranean scrub-lands, or the vast flowery plains their ancestor slowly got adapted to. They simply see it as the environment they have to work with. Our cities are no more than anthills for plants to grow on, and I invite you to see them through the eyes of the insects sharing the space with us. This will be a mix between an urban ecology presentation, and a guided meditation sequence. You can bring only your empathy and your curiosity, and be ready to jump with me in stories of what happens when nature becomes unnature, and installs itself in our fortresses of concrete.

The Anthusiasts View

Florian Strahodinsky

Together we are looking at incredible animals that can be encountered nearly anywhere on planet Earth: ants. Most of us have seen ants at some point in life and may have been intrigued by their polarizing characteristics. Ants occur in pretty much any variation imaginable. This is reflected by different aspects, such as morphology, behavior or also the natural habitat, sometimes the latter may be a very specific ecological niche.
Common among most ants is the formation of colonies, masterpieces of cooperative behaviors between its smaller components – reproductive queens and sterile workers. The colony structure allows for strategies that are beyond the capabilities of solitary living, some examples are the use of agriculture [1] and social disease defense.
In this talk I will share my experiences as a myrmecologist and my work on social immunity in ants [2]. We also look at some striking similarities shared between ants and humans, but also why direct comparison may be difficult.

[1] Aylward, F. O., Currie, C. R., & Suen, G. (2012). The evolutionary innovation of nutritional symbioses in leaf-cutter ants. Insects, 3(1), 41-61.

[2] Cremer, S., Armitage, S. A., & Schmid-Hempel, P. (2007). Social immunity. Current biology, 17(16), R693-R702.

Probabilistic Intuition

Pepa Tkadlec

Humans are notoriously bad at estimating probabilities, but they can get better with practice. In this talk, we will run a quick quiz consisting of questions of the form "How likely is it that [..]?". I expect that most of your guesses will be way off. But that's OK – some of the questions are so counter-intuitive that they are called paradoxes, even though there is nothing contentious about them (they just appear surprising at first glance). We will use those examples to illustrate some basic features of randomness, and to identify several themes that often lead people's probabilistic intuition astray. By the end of the talk, your probabilistic intuition should be at least a bit better.

Networks, Networks and more Networks

Nino Lauber

Since the turn of the century several new research fields emerged that are often collected under the overall label of 'system science' or 'complexity science' like, systems biology [1], systems chemistry [2], systems medicine [3], etc. In general, they represent very divers and interdisciplinary areas of research that aim at studying nonlinear, dynamical and often seemingly chaotic system, often using various tools from mathematics, physics and computer science. A central problem with the study of such complex systems is that their overall behavior cannot be predicted and extrapolated by studying their individual components and then simply averaging over them. It is rather necessary to look at how the all the parts are connected and influence each other, which is often in a non-obvious way. As such, a sentence that is often used in this context is that: "the whole is more than the sum of it's parts"*. This concept is represented quite nicely by networks and it is thus no surprise that they are at the center of attention within many research fields associated with the above mentioned system sciences. In this talk I therefore want to give a quick overview of network science in general and it's connection to the mathematical field of graph theory. The main idea is to give a general outline of the different types of networks (or graphs) and their basic properties, as well as some examples of how these mathematical structures are used as models for the complex systems that are often encountered within the various research fields.

* This sentence is often attributed to Aristotle, however there Is no direct source for that. A similarly worded phrase can be found here though [4].

[1] Kitano, H. (2002). Systems biology: a brief overview. Science, 295(5560), 1662-1664.

[2] Ludlow, R. F., & Otto, S. (2008). Systems chemistry. Chemical Society Reviews, 37(1), 101-108.

[3] Alon, U. (2023). Systems medicine: physiological circuits and the dynamics of disease. CRC Press.

[4] Anderson, P. W. (1972). More Is Different: Broken symmetry and the nature of the hierarchical structure of science. Science, 177(4047), 393-396.

Survival of the Medalist

Simon Rella

Friday night, the high priestess will ignite the final torch with the flames of the cauldron, signaling the commencement of the Olympic Games. Athletes from 206 nations will compete for Olympic medals, an event that represents the pinnacle of many careers. Over the years, performances across various sports have reached unprecedented levels of optimization, with refined techniques and ideal body types setting new standards. Only the most optimized will prevail. In this talk, I will delve into the rich, tradition-filled history of the Olympic Games and examine how Olympic performance progression can be viewed as an evolutionary Darwinian process.

Improv Theater

Sonja Schobesberger

Discover parts of yourself and enjoy potentially insightful dynamics with other cool people by using the ways and ideas of improvisational theatre. We will look into different parts of the very broad spectrum which manifests improv - from playful games, abstract chaos to authentic relationship building.

The Electricity grid of the Past and Future

Jan Hurt

At the latest since the recent energy crisis, the functioning of the current and future power systems has become critical topics of discussion. The electricity market, due to its intermittent nature, has several unique features, including a characteristic intra-daily price profile. Concepts like the merit order [1] principle have been in the public spotlight.

Transitioning to a renewable power grid necessitates a redesign of our current infrastructure. Moving away from the centralized grid dominated by a few large power plants, we need to build distributed photovoltaic (PV) and wind power plants. The intermittent nature of these renewable sources requires integration with energy storage, stronger grid interconnections, and the implementation of smart grids and sector coupling. This transition will demand significant investments and changes [2].

However, there often is a lot of resistance from the local population to the installation of large structures like windmills and new power lines. In this talk, I aim to explain the current and future power grid, detailing the steps needed for a renewable transition. I will also present an example of how public resistance can be countered through education and awareness initiatives [3].

[1] Lion Hirth. Price formation on Electricity Markets. https://vimeo. com/750275820.

[2] FFF - Niederoesterreich. Windkraft im Waldviertel - ein Faktencheck. https://fridaysforfuture.at/windkraft-im-waldviertel.

[3] Bryn Pickering, Francesco Lombardi, and Stefan Pfenninger. "Diversity of options to eliminate fossil fuels and reach carbon neutrality across the entire European energy system". In: Joule 6.6 (2022), pp. 1253–1276.

Transforming the Web of Thoughts into a String of Words: Some Things I learned about (scientific) Writing

Jana Meixner

No matter what we are working on, as scientists we are always working with words. The written word is our primary means of communication. But how do we get across our ideas and thoughts in a way, that is both easy to understand and enjoyable to read? How do we turn the web of thoughts in our heads into a coherent string of words? How do we make the ideas and facts we want to convey as accessible as possible to others? In this short talk I want to share with you some things I have learned about writing from those who should know, such as neurolinguist Steven Pinker, writer Natalie Goldberg, and many others.

I am a biologist, journalist and scientist working in the field of evidence-based medicine. Writing and science communication is an essential part of my everyday work. In my work, I focus on how health information needs to be designed so that it can be understood – by everyone, regardless of their level of education or understanding of the world.

A public Sceptical towards Science?

Thomas Zauner

The Eurobarometer study in 2021 [1] showed that people in Austria – at that time – did not have a great amount of trust in science and the country ranks among the last in several categories in the survey. Why that is the case and what this actually means was investigated by a separate meta-study conducted by the Institute for Higher Studies in 2022 and 2023 [2]. This new study was initiated by the Ministry for Education, Science, and Research, which also started to implement measures to raise the public's awareness of and trust in science.
This talk will present the results of the meta-study which were published in August 2023, why it found that the sceptical attitude towards science that was show in the Eurobarometer study may be not as sever as initially thought and how nuanced a perspective on this issue is required to get the full picture.

[1] European citizens' knowledge and attitudes towards science and technology, https://europa.eu/eurobarometer/ surveys/detail/2237

[2] Starkbaum, Johannes, et al. "Endbericht. Ursachenstudie zu Ambivalenzen und Skepsis in Österreich in Bezug auf Wissenschaft und Demokratie." (2023)

The Climate Fresk (Klimapuzzle)

Chiara Cardelli

The Climate Fresk [1] (in Austria Klimapuzzle) is a collaborative serious game based on a set of cards where the participants draw a "fresco" (hence "fresk"), which summarises the work of the Intergovernmental Panel on Climate Change (IPCC) [2] and aims to turn IPCC content into a climate dialog. Everyone can become a workshop facilitator of the Climate Fresk through free trainings in which you learn how to lead a workshop yourself. In this way, non experts can spread further a dialog around climate change in their communities. As of 2023, over a million people worldwide have participated in a Climate Fresk Workshop. In this workshop we will experiment and reflect critically especially on the second part of the Climate Fresk, which aims to empower participants to take their action in their surrounding environment.

[1] https://climatefresk.org/world/

[2] https://www.ipcc.ch/