

# Artificial Life Beyond AI: Neats, Scruffies and Holograms

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## Keynote Abstract

In my talk I give a broad-brush overview of 4 billion years of Real Life, and 2000 years of Artificial Life. The role of AI, as a subtopic of ALife, is discussed in the context of the early (1950s on) AI distinction between Neats and Scruffies. Roughly, the Neats believed that our reasoning abilities depend on reasoning 'all-the-way-down', they saw computers as the model for the brain, and this led to the dead-end of GOFAL. Scruffies believed humans and animals were more ad hoc machines crafted by evolution; the ability to reason is an explanandum (to be explained), not an explanans (taken for granted).

I give my updated version of this distinction: when trying to explain (or re-create) some high-level regularities in biological phenomena, the Neat approach is to assume these echo somewhat similar low-level mechanisms; whereas the Scruffy approach sees no need for such rule-bound assumptions.

Holograms are introduced as a powerful metaphor for the Scruffy approach, showing how high level labels for cognitive phenomena can have zero direct low-level correlates in the underlying machinery. Attractors and invariants in physical and social dynamics are key to understanding life and cognition. I give a historical connection between such holographic principles and Deep Learning, a resounding triumph for Scruffy AI -- though still not Scruffy enough. Further connections are drawn between holograms and recently proposed explanations for Micronesian wave navigation.

ALife is much broader than AI, and needs to go deeper still; depth in space and time is discussed. There are boundless opportunities for innovative ALife research, provided one follows the Scruffy approach of challenging unsupported assumptions.

The so-called Singularity is characterised as a fantasy of the Neat approach taken to its absurd limits, that misdirects attention from the very real political and social dangers of AI. In contrast, the awe-inspiring Monarch butterfly illustrates the spectacular range of biological phenomena that ALifers should be celebrating.