TIM_BM_025 Cybernetics, Computation, Pask & Conversation, AI & Constellations

***Prerequisites and co-requisites**
There are no official prerequisites other than students should be conversant / sufficiently fluent in English as the course will be taught in English. It is recommended that students are able to fully commit their time to the intensive and condensed nature of the class, and recognize that the course is highly participatory and reading intensive relative to its timeframe. Overall, the course welcomes all students that have an interest in cybernetics, artificial intelligence, 2nd order cybernetics, foundations of language, modeling, perception, computation, information, modes of learning, problem solving / solution finding, epistemological strategies to understanding. A cooperative, inventive mindset is welcome, playfulness is encouraged.

***Course objectives & *Learning outcomes**
The course objective is to give students an introductory *understanding-of* as well as a *feel-for* cybernetic concepts / terminology (e.g. A. Turing understood intelligence as emotional concept), in order to pass them on, especially given the interdisciplinary disposition and transdisciplinary consequences cybernetics has brought about. This includes an understanding of the philosophical background / epistemological challenges regarding language, modeling, saying / showing and drawing distinctions.

The learning outcome is for the student to be able to convey general (and some specific / advanced) notions and ideas behind cybernetic and related concepts and terminology. Conveying what problems the cybernetic community tried to solve and how this is relevant to respective fields. Each student will extract a particular example they choose to explicate to themselves and their peers in form of a presentation, as part of fulfilling the course.

***Course content (list of topics to be dealt with)**
That in a room full of cyberneticists there are easily as many understandings of their subject says more about cybernetics and the loops (re-entries) it sends us into. What would become “Cybernetics" began with the interdisciplinary Macy Conferences in 1942 — on circular causal and feedback mechanisms in biological and social systems — but was only given its name by Norbert Wiener in 1948. This was preceded by Warren McCulloch’s & Walter Pitts’s seminal 1943 paper ‘A Logical Calculus of the Ideas Immanent in Nervous Activity’, introducing the concept of neural networks.

We will touch upon some of the preceding epistemological problems that brought Wittgenstein and Turing together in order to better understand the later interweaving of cybernetics and artificial intelligence. We will look at “Information” in Claude Shannon’s first order and Gregory Bateson’s second order understanding of the term. The Biological Computer Lab (BCL; Univ. of Illinois), founded by Heinz v. Foerster, was the center of cybernetic research from 1958 to 1974, where the ideas of foundational researchers such as W. Ross Ashby (Homeostat; Law of Requisite Variety), Gordon Pask (Conversation Theory) and Humberto Maturana (Autopoiesis) were the driving forces. Second-order cybernetics introduced the “oberserver [problem]” and brought about an opening away from strictly machine-based computation towards social practices with emergent phenomena, some of which appear enigmatic and are gaining new perspectives through current foundational research. If the “black box" (non-trivial machine) seems to continue to grow before everyone's eyes through current generative AIs, the syntactic approach of systemic-structurual constellations work (representational / inferential group modeling) offers interesting approaches to thinking and acting on cybernetic concepts such as regulation, control, information and boundaries, or on the various possibilities of how Wittgenstein's Tractarian “saying" & “showing" could (also) be navigated. We will take cues from Karl Friston, Michael Levin and Joscha Bach to look at current developments in AI and biological research.

*** Recommended and required reading (in excerpts, provided)**
Claus Pias (ed.) (2016), Cybernetics The Macy Conferences 1946-1953. The Complete Transactions,
Norbert Wiener (1948), Cybernetics: Or Control and Communication in the Animal and the Machine
Norbert Wiener (1950), The Human Use of Human Beings

Albert Müller, Karl H. Müller (ed.) (2007), An Unfinished Revolution? Heinz von Foerster and the Biological Computer Laboratory 1958 – 76
Ludwig Wittgenstein, Tractatus-Logico-Philosophicus (1922) https://people.umass.edu/klement/tlp/tlp-ebook.pdf USE mainly the Pear/ McGuiness translation (but check in / use the other Ogden translation as well)
B. Jack Copeland (Ed.) (2004), The Essential Turing: Seminal Writings in Computing, Logic, Philosophy, Artificial Intelligence, and Artificial Life- Plus The Secrets of Enigma
W. S. McCulloch & W. Pitts (1943), A Logical Calculus of the Ideas Immanent in Nervous Activity.

***Planned learning activities and teaching methods**
Each of the six days will entail reflection (of what has been read / discussed / achieved), followed by inputs by the lecturer in form of introductions to the topics at hand. Close reading of texts and excerpts of texts to be brought into correspondence will be complemented by group discussions, both in small break-out groups and also the plenum, as well as exercises to be worked on in small groups of 3—4 persons: e.g. how would you explain […] to (I) your peer/s, (II) a child, (III) without academic language (e.g. through everyday examples)?

Approaches to cybernetics will be reflective / philosophical and taken through the concepts as well as their personage (discoverers / inventors) of respective concepts. The course is meant to facilitate conceptual understanding ("understanding" itself a cybernetic term), which means we will ever so slightly (and humbly) just graze the actual scientific (mathematical) pathways that were employed for scientific discourse — in other words: no mathematical knowledge is required.

The point is to grasp the original ideas, how they connect and to what consequence in all our lives.

Systemic-structural constellations work (SySt) will be explained and may be used for illustration, but no actual client work will be facilitated for students. SySt will be used as demonstration example of a modeling methodology, which works along the topological boundarys of the "black box" that is the client's model of his/her/their chosen theme to work on in this way.

Day 1, Wednesday, September 25, 2024, 10:00—13:40
WHOSE CYBERNETICS? — INTRODUCTIONS.
In this class we encompass the vast sea (of cybernetics) like true Kybernetes (ancient Greek for steersperson, navigator), to get a feel for the subject, including how AI is "nested" in Cybernetics.
Assignments/Readings to complete before the class on Wednesday:
1. Bill Cope & Mary Kalantzis (2022) The cybernetics of learning, Educational Philosophy and Theory; NB! — Episodes 1—11, p. 2252—2381 **(without the Coda!)**
2. Heinz von Foerster (1982), CIRCULAR CAUSALITY The Beginnings of an Epistemology of Responsibility; p. 11—17 **Before reading HvF's short introduction, glance at the three Contents (Index) pages, to get a feel for the variety of themes that initially were negotiated in cybernetics.**
3. Norbert Wiener (1948), Cybernetics, Preface to the Second Edition, p. vii—xvi; **(graciously pass over any of the mathematics!)**
4. Norbert Wiener, The Human Use of Human Beings, *I Cybernetics in History*, p. 15—27

Day 2, Thursday, September 26, 2024, 10:00—13:40
SAYING & SHOWING
In this class we will look at the challenges of modeling language, (in the human and the machine.)
Assignments/Readings — browse and read excerpts to get a feel for the theme of the day SAYING & SHOWING — we will then closely explore excerpts in class together:
1. S.G. Sterrett, PICTURES, MODELS, AND MEASURES; **only look at the picture (and caption) on p. 116** and imagine that this may have been the impetus for what should become Ludwig Wittgenstein's so-called "picture-theory of language".
2. Ludwig Wittgenstein (1922), Tractatus Logico-Philosophicus (TLP); **browse only through propositions within 2.1ff and 2.2ff**:
The pictorial relationship (TLP 2.1514)
… whereby LW understands the correlation of the picture's elements with the depicted elements.
The pictorial form (TLP 2.17) [Form der Abbildung]

… whereby LW understands what the picture must have in common with reality, such as the *manifoldness* of its elements and the *definite combination* of the elements in the picture.
The representational form (TLP 2.173) [Form der Darstellung]
… whereby LW understands that the picture is depicted from a standpoint from without itself – *(…), therefore the picture represents its object rightly or falsely.*
[only "the picture-taker herself" can attest to that, so to speak]
The logical form
TLP 2.182 Every picture is *also* a logical picture. (On the other hand, for example, not every picture is spatial.)
Later in the Tractatus he extends this idea to the modeling of propositions [=sentences]:
TLP 4.031 In a proposition a situation is, as it were, constructed experimentally [=tentatively].
(Relate this to the picture in **1.** S. G. Sterrett, PICTURES, MODELS, AND MEASURES, p. 116)
We will then explore, why the above, as part of a strategy to formalize (the English) language, didn't stick (AI pioneer Marvin Minsky failed similarly again with symbolic AI 40 years later): "Meaning" (in language) appears not reducible to use of particular symbols. At the same time the Tractatus remains one of the most inspiring and influential philosophical texts of the 20th century to date. On from here there are two ways forward to insights:
One is systemic-structural constellations work (SySt), which can be understood as "applied picture theory of language" (with an extended understanding of language), which can be demonstrated. SySt is not trying to be AI, but points to other fascinating perceptual phenomena and faculties, relevant to future research.
The other: Wittgenstein developed further strategies to get at meaning in language. One of which was mutually co-influenced by Alan Turing, who initially was Wittgenstein's student in Cambridge, and then his peer. U.S. philosophy professor Juliet Floyd, in fascinating detective work, excavated how strongly they influenced each other, whereby they understood computation foremost embedded in social practice with its own surrounding phraseology.
3. Juliet Floyd (2019), Wittgenstein and Turing; **only Abstract and Section 1 (p. 263—266)**

Day 3, Friday, September 27, 2024, 10:00—13:40
CYBERNETICS WORKSHOP & EXPLORATION
We will continue with input & questions reflecting the previous two days.
Then break-out groups will do an extended exercise — including presentations — while also employing: **1.** Klaus Krippendorff's (1986) "Dictionary of Cybernetics".
2. We may also digitally explore Joscha Bach's recent excellent talk at the AGI-24 Conference.

Subsequent program for Day 4, October 18, 2024 — Day 5, November 8, 2024 — Day 6, November 29, 2024 with emphasis on 2nd order cybernetics and focus on Gordon Pask's work, will follow on September 20th 2024.

***Assessment methods and criteria**
Given the short, intensive seminar format of this course, full attendance and active, engaged participation that demonstrates that students have done the readings are the most significant components of the evaluation. In addition, there will be one written essay required as a final evaluation marker of the course that encourages the use of both creative and critical-thinking approaches to the subject matter.

***Grading Distribution**
The course only has a pass/fail grading option.
Attendance is 40%, participation that demonstrates that the student has done the required reading is 40%, presentation of individual and group work in a professional communication style is 10%, and required final essay, which also demonstrates that the student has done the required readings is 10%. In order to pass the course, students must get a minimum evaluation of 65%.

Thank you for our interest! — Marcus J. Carney — marcusjcarney@gmail.com