

# P1 - A semiotic perspective of AI in R&D Management

## 1. IMPACT of AI

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**Track summary:** Greenspan's coined expression "irrational exuberance" might also describe the rapid uptake of Generative AI (GenAI). This track takes a critical view of GenAI and its evolution from the philosophical roots of Natural Language Processing (NLP), which using Large Language Models (LLMs) only predict semantic probabilities. Because semantics is only one part of communications, GenAI cannot be aware of the interpreter's (human or otherwise) sensemaking models of the relationship between object and sign, as described by triadic Peircean semiotics - the study of signs. Despite trends of LLM products like Google NotebookLM to "ground" LLMs from user content, multiagent 'society of minds,' more guard-rails - 'Claude,' more efficient techniques than transformers - RETNET, semantic analysis remains GenAI's fundamental constraint.

This track invites papers which can put the evolution of NLP and GenAI in perspective, compared to Artificial General Intelligence (AGI) or strong AI, which strives for, but which has not yet realized a fully enabled semiotic strong AI. Each submission should focus on R&D management for a particular industrial or service sector, analyzing the sector's top ten or so R&D Chatbot and AI offerings. The literature review should link AI articles and studies to semiotics and NLP's evolution, and about the sector's AI implementations and challenges that ungrounded GenAI Chatbots and LLMs raise. Practically, for the selected AI offerings, the findings and recommendations sections should focus on how to apply human procedural, or other workarounds for what a "digital twin" representation can and cannot do within the current limits of GenAI LLMs.

The image shows a screenshot of a document page with two columns of text. The left column contains a list of notes, and the right column contains a bibliography and character information. The notes are numbered 1 through 16, and the bibliography is numbered 17 through 22. The character information includes a biography and a maximum character count.

**NOTES:**

1. Forth's Language of Thought Hypothesis (LOTH) is a key underpinning of classic CTM and posulates the brain as a symbolic and syntactical processor (Mikawa, 2023; Peirce & Fodor, 2005). Connectionism arrived in the 1980's with Neural Networks seen either as a replacement or addition to classic CTM (Michael Behe, 2020).
2. Embodied cognition is more of a research goal than theory, adapted differently by archetypes i.e., corvids versus cephalopods, cognition extends into the external world which CTM/Connectionism cannot explain (Dingus, 2020).
3. 2017 - a game changing year for LLMs with highly efficient transformation by attention encoding/decoding for large sequences over a wide scope of content - larger inputs/inputs (OpenAI, 2021; Vaswani et al., 2017).
4. NLP's roots span centuries from Plato, Aristotle and to Chomsky who formalized grammatical structures to allow predictive processing, but built on Frege, Russell, Carnap and the work of many more (Austin, 2021; Sowa, 2014).
5. In addition to pretraining, GPTs have rapidly progressed with fine-tuning "Zero-Shot" learning (Wu et al., 2023).
6. GAI transformer architecture and AI Generated Content (AIGC) are distinct but are coupled (Zhang et al., 2022).
7. Curiously, the precursors of written language have been found on clay tokens transitioning to script (Damen, 2017).
8. Semiotics an anti-Cartesian logic by C.S. Peirce, defines "index", "icon" and "symbol" as signs that can define meaning in communications and may have been the foundation of language from early speech and gestures, it has been proposed as a way forward to strong AI or AGI (Barlow & Everett, 2021; Bennett, 2021; Everett, 2017).
9. C.S. Peirce vision of Semiotics is based on a philosophy of Scholastic Realism (Cárdenas, 2018; Reichberg-Halton & McMurtry, 1988).
10. Reductionism - the mind is processed by biochemical and electrical stimuli (Brier & Brier, 2014; Parker, 2022).
11. It is expected that GPTs may demonstrate AGI capabilities by the end of 2023 (Gates, 2023).
12. LLMs require huge power consumption and environmental costs (Bender & McCabe, 2023).
13. Offshore low cost resources are used to screen low content from LLM outputs (Prings, 2023).
14. OpenAI caps on GPT4 to around 25 messages indicate the power consumption issues (Duffren, 2023).
15. When one researcher Abduction, one fish Peirce's abduction and died peacefully (Colapietro, 2007).
16. Peirce died in 1914, most of his seminal work was unpublished but later resurrected by academics (Riddell, 2014).

**17.** The Vienna circle has defined NLP and the scientific method by key members such as [Rudolf Carnap](#), 1978).

**18.** By the 1930s C.W. Morris had restructured semantics as part of semiotics influenced by logical positivism, it was pragmatism in name only - it had lost the "scholastic realism" Peirce had tried to "scientifically resurrect". Carnap adopted C.W. Morris' work which influenced Chomsky's which eventually led to NLP as a mathematical [symbolic logic](#) real world referential grounding embodiment (Cárdenas, 2018; Reichberg-Halton & McMurtry, 1988).

**19.** Interestingly, although researchers use Turing as a supporter of Cartesian computationalism, the last page of his famous 1950 paper has this comment "... it is best to provide the machine with the best sense organs that money can buy", perhaps he also [appreciated](#) embodied cognition? (Turing, 1950).

**20.** Reverse ontology [substitutes](#) items existing only as a copy of their virtual originals (Baskerville et al., 2020).

**21.** ChatGPT is free, but ChatGPT 4 is \$20 per month and capped at 25 messages (OpenAI, 2023).

**22.** LLMs present a significant risk for internet resource use (many GPUs) and consuming toxic [materials](#) from the internet, while what they are [producing](#) is regressive "symbolic" [obsession](#), 2023; Bender & McCabe, 2023).

**BIBLIOGRAPHY**  
Available on request.

**0 CHARACTERS**  
Biographies  
Short biography of each track organizer (i.e., academic background and experience), and how the convenor team meets the criteria.  
Maximum 2500 characters (about 500 words)  
As a researcher and management consultant with a doctoral degree in R&D for large strategic projects (Grenoble Ecole de Management), I have developed unique models to aid clients conducting R&D within a non-laboratory business setting.  
I am an R&D innovation consultant for R&D funding for Multi industries: IT projects, food processing, manufacturing, engineering, and video gaming. The cost savings from government incentive programs for R&D is one thing (limited benefits), however, the key goal of my focus is to aid further research and to help improve R&D Management practices for experimental projects with Technological Uncertainties within a business setting.  
My Research Community is the annual global R&D Management Conference (Wiley Journal), where I regularly present papers. I presented my doctoral thesis at Trento University, Italy, "Experimental Innovation: Charles Sanders Peirce revisited" in the track - "2.30 Contextual Specificity in R&D Management".