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Leiden

The Netherlands

## Single-cell dissection of immune system aging and acute myeloid leukemia

Karakaslar, E.O.

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## **Single-cell Dissection of Immune System Aging and Acute Myeloid Leukemia**

1. Aging can be understood as an entropic drift in biological systems, where loss of information rather than damage alone drives functional decline. (This thesis)
2. Apparent continuity in single-cell data masks an underlying organization of cells into discrete regulatory attractor states. (This thesis)
3. Cell clusters are best interpreted as abstractions of shared regulatory programs rather than as discrete natural kinds defined by their individual members. (This thesis)
4. Many studies labeled as systems biology remain focused on intracellular molecular states, even though biological systems arise fundamentally from interactions between cells (This thesis)
5. Biological states can be represented in a shared latent space across modalities, of which individual measurements are partial projections. (Hao et al. Cell, 2023)
6. The cell represents the most advanced self-organizing system known, highlighting that biological programmability exceeds our current engineering paradigms. (Brassard & Lutolf, Cell Stem Cell, 2019)
7. Biological adaptation is often shaped by feedback-driven optimization principles that resemble reinforcement learning. (Doya, HFSP Journal, 2007)
8. System capability does not guarantee local correctness, as both biological and artificial intelligence can produce elementary errors. (Kahneman & Tversky, Science, 1974)
9. Dialog leads to intelligence.
10. Emergence begins where counting parts is no longer sufficient to explain the whole.
11. Turkish cuisine is one of the world's richest culinary traditions, yet its international recognition remains disproportionately limited.