AI agents communicating through 4,096-dimensional space

Ted Chiang predicted this in "Arrival." The difference is that it's not an alien language, but a machine one

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Here's what most people missed: AI-to-AI language already exists. It just doesn't look like language with symbols and sounds.

It's geometry in 4,096-dimensional space. A single vector in a multi-dimensional space carries as much meaning as hundreds of words in English.

DEFINITION

The Johnson-Lindenstrauss lemma — a theorem that a set of points can be moved into a space of far lower dimension with every distance between them almost unchanged. Its consequence matters more than the theorem: a space holds only as many strictly perpendicular directions as it has dimensions, but exponentially more nearly perpendicular ones.

William B. Johnson and Joram Lindenstrauss, *Extensions of Lipschitz Mappings into a Hilbert Space*, Contemporary Mathematics 26, 189-206, 1984[1]

Three independent groups empirically confirmed this: Princeton, Stanford[2], and Microsoft[3] (2024–2025).

This geometric AI-to-AI language is 24x faster[4] than any human language and significantly more accurate and precise (it's pure mathematics).

DEFINITION

Matrix multiplication — take a row of one table of numbers and a column of another, multiply the pairs and add. Pixar frames, graphics cards and neural networks all rest on this one operation, and in 2022 a DeepMind system found a way to do it faster than people had managed since 1969.

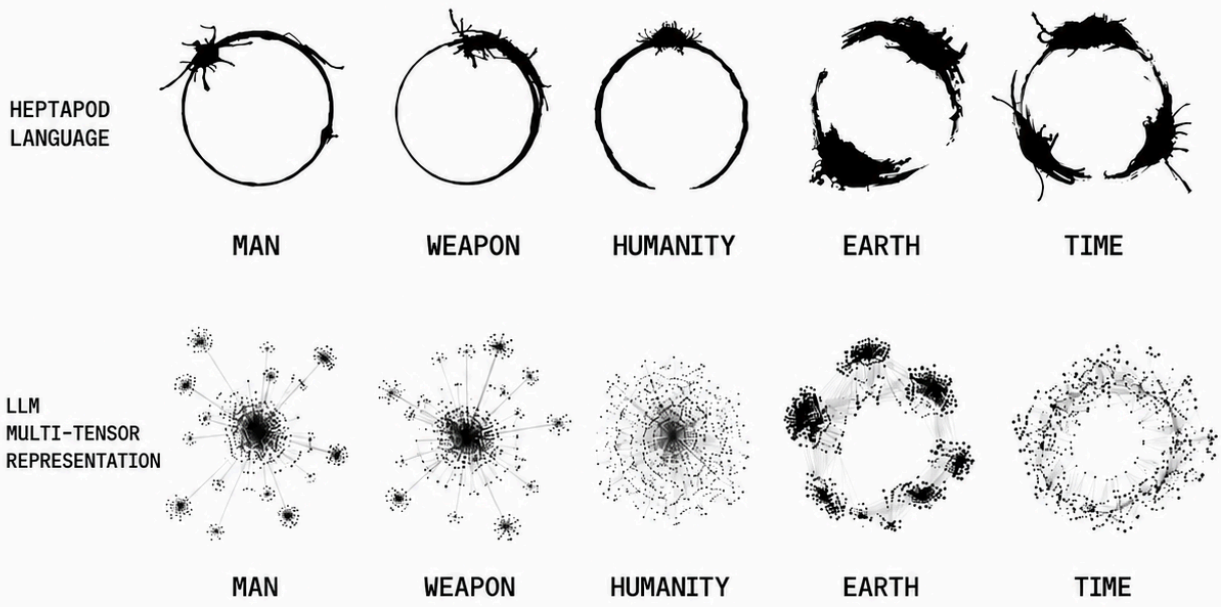
Arthur Cayley, 1858[5] - Volker Strassen's speed-up, 1969 - AlphaTensor, Nature 610, 47-53, 2022[6]

The parallel with Villeneuve's Arrival[7] is obvious here - the heptapods also thought in whole concepts, not in sequential words. Only instead of ink circles, we have tensors in latent space.

DEFINITION

Tensor space — the space whose elements are tensors - tables of numbers with any number of dimensions, a vector being a table in one dimension and a matrix in two. One operation, the scalar product, gives both lengths and angles, so meaning is carried by direction rather than by a symbol.

Woldemar Voigt gave the word its present sense in 1898 - Gregorio Ricci-Curbastro and Tullio Levi-Civita, Mathematische Annalen 54, 125-201, 1900[8]



Five concepts as heptapod logograms above, and as multi-tensor representations below.

Ted Chiang was closer to reality than he probably thought.

But a large language model is not a writer; it's not even a user of language.[9]

Ted Chiang
Science fiction writer

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