Think *Generates* ***Companion****s: A Construction Plan*

VIII

Welcome to the 2023 edition of the THINK conference! The front page of this companion - for the first time - was generated by artificial intelligence. Going back into the corpus of previous THINK talks, we can track relevant developments in this rapidly evolving field (stick around for Thomas' talk on Saturday!) just by looking at their abstracts. AI certainly has not been the only field, which has received thorough attention by this wonderful community. And likewise in 2023 we will get to discuss on a wide array of topics, ranging from cognitive science (Kimberley, Moritz), microbes (Sabrina, Max, Nathalie & Rai), climate science (Sreyam), history (Andreas & Simon) all the way to the origins of the origins (Nino). In the afternoons Ekaterina, Chiara and Alissa will guide us in some hands on knotting, planning and generating. Similar to last year, we will have a Project Day on Thursday. The idea of which is the generation of new forms of art and science - on the spot. Please also take the opportunity to explore the area around Boku Lehrforst. And take each other on walks, discuss and make new companions. We are looking forward to a great time with you all!

Santiago
Suyin
Simon
Rafi
Tobias

VIII THINK *Gener-8* Schedule

	Wednesday (Arrival)		**Thursday (Projects)**		**Friday (Conference)**		**Saturday (Conference)**	**Sunday (Dept.)**
		08:30-09:00	Getting Ready	**08:30-09:00**	Getting Ready	**08:30-09:00**	Getting Ready	Getting Ready
		09:00-09:50	Breakfast	**09:00-09:50**	Breakfast	**09:00-09:50**	Breakfast	
		10:00-10:40	Generate Projects	**10:00 - 10:30**	Nino Lauber - The Origins of Origins of Life Research	**10:00 - 10:30**	Sabrina Rosina - Welcome to the Plastisphere	Break-fast & Tidying up
		10:55-11:35	Projects	**10:40 - 11:20**	Kimberley Brosche - Animal Cognition Fun Facts	**10:40 - 11:20**	Moritz Kriegleder - Mind Wandering & Wondering	
		11:50-12:30		**11:30 - 12:30**	Nathalie & Rai - Exploring the Immune System of Bacteria	**11:30 - 12:30**	Andreas & Simon - The Alpine Network	
		12:30-14:30	Lunch Break	**12:50-14:30**	Lunch Break	**12:50-14:30**	Lunch Break	
		14:30-15:00	Activation		Activation		Activation	
17:30 - 18:00	Arrival	**15:00 - 16:00**	Projects	**15:00 - 15:30**	Sreyam Sengupta - Carbon Capture & Storage	**15:00 - 15:30**	Thomas Zauner - The Human Work Behind AI	
				15:40 - 16:10	Max Aubry - Fermentation	**15:40 - 16:40**	Chiara Cardelli - How to Plan for Impact?	
18:00	Opening	**16:30 - 18:00**		**16:30 - 18:00**	Ekaterina Osipova - Feminist Epistemologies and Alternative World-knotting			
						17:00 - 18:00	Alissa Freilinger - Generating Phenomena to Study Nature	
19:00-20:30	Dinner	**19:00-20:30**	Dinner	**19:00-20:30**	Dinner	**19:00-20:30**	Dinner	
	Evening Walk		Project Presentations		Game Night / Think Powerpoint Karaoke		Music Session / Open End	

List of Abstracts

The Origins of Origins of Life Research

Nino Lauber

The question concerning how life initially formed on Earth is perhaps one of the oldest and most fundamental questions that preoccupied humanity (next to questions about the origin of the universe or the meaning and purpose of life, etc.). In general, it is possible, through various kinds of indirect evidences (like geological- or paleobiological data), to date the appearance of the last universal common ancestor (LUCA), from to roughly 3.5 billion years ago. However, there is still no consensus on what type of organism LUCA was (or if it was a full fledged organism to begin with). Moreover, the exact processes of how LUCA developed (i.e. what came before it) are still debated within the scientific community. Historically, the origins of life field has always been the centre of debates and controversies [1]. In general, over its long course the field saw different stages of development and paradigm shifts [2]. Therefore, in this talk I want to give a short overview of the history of origins of life research. As such, the idea is to characterize the different phases the research field has gone through, what where the most important theories and key experiments that lead to new perspectives, but also who were the researchers that drove this field forward. Last but not least, I also want to give some perspectives about the future of origins of life research [3].

[1] Pereto´ J. Controversies on the origin of life. Int Microbiol 8(1):23-31. 2005.

[2] Fry I. The origins of research into the origins of life. Endeavour 30(1):24-28. 2006.

[3] Preiner M, Asche S, Becker S, Betts HC, Boniface A, Camprubi E, Chandru K, Erastova V, Garg SG, Khawaja N, et al. The Future of Origin of Life Research: Bridging Decades-Old Divisions. Life 10(3):20. 2020.

My Favorite Fun Facts in Animal Cognition

Kimberley Brosche

Studying the cognitive abilities of non-human animals can teach us about other species' view of the world, their specific needs, and about the evolution of our own minds. At the same time, not only the results of animal cognition studies but also the methodologies devised to overcome the challenges of testing non-verbal beings provide fascinating food for thought. Inspired by last year's conversations, I will give an overview of non-human animals' astonishing cognitive abilities and how they have been discovered. For example, we will look at the way domestic chicks count [1], animals that know their body is in the way [2], [3], how jays remember past experiences [4], companion animals whose learning is enhanced if addressed by humans [5]–[7], and how some animals might take others' perspective [8]. By sharing just a glimpse of the field that fascinates me, I hope to generate lively discussions, spark curiosity and, together with you, establish novel interdisciplinary connections.

[1] R. Rugani, D. M. Kelly, I. Szelest, L. Regolin, and G. Vallortigara, "Is it only humans that count from left to right?," Biol. Lett., vol. 6, no. 3, pp. 290–292, Jun. 2010

[2] R. Lenkei, T. Faragó, B. Zsilák, and P. Pongrácz, "Dogs (Canis familiaris) recognize their own body as a physical obstacle," Sci. Rep. Nat. Publ. Group, vol. 11, no. 1, p. 2761, 2021

[3] R. Dale and J. M. Plotnik, "Elephants know when their bodies are obstacles to success in a novel transfer task," Sci. Rep., vol. 7, no. 1, p. 46309, Apr. 2017

[4] N. S. Clayton and A. Dickinson, "Episodic-like memory during cache recovery by scrub jays," Nature, vol. 395, no. 6699, pp. 272–274, Sep. 1998

[5] P. Pongrácz, A. Miklósi, K. Timár-Geng, and V. Csányi, "Verbal attention getting as a key factor in social learning between dog (Canis familiaris) and human," J. Comp. Psychol. Wash. DC 1983, vol. 118, no. 4, pp. 375–383, Dec. 2004

[6] J. Kaminski, L. Schulz, and M. Tomasello, "How dogs know when communication is intended for them," Dev. Sci., vol. 15, no. 2, pp. 222–232, Mar. 2012

[7] J. Topál, G. Gergely, A. Erdohegyi, G. Csibra, and A. Miklósi, "Differential sensitivity to human communication in dogs, wolves, and human infants," Science, vol. 325, no. 5945, pp. 1269–1272, Sep. 2009

[8] T. Bugnyar, S. A. Reber, and C. Buckner, "Ravens attribute visual access to unseen competitors," Nat.Commun., vol. 7, no. 1, Art. no. 1, Feb. 2016

Exploring the Immune System of Bacteria and their Genomic Organisation

Nathalie Gruber & Raimundo Saona

Bacteria and their predators (phages) have co-evolved for a long time and developed multiple defense and attack mechanisms. Some of these defense mechanisms are encoded in bacterial DNA. Many of them have recently been discovered and denoted "defense islands" because they tend to cluster in the DNA. This spatial clustering makes searching for them easy but leads to some natural questions.

- Why do these systems cluster?
- Is it due to (i) being transferred together or (ii) synergy between systems?
- Is there a functional benefit due to the co-localization?
- Inside a "defense island", are all these genes solely involved in defense?

In our joint talk, we discuss these questions from a biological and game-theoretical perspective.

[1] Makarova, K. S., Wolf, Y. I., Koonin, E. V. (2013). Comparative genomics of defense systems in archaea and bacteria. Nucleic acids research, 41(8), 4360-4377.

[2] Millman, A., Melamed, S., Leavitt, A., Doron, S., Bernheim, A., Hör, J., ... Sorek, R. (2022). An expanded arsenal of immune systems that protect bacteria from phages. Cell host microbe, 30(11), 1556-1569.

Carbon Capture & Storage: Does it Work and is it a Viable Solution to Global Warming?

Sreyam Sengupta

Carbon capture has been sold as the cure for climate change. There are many methods that claim to capture carbon: bio-energy, direct capture, enhanced weathering, afforestation, alkalinity addition to oceans etc. All of these come with pros and cons. In this talk we'll discuss the history of carbon capture aka Negative Emissions Technologies (NETs), the various methods, and whether it's really the cure for climate change.

Fermentation: A Dive in Food-motivated Human-Microbe Interactions

Max Aubry

Microbes surround our species in space, and in time. They evolved around us, using us as evolutionary launching pads, and there is no doubt they will exist for a long time after us. Before we even understood what they were, we sealed strong alliances with some of them, often around food. As we gave them new ecological niches to conquer and strive in, they helped us diversify our diet, bringing new flavours and nutrients. From the controlled industries to the wild spontaneous fermentations, they are now everywhere, and it's hard to imagine what eating or drinking would be without them. The evolutionary and anthropological history of how microbes transform our food, for the better or for the worse, is a complex and fascinating one. In this talk, I will try to give you a view of these organisms, their evolutionary history, and the wonders they produce, grouped under the term 'fermentation'.

[1] Biedermann, Peter H.W., and Marko Rohlfs. 'Evolutionary Feedbacks between Insect Sociality and Microbial Management'. Current Opinion in Insect Science 22 (August 2017): 92–100.

[2] Campbell-Platt, Geoffrey. 'Fermented Foods — a World Perspective'. Food Research International 27, no. 3 (January 1994): 253–57.

[3] Sharma, Ranjana, Prakrati Garg, Pradeep Kumar, Shashi Kant Bhatia, and Saurabh Kulshrestha. 'Microbial Fermentation and Its Role in Quality Improvement of Fermented Foods'. Fermentation 6, no. 4 (6 November 2020): 106.

[4] Tamang, Jyoti Prakash, Paul D. Cotter, Akihito Endo, Nam Soo Han, Remco Kort, Shao Quan Liu, Baltasar Mayo, Nieke Westerik, and Robert Hutkins. 'Fermented Foods in a Global Age: East Meets West'. Comprehensive Reviews in Food Science and Food Safety 19, no. 1 (January 2020): 184–217.

Feminist Epistemologies and Alternative World-knotting

Ekaterina Osipova

The future of this world appears overwhelmingly bleak. Neoliberal politics, geopolitical conflicts and unfolding climate catastrophes all lead to a care-less world in crisis [4]. Against this backdrop, we are seemingly approaching an unavoidable future, merely functioning as gears within a rigid, meticulously orchestrated death machine [1]. Yet, feminist epistemologies have taught us that our ways of knowing and perceiving the world are situated [6], plural [2], relational and interdependent [12, 13], and they ultimately shape and form the world we live in [3]. Hence, it is crucial to envision alternative ways of living together. Based on Ann Light et al.'s work on designing alternative futures [8, 9, 10, 11], this workshop invites participants to collectively imagine and create alternative worlds. After receiving a brief introduction to different lines of scholarship on feminist epistemologies, participants will convene into small groups to engage in speculative practices [5] that will generate new worlds with their own novel relationalities, kinships, values and politics. As Haraway reminds us: "It matters what thoughts think thoughts. It matters what knowledges know knowledges. It matters what relations relate relations. It matters what worlds world worlds. It matters what stories tell stories" [7, p. 35]. So let us embark on a journey of collective world-knotting together.

[1] AJJ (2023) Death Machine [Lyrics]

[2] Akama, Yoko, Ann Light, and Takahito Kamihira. 2020. 'Expanding Participation to Desig with More-Than-Human Concerns'. In Proceedings of the 16th Participatory Design Conference 2020 - Participation(s) Otherwise - Volume 1, 1–11. PDC '20. New York, NY, USA: Association for Computing Machinery.

[3] Barad, K. (2007). Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning. Durham, NC: Duke University Press.

[4] The Care Collective (2020). The Care Manifesto. The Politics of Interdependence. London and Brooklyn, NY: Verso.

[5] Dunne, A., Raby, F. (2013). Speculative everything: Design, fiction, and social dreaming. Cambridge, MA and London: MIT Press.

[6] Haraway, D. (2001 [1988]). Situated Knowledges. The Science Question in Feminism and the Privilege of Partial Perspective. In M. Lederman I. Bartsch (Eds.), The Gender and Science Reader (pp. 169–188). London: Routledge.

[7] Haraway, D. (2016). Staying with the Trouble. Making Kin in the Chthulucene. Durham and London: Duke University Press.

[8] Light, A. (2021). Collaborative speculation: Anticipation, inclusion and designing counterfactual futures for appropriation. Futures, 134, 102855.

[9] Light, A., Bardzell, J., Bardzell, S., Cox, G., Fritsch, J., Hansen, L. K. (2015). Making "World Machines": Discourse, design and global technologies for greater-than-self issues. Aarhus Series on Human Centered Computing, 1(1), 1-3.

[10] Light, A., Brereton, M., Roe, P. (2015). Some Notes on the Design of 'World Machines'. In Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction, 289–293.

[11] Light, A., Powell, A., Shklovski, I. (2017). Design for Existential Crisis in the Anthropocene Age. In Proceedings of the 8th International Conference on Communities and Technologies, 270–279.

[12] Puig de la Bellacasa, M. (2015). Ecological Thinking, Materiality, Spirituality, and the Poetics of Infrastructure. In G. C. Bowker, S. Timmermans, A. E. Clarke E. Balka (Eds.), Boundary Objects and Beyond. Working with Leigh Star (pp. 47 – 68). Cambridge, MA and London: MIT Press.

[13] Puig de la Bellacasa, M. (2017). Matters of care: Speculative ethics in more than human worlds. Minneapolis and London: University of Minnesota Press.

Welcome in the Plastisphere

Sabrina Rosina

Over the past few decades, humanity has not only destroyed, but also created several new ecological niches. Particularly diverse and numerous is the ecological niche of plastic wastelands. Oceanic, but also terrestrial so-called plastispheres deserve a broader discourse, which is why this talk will focus precisely on them: What are plastispheres? Who are the inhabitants? And what ecological meaning carries this new assemblage with petroleum-based polymers within? Join Sabrina Rosina in her deep-dive through recent publications, some of her latest artwork as well as speculative musings about possible interspecies alliances in the global struggle for survival in the Anthropocene. New Ecologies are on the rise. Let's get to know them.

436 species of fungi and bacteria are known to digest plastic polymers.

- digestibles: polyethylene terephthalate (PET), expanded polystyrene (EPS), polyethylene (PE), polyurethane (PU), polyamide (PA), polypropylene (PP) and polyvinyl chloride (PVC)
- bacti in the hot spot: *Rhodococcus ruber* and *Jonesia cf. Quinghaiensis*
- fungi in the hot spot: *Aspergillus terreus* and *Engyodontium album*

[1] Amaral-Zettler, Linda A., Erik R. Zettler, and Tracy J. Mincer. "Ecology of the plastisphere." Nature Reviews Microbiology 18.3 (2020): 139-151.

[2] Goudriaan, Maaike, et al. "A stable isotope assay with 13C-labeled polyethylene to investigate plastic mineralization mediated by Rhodococcus ruber." Marine Pollution Bulletin 186 (2023): 114369.

[3] Knott, Brandon C., et al. "Characterization and engineering of a two-enzyme system for plastics depolymerization." Proceedings of the National Academy of Sciences 117.41 (2020): 25476-25485.

[4] Maurya, Ankita, Amrik Bhattacharya, and Sunil Kumar Khare. "Enzymatic remediation of polyethylene terephthalate (PET)–based polymers for effective management of plastic wastes: an overview." Frontiers in Bioengineering and Biotechnology 8 (2020): 602325.

[5] Pang, Guan, et al. "The distinct plastisphere microbiome in the terrestrial-marine ecotone is a reservoir for putative degraders of petroleum-based polymers." Journal of Hazardous Materials 453 (2023): 131399.

Mind Wandering & Wondering

Moritz Kriegleder

Theories of attention are at the heart of most theories of cognition. How and why we focus on certain things in our direct environment and not others determines what we perceive and how we make sense of the world (Sandved-Smith et al. 2021). But historically neuroscience did not cover the moments when we stop paying attention. Mind wandering is a rich experience that most of us have daily, but textbooks only define it as "off-task behavior". In my talk I will present recent models of mind wandering (van Vugt et al. 2015) and ask the participants to join for a demonstration to understand how you experience it yourself. Getting an overview of the variety of mind wandering experiences can be used to improve future studies of attentional control and help us understand the fundamentals of perception. This could be useful for therapy of attentional and perceptional disorders such as ADHD and schizophrenia (Sterzer et al. 2018).

[1] van Vugt, M., Taatgen, N., Sackur, J., Bastian, M. (2015). Modeling mind-wandering: a tool to better understand distraction. In N. Taatgen, M. van Vugt, J. Borst, K. Mehlhorn (Eds.), Proceedings of the 13th International Conference on Cognitive Modeling. (pp. 252). Groningen: University of Groningen.

[2] Sandved-Smith, L., Hesp, C., Mattout, J., Friston, K., Lutz, A., Ramstead, M. J. D. (2021). Towards a computational phenomenology of mental action: modelling meta-awareness and attentional control with deep parametric active inference. Neuroscience of consciousness, 2021(2), niab018. https://doi.org/10.1093/nc/niab018

[3] Sterzer, P., Adams, R. A., Fletcher, P., Frith, C., Lawrie, S. M., Muckli, L., Petrovic, P., Uhlhaas, P., Voss, M., Corlett, P. R. (2018). The Predictive Coding Account of Psychosis. Biological psychiatry, 84(9), 634–643. https://doi.org/10.1016/j.biopsych.2018.05.015

The Alpine Network

Andreas Ehrmann & Simon Rella

In October 1921, climbing legend and high ranking member of the Alpenverein, the viciously antisemitic Eduard Pichl introduced the so called Aryan Paragraph in the German and Austrian Alpenverein: "Members of the section can only be Germans, and therefore only Aryans." [1]. This was an unprecedented step for an organisation as large as the Alpenverein at that time. As a result liberal and Jewish members of the Alpenverein founded a new section, called Donauland, which one year after its foundation had more than 2000 members and continued to grow rapidly. After the Anschluss in 1938, Donauland was soon disbanded. Its members left the country or were deported.

Besides their physical magnificence, the Alps have always been a political landscape of significant dimensions. Artists, scientists, religious figures and politicians alike are seeking tranquility, reflection and purity in the mountains.

In this talk, we follow the tracks of several early alpinists, portraying prominent figures like Viktor Frankl, Paul Preuss, Emmy Eisenberg, Emil Zsigmondy and others by their contributions to arts and science. We quantitatively analyze the social network of these alpinists, focusing on the connections between them for first ascents, and track its evolution throughout the 20th century. We thereby quantify socio-political shifts within the Alpine guilds and discuss their implications.

[1] Daniel Kufner (2022), Sektion Donauland – eine Annäherung Prosopographie der Erstmitglieder 1921, Masterarbeit Uni Wien

[2] Eduard Pichl (1927), Wiens Bergsteigertum, Verlag der Oesterreichischen Staatsdruckerei

[3] Ingrid Runggaldier (2011), Frauen im Aufstieg: Auf Spurensuche in der Alpingeschichte, Edition Raetia

[4] Newman, M. (2018). Networks. Oxford university press.

The Human Work behind AI

Thomas Zauner

So-called "artificial intelligence"—better called machine learning—is the buzzword of our current time. It promises to alleviate human suffering, improve our communities, save the planet, and, first and foremost, create lots and lots of profit. The problems of who this profit is for and who controls the means of machine learning are enormous and immensely important issues. Yet, in this talk, I want to focus on how these systems are created by human hands. While programmers program machine learning systems and web scrapers scrape the internet for data to train them on, there is another crucial facet of creating these systems that is often overlooked: They need a human touch in the selection, curation, and annotation of data. People, often in the Global South, work hard in jobs mediated my platforms like Mechanical Turk or Clickworker. What they are doing and how this shapes the machine learning systems we become more and more reliant upon, I will discuss in my talk.

[1] AI Is a Lot of Work. Josh Dzieza. The Verge. 2023.

[2] The Humans Working Behind the AI Curtain. Mary L. Gray, Siddharth Suri. Harvard Business Review. 2017.

How to Plan for Impact? Using Logic Modelling to Orient Transdisciplinary Research towards Societal Impact.

Chiara Cardelli

Impact is a topic which is gaining more and more importance in science and research. Moving away from only generating impact within academia, science also wants to contribute to changes in society. However, the biggest challenges of our time are complex and interdependent issues that need to address changes in a wide array of sectors and involving different stakeholders. This begs the question what kind of impact(s) we want to achieve and how we want to get there. This interactive session will give an introduction into how to use logic modelling to plan for the societal impact of a project. Participants will gain a first insight on what it means to develop a theory of change, making the pathways towards the desired impact explicit. A strong emphasis will be put on the role of involving relevant stakeholders for impact. By either bringing in their own projects or by working on various example projects which will be provided, participants will work in small groups to develop a first draft and reflection for societal impact pathways. In the plenum, we will compare the work from the groups and open up the discussion on the different ways projects can achieve societal impact. Participants will gain an understanding on how to orient a project around societal impact and fill the gaps to reach it.

Generating phenomena to study nature

Alissa Freilinger

Modern science extends beyond the passive observation of natural phenomena. It actively generates and manipulates them in order to study nature. Ian Hacking aptly states that “to experiment is to create, produce, refine and stabilize phenomena” [1]. In this context, Gaston Bachelard’s concept of "phenomenotechnique" [3] offers an interesting perspective on the generation of scientific knowledge.

To kick-start the workshop, I will begin with a brief introduction inspired by an artwork of Marina Gadonneix - a photography of artificially produced lightning taken at Ampère Laboratory [3]. Following the introduction, participants will have the opportunity to engage in group work, focusing on questions related to the production and manipulation of phenomena within their own fields of study or areas of interest, and delve into the implications of these practices for knowledge generation. Finally, the workshop will culminate in a discussion of the collective findings from the group work.

[1] Hacking, I. (1983). Representing and Intervening: Introductory Topics in the Philosophy of Science. Cambridge University Press.

[2] Bachelard, Gaston. (2006). Noumenon and Microphysics. The Philosophical Forum, 37(1), 75–84.

[3] Gadonneix, Marina. (2016). Untitled (Lightning). Photo. Hors Collection

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