Artificial Life: Investigations about a Universal Osmotic Paradigm (UOP)

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Content

Introduction

Introduction:

- Einstein → Theory of **Relativity** and Brownian **Motion** (Einstein and Smoluchowski, 2001)
- Osmotic Paradigm → process multiplicity → graph theory (knots, edges)
- Difference between Artificial Life and Artificial Intelligence

Research Questions & Goal:

(1) Universal Osmotic Paradigm (UOP)?

(2) Artificial life and UOP?

(3) UOP → Production Application Witness?

Axioms I

Axiom 1

The **Osmotic** *can be correlated with the* **Intermittent**.

Axiom 2

A feed-back produces a transfer from the **outer** *to the* **inner border**.

Axiom 3

Border *can be defined as the region in that the* **direction change** *(of the motion of x) shows an increased* **probability**.

Axioms II

Axiom 4

A body that is moving, stays in **motion** *if no* **force** *is acting upon it.*

→ Newton

Axiom 5

The **border** *can be understood as a* **force**.

Axiom 6

A differentiation or **ordering process**, *increases the division of information flows, and as this implies directional change, especially in a specific region, this implies as a further consequence the* **formation of a border**.

Axioms III

Axiom 7

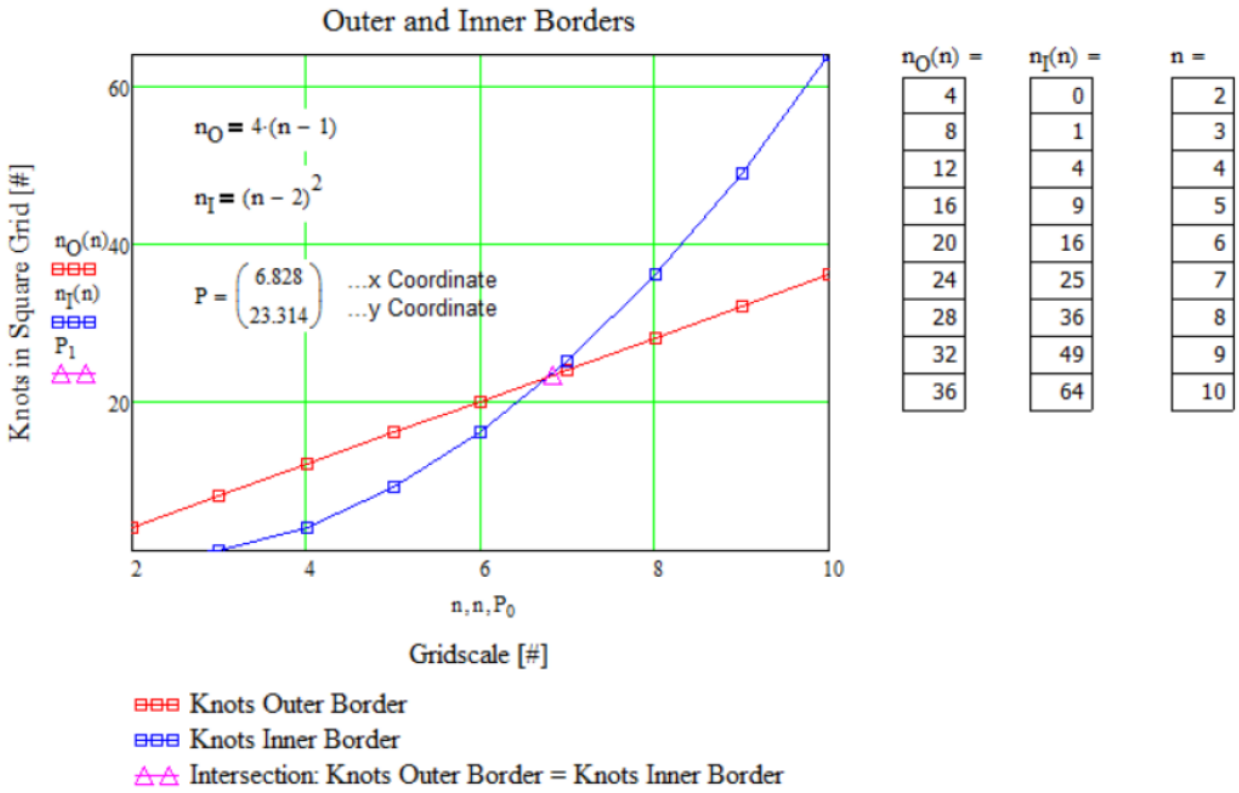
The **border** *region, is (hence) a region of* **directional change**, *and a region of increased change.*

Figure 1 $\Rightarrow$:

Axiom 8

If the **density increases** *for a system then the probability of the emergence of a* **system border increases** *as the inner osmotic force increases relatively.*

Artificial Life - Osmotic Force - Brain Evolution I



$n_O(n)$ =	$n_I(n)$ =	n =
4	0	2
8	1	3
12	4	4
16	9	5
20	16	6
24	25	7
28	36	8
32	49	9
36	64	10

Figure 1: **Outer** and **Inner Border** Knots in a square Knot Grid

Artificial Life - Osmotic Force - Brain Evolution II

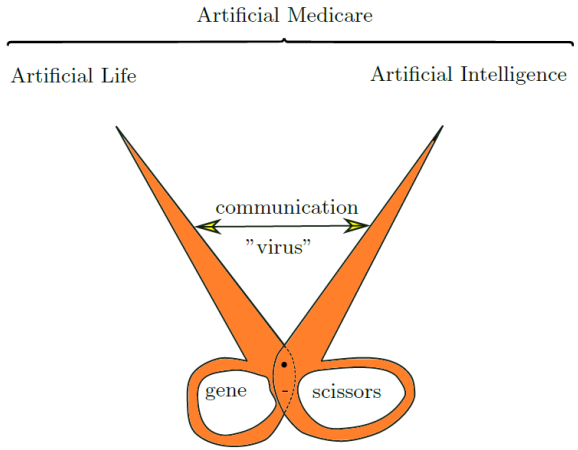


Figure 2: Artificial Scissors / Brain Evolution

Artificial Scissors: Osmotic Forces:

- Virus is half-life → important in evolution (Kauffman, 1993)
- Gene Scissors change from outer side gene structure → artificial life evolution
- Insertion of Genes → intermittency (Axiom 1) → new medicine, life form ...
- Artifical Intelligence → intermittency & accuracy ↑ e.g. molecular processes

Artificial Life - Osmotic Force - Brain Evolution III

Brain Evolution

- Border forming $\rightarrow$ bifurcation brain surface
- Language exerts evolutive force on brain structure
- Social Osmotic Pressure $\rightarrow$ Language
- Artificial Intelligence increases osmotic language flows through intermittent language borders

Model in Witness I

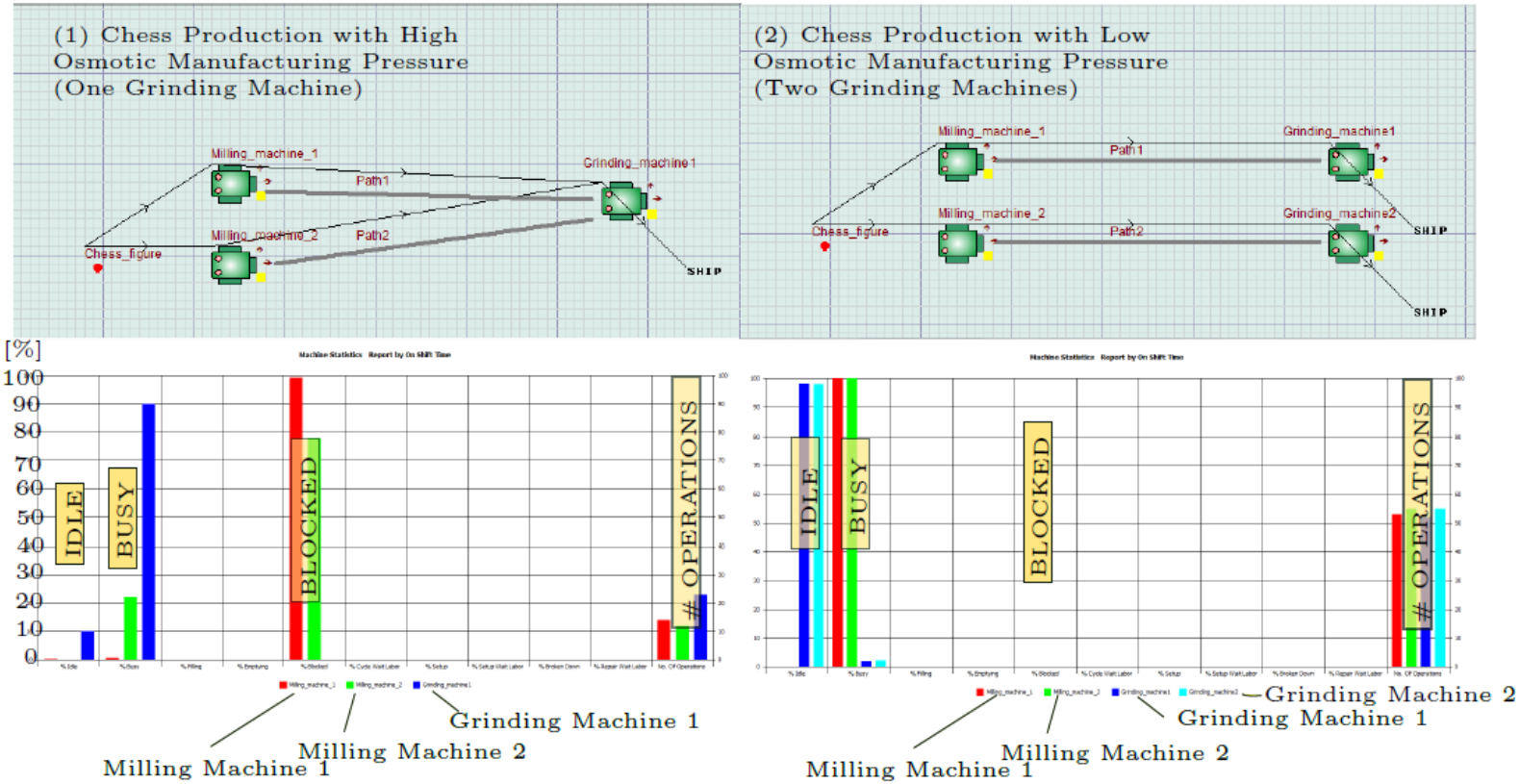


Figure 3: Witness Model of Chess Production (1) High (2) Low Osmotic Manufacturing Pressure

Conclusions and Outlook I

Summary and Conclusions:

- UOP $\rightarrow$ 8 axioms for the osmotic paradigm
- Artificial Life and UOP
  - Gene-Scissors $\leftrightarrow$ AI
  - Brain Evolution $\leftrightarrow$ Language
  - Production and osmotic pressure

Outlook:

- UOP Quantification with:
  - Graph-Theory
  - Statistical Methods
  - Explizit Numerical Investigations
- Further Applications and Generalisations

Thank you cordially for your attention!

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PS.: The presentation can later also be found at:

http://www.dr-heiden.com/Vortraege.htm

Bibliography I

Arbib, M. A. and D. Caplan (1979). "Neurolinguistics must be computational". In: *Behavioral and Brain Sciences* 2, pp. 449–483.

Boden, Margaret, Valentino Braitenberg, Brian Cantwell-Smith, Gregory Chaitin, Daniel C. Dennet, Keith Devlin, Fred Dretske, and Hubert Dreyfus (2008). *Philosophy of Computing and Information*. Ed. by Luciano Floridi. Automatic Press / VIP, United States of America and United Kingdom. 204 pp. ISBN: 8792130097.

Dasgupta, S., C. Papadimitriou, and U. Vazirani (2008). *Algorithms*. Boston: The McGraw-Hill Companies. ISBN: 9870073523408.

Dürr, Hans Peter (1990). *Das Netz des Physikers*. dtv, München.

Bibliography II

Einstein, Albert and Marian von Smoluchowski (2001). *Untersuchungen über die Theorie der Brownschen Bewegung - Abhandlung über die Brownsche Bewegung und verwandte Erscheinungen*. Vol. 199/207. Ostwalds Klassiker der exakten Wissenschaften. Verlag Harri Deutsch, Frankfurt am Main (cit. on p. 3).

Grush, Rick and Patricia Smith Churchland (1996). "Lücken im Penrose Parkett". In: *Bewusstsein. Beiträge aus der Gegenwartsphilosophie*. Mentis / Schöningh, pp. 221–250. ISBN: 3506755137.

Heiden, Benedikt Leonhard Tonino (Jan. 13, 2021). *Children's Philosophy about Artificial Life with Benedikt Heiden, Weiz, Austria*.

Bibliography III

Heiden, Bernhard and Bianca Tonino-Heiden (Aug. 2020). "Key to Artificial Intelligence (AI). Intelligent Systems and Applications, IntelliSys 2020". In: *Advances in Intelligent Systems and Computing*. Ed. by K. Arai, S. Kapoor, and R. Bhatia. Vol. 1252. Springer, Cham., pp. 647–656. DOI: 10.1007/978-3-030-55190-2_49.

— (2021). *Philosophical Studies - Special Orgiton Theory / Philosophische Untersuchungen - Spezielle Orgitontheorie (English and German Edition) (unpublished)*.

Heiden, Bernhard, Bianca Tonino-Heiden, Wolfgang Wissounig, Pascal Nicolay, Michael Roth, Silvia Walder, Xing Mingxing, and Willem Maat (2019). "Orgiton Theory". unpublished.

Bibliography IV

Heiden, Bernhard, Matthias Volk, Volodymyr Alieksieiev, and Bianca Tonino-Heiden (2020). "Framing Artificial Intelligence (AI) Additive Manufacturing (AM)". In: 14th International Symposium "Intelligent systems" (INTELS'20), 14.-16. Dec. (Lomonosov Moscow State University, Online). Moscow, Russia: Procedia Computer Science, Elsevier B.V. URL: http://intels-conf.ru/. in print.

Hoshika, S., N. A. Leal, M. J. Kim, M. S. Kim, N. B. Karalkar, H. J. Kim, A. M. Bates, Jr. Watkins N. E., H. A. SantaLucia, A. J. Meyer, S. DasGupta, J. A. Piccirilli, A. D. Ellington, Jr. SantaLucia J., M. M. Georgiadis, and S. A. Benner (2019). "Hachimoji DNA and RNA: A genetic system with eight building blocks". In: *Science* 363.6429, pp. 884–887. DOI: 10.1126/science.aat0971. URL: https://www.ncbi.nlm.nih.gov/pubmed/30792304.

Bibliography V

IEEE Standards Association (May 15, 2018). *Ethically Aligned Design: Prioritizing Wellbeing for AI and Autonomous Systems Webinar Replay*. URL: https://youtu.be/elcDG5lB5XQ.

Kauffman, Stuart A. (1993). *The Origins of Order - Self-Organization and Selection in Evolution*. Oxford University Press, New York (cit. on p. 8).

Köther, Reinhard and Alexander Sauer (2017). *Production technology for industrial engineers, in German: Fertigungstechnik für Wirtschaftsingenieure*. Hanser Fachbuchverlag. 492 pp.

Mandelbrot, Benoît B. (1991). *Die fraktale Geometrie der Natur*. Birkhäuser Verlag, Basel Boston Berlin.

Bibliography VI

Metzinger, Thomas (1996). "Begriffliche Grundlagen". In: *Bewußtsein, Beiträge aus der Gegenwartsphilosophie*. Ed. by Thomas Metzinger. 3rd ed. Schöningh. ISBN: 3506755137.

Scharmer, C. Otto (2011). *Theorie U: Von der Zukunft her führen: Prescencing als soziale Technik*. Carl-Auer Verlag.

Sullins, John (2020). "Information Technology and Moral Values". In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Winter 2020. Metaphysics Research Lab, Stanford University. URL: https://plato.stanford.edu/archives/win2020/entries/it-moral-values/.

Bibliography VII

Thaddeus, Metz (2016). "The Meaning of Life". In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Fall 2008. Metaphysics Research Lab, Stanford University. Chap. The Meaning of Life. URL: https://plato.stanford.edu/archives/sum2013/entries/life-meaning/.

Tonino-Heiden, Bianca and Bernhard Heiden (2018). "Bildung 4.0 im Zeitalter der Post-Globalisierung". In: *Mit Innovationsmanagement zu Industrie 4.0*. Springer Fachmedien Wiesbaden, pp. 227–234. DOI: 10.1007/978-3-658-11667-5_18.

Toulmin, Stephen (1994). *Kosmopolis - die unerkannten Aufgaben der Moderne*. 1st ed. Frankfurt am Main: Suhrkamp.

Bibliography VIII

University of Graz (2020). *Artificial Life Laboratory, Graz, Austria*. URL: http://zool33.uni-graz.at/artlife/ (visited on 11/01/2020).

Villari, M., M. Fazio, S. Dustdar, O. Rana, and R. Ranjan (2016). "Osmotic computing: A new paradigm for edge/cloud integration". In: *IEEE Cloud Computing* 3, pp. 76–83.

von Förster, Heinz (1985). *Sicht und Einsicht*. Vieweg+Teubner Verlag. 252 pp. ISBN: 3528084685.

— (1993). *KybernEthik*. Merve Verlag GmbH. 175 pp. ISBN: 3883961116.

Bibliography IX

Weber, Bruce (2018). "Life". In: *The Stanford Encyclopedia of Philosophy*. Ed. by Edward N. Zalta. Summer 2018. Metaphysics Research Lab, Stanford University. URL: https://plato.stanford.edu/archives/sum2018/entries/life/ (visited on 05/06/2021).