First Order Predicate Logic and Informational Process Optimisation

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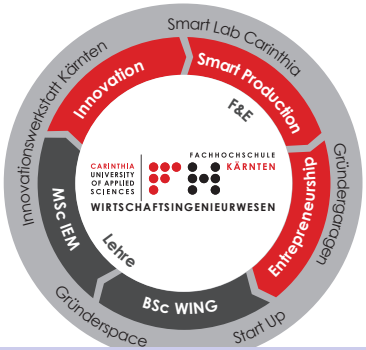
Wed 2026/08/12 - 16h00-16h40, Wittgenstein Symposium 2026, Kirchberg am Wechsel, Austria



Inhalt I

Introduction

- Theorem Provers are based on ideas of Frege, Russell, Tarski, Łukasiewicz, Gödel, Church et. al. → They connect Boolean Logic with Set Theory (Cantor) → Examples: Isabelle, Prolog
- [BuM83,2] p.16: "Ludwig Wittgenstein beeinflußte den Wiener Kreis tiefgreifend ... die Leute hörten auf, über die Wissenschaft zu reden, um nun über die Sprache der Wissenschaft zu sprechen ... Kurz gesagt, (er) tötete den Wiener Kreis von innen her, ehe der Nationalsozialismus seinen gegen die Vernunft Blitzkrieg führte." → Problem with AI 'Bubbles' as 'computational applications are in the widest sense language 'artificial' language extensions (s. Fig. 5).

Wittgenstein → Axioms I

- (PU 2019:§9ff.) → 'this' → Axiom 1
- (PU 2019:§15) → 'namecard' → Axiom 1

> Axiom 1: Philosophy can create something new. Science tries to study the given.

- (TLP 2003) → give ourselves rules by laws, social norms to perform logic operations in reality → Axiom 2

> Axiom 2: A process can be translated (at least partly) into a logical form.

Wittgenstein → Axioms II

- (PU 2019) → the city of sentences or words is arbitrarily expandable → evolution of language
- (TLP 2003) → permits a Gödelisation of the world's theoreticity.

> Axiom 3: A process can lead to an application or beyond itself (Bifurcation Axiom).

Example: Plant that is searching for water and growing in a scarce environment or stays 'stable' in a resourceful environment.

First Order Predicate Logic and Solution by Stephen Wolfram I

$$\underbrace{\underbrace{(p \uparrow q) \uparrow r]}_{\text{System 1}} \uparrow \underbrace{\{p \uparrow [(p \uparrow r) \uparrow p]\}}_{\text{System 2}} = r}_{\text{Wolfram's Logic Axiom}} \tag{1}$$

$$\underbrace{\underbrace{[(p \bullet q) \bullet r]}_{\text{System 1}} \bullet \underbrace{\{p \bullet [(p \bullet r) \bullet p]\}}_{\text{System 2}} = r}_{\text{Wolfram's Logic-Axiom}} \tag{2}$$

Figure 1: Wolfram' Logic Axiom with Scheffer's Stroke and in Wolfram notation (Wolfram's Blog)

Logical Optimisation of a Control System I

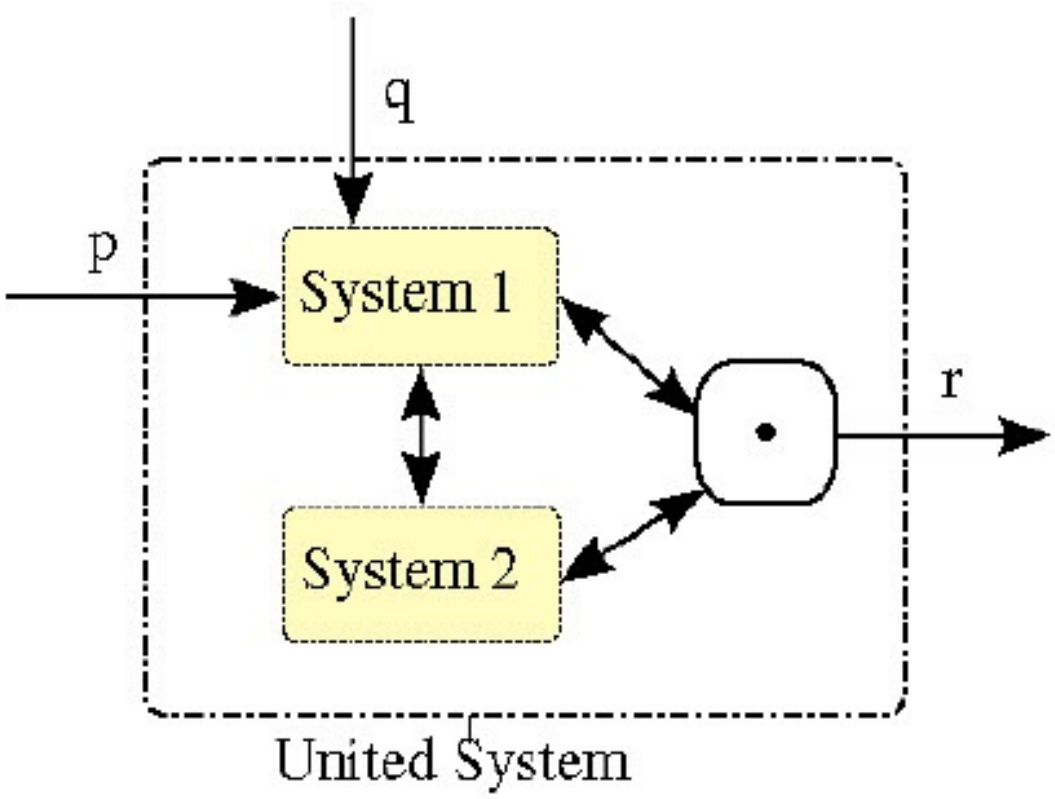


Figure 2: United System of Minimal Logical System and Optimal Control System

Synthesis and Topological Structure of Minimal Logical System and Optimal Control System I

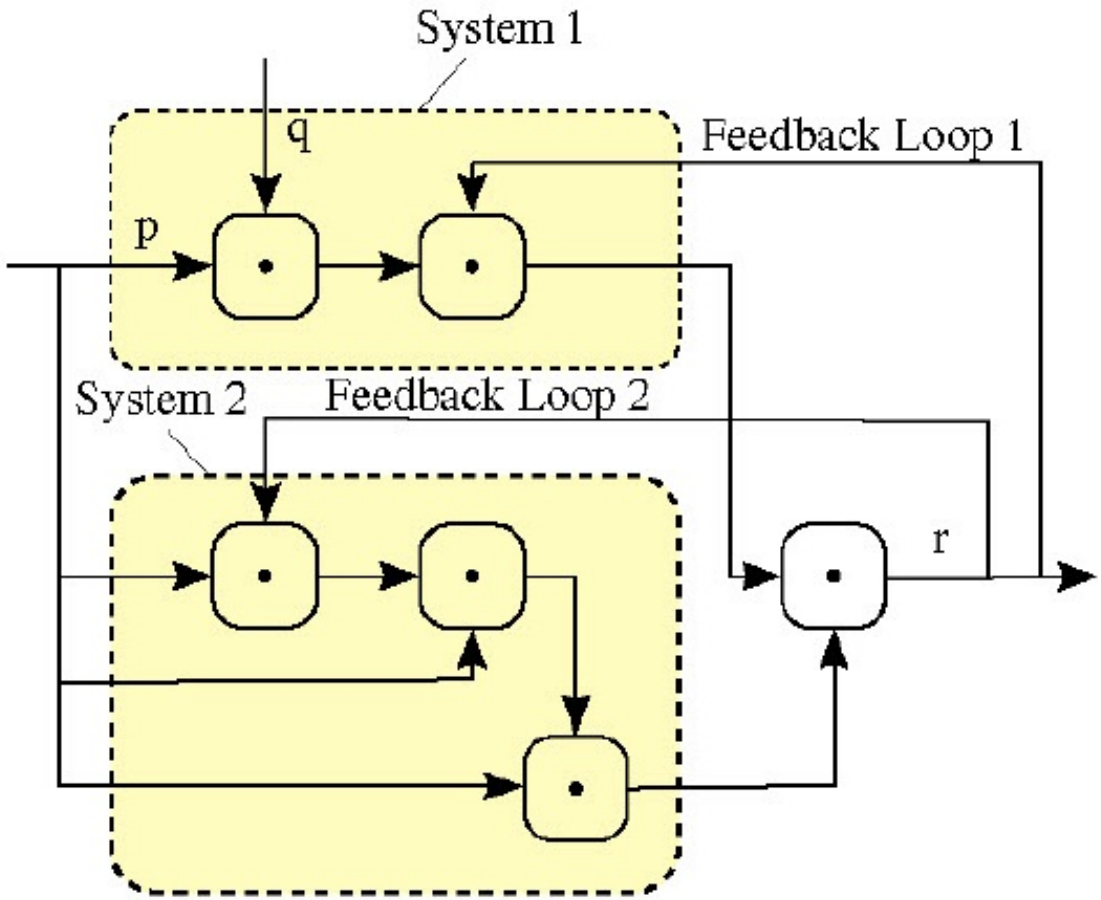


Figure 3: Block Diagram of Wolfram's Logic Axiom (see eq. 2)

Synthesis and Topological Structure of Minimal Logical System and Optimal Control System II

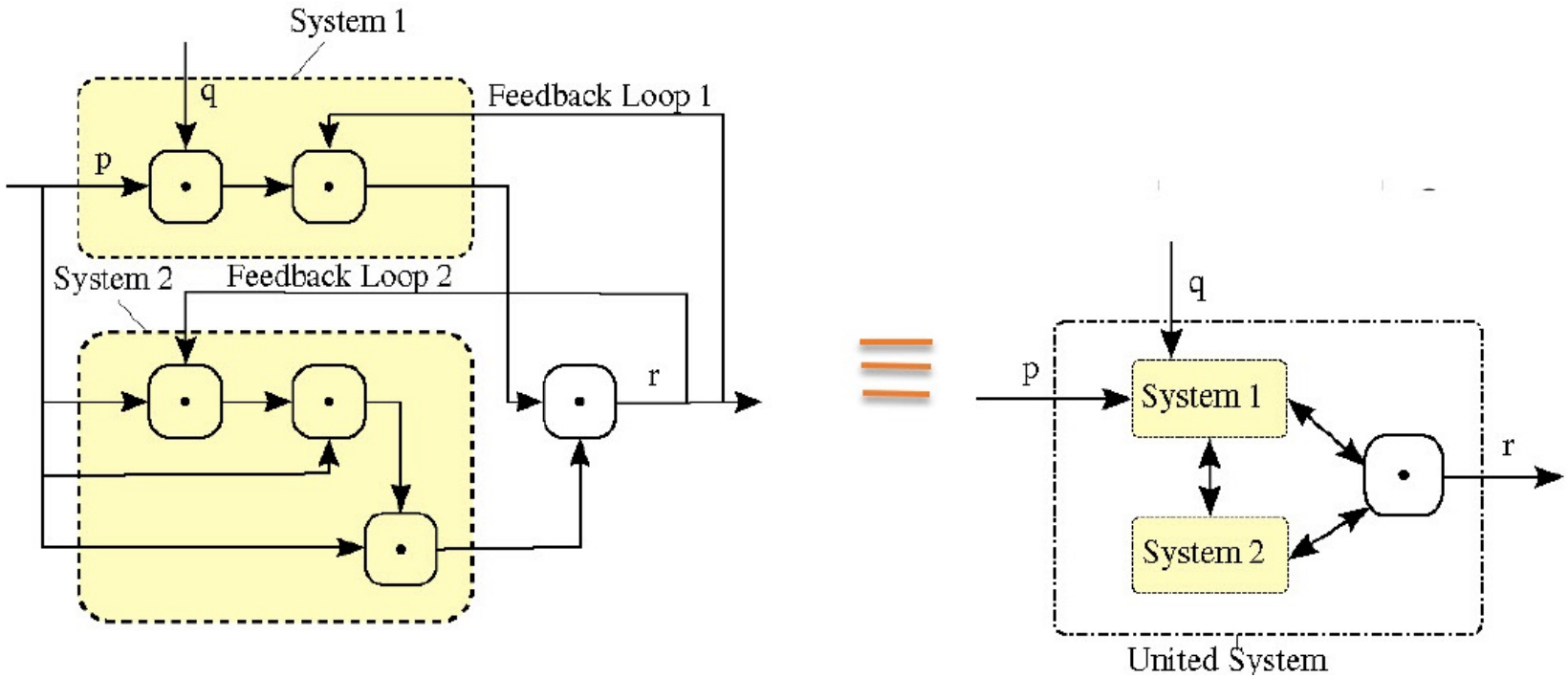


Figure 4: Synthesis

Synthesis and Topological Structure of Minimal Logical System and Optimal Control System III

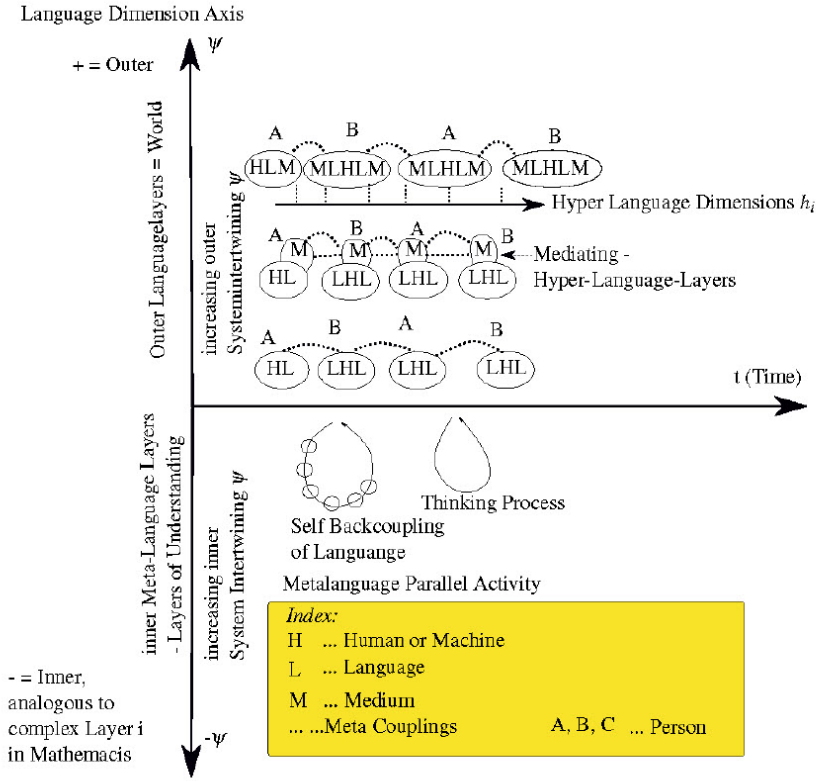


Fig. 3 External and internal language dimensions.

Figure 5: Emergentistic Language-World Selforganisational Process with Wittgensteinian Style Core Language Theory

Conclusion and Outlook I

- There is a 'minimum law for information'.
- This is an 'optimal solution' in the von Neumann sense.
- Logic is purely geometric or topological.
- The optimal control structure is identical with the optimal logical structure of the predicate logic.
- Both are two nested feedback loops.
- The logic limits selforganisation and rationality with a lower bound.
- In the Wittgensteinian sense logic is twofold: (1) on the language side and (2) on the side of objective reality that is described by the language.
- If one takes together real side and language side, this gives the empirical theoretical as a double feedback loop for innovation as a minimal and optimal system.

Conclusion and Outlook II

- Mathematical tools (like Mathematica) can show minimal sets for combinatorial systems like predicate logic.
- Wittgenstein: With the logical elements the room of possibilities is given → The hidden optimal structure is then also calculable in a deductive (algebraic) system.
- Quantum Logic operates with non-commutable algebra which gives the possibility to directly implement and operate with new algebras that sort reality processes by the algebraic structure directly[1]: This is in accordance with Wittgenstein's idea of syntactic correctness of an algebra or language system. → The syntax sorts out true i.e. real propositions.

[1] https://www.wolfram.com/wolfram-u/courses/mathematics/wolfram-quantum-framework-all-systems/ Wolfram-U presentation 2026/08/05

Danke für die Aufmerksamkeit!
Thank you cordially for your attention!

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PS.: The Presention can be found at/Die Präsentation kann auch auf folgender Website gefunden werden:

https://dr-heiden.com/Vortraege.htm

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