

# → Hallucinations are (almost) all you Need

This rapid *artistic* **overview of key scientific AI examples that covers a year** (loosely defined as starting with GPT-4 on March 14th, 2023) is framed by **the hypothesis that fundamental research in science is being transformed by a practice predominantly associated with the arts: namely hallucinations.**

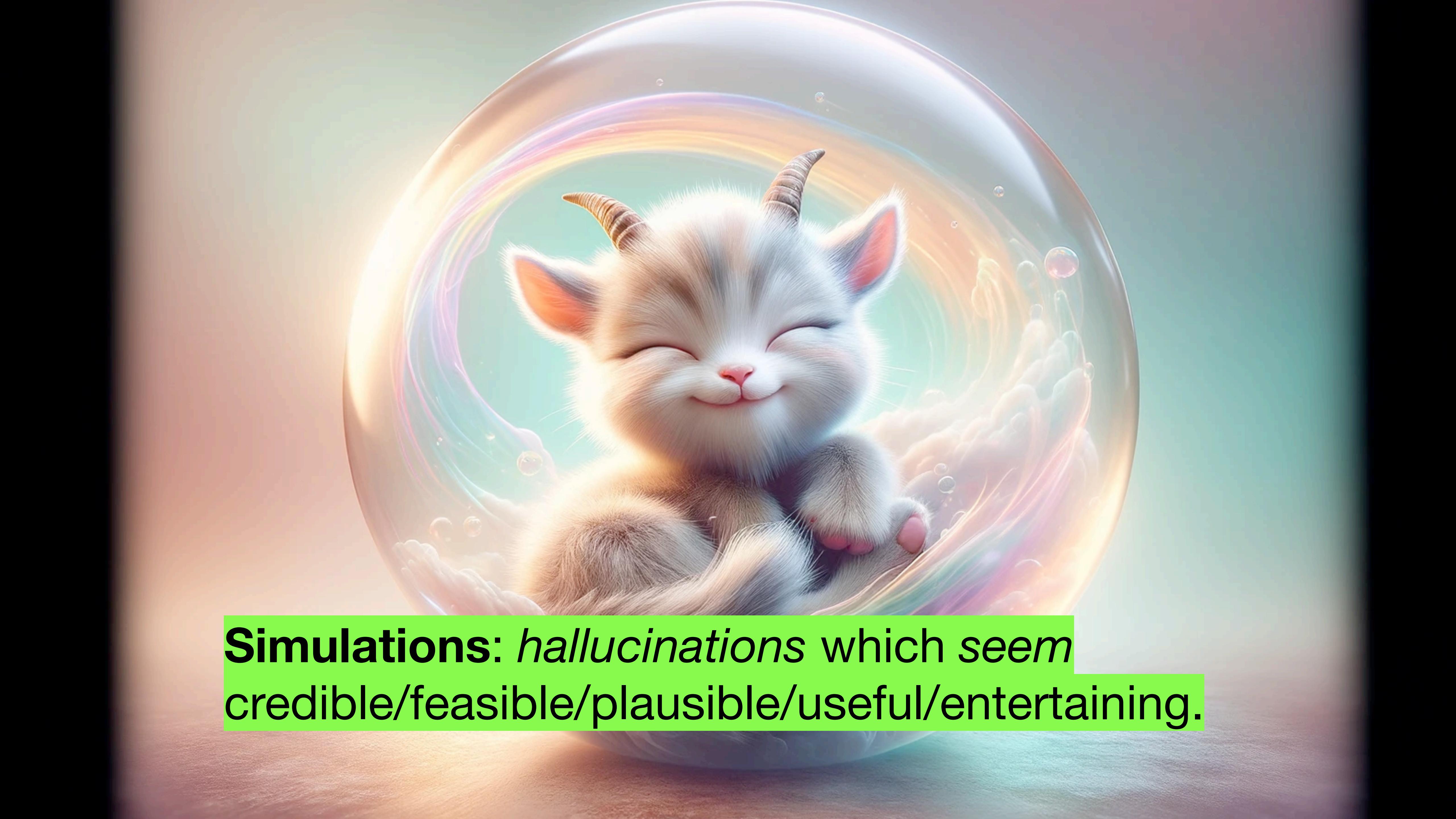
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**Hallucinations:** neurological *data* which arises without a *direct* relationship to external stimuli.

A fluffy white cat with large orange ears and small horns is sleeping peacefully inside a glowing crystal ball. The ball has a vibrant rainbow glow around it, and there are small bubbles floating around the cat. The background is a soft, blurred gradient of warm colors.

**Simulations:** *hallucinations* which seem  
credible/feasible/plausible/useful/entertaining.

# SIMULATIONS POPULATE TOPOLOGIES OF THE POSSIBLE.

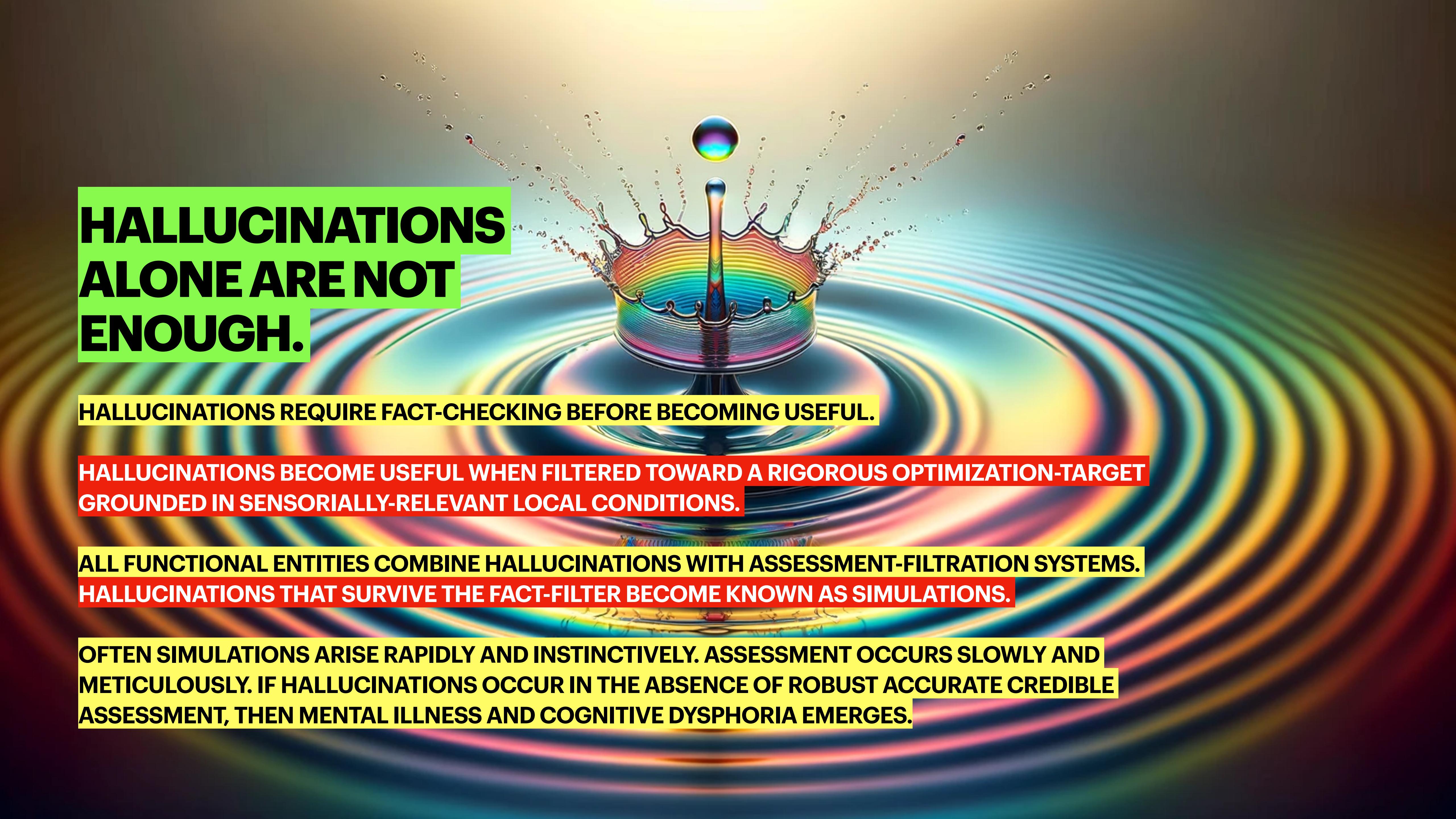
SIMULATIONS ARE A SUBSET OF HALLUCINATIONS THAT POPULATE TOPOLOGIES OF THE POSSIBLE. THEREFORE, HALLUCINATIONS ARE OFTEN INFORMATIVE, HELPFUL.

MOREOVER, IT CAN BE CLAIMED THAT SIMULATIONS (I.E. HALLUCINATIONS) ARE UBIQUITOUS, UNIVERSAL NECESSARY FEATURES OF ALL COGNITIVE SYSTEMS. ENTITIES MAKE GUESSES WITHIN A STATE SPACE OF POTENTIAL TEMPORALITIES, - PREDICTIVE SIMULATIONS THAT GENERATE PLAUSIBLE FUTURE SCENARIOS.

WHAT WILL HAPPEN NEXT? WHAT COULD BE BEST? WHAT SHOULD 'I' DO?

TO A LARGE DEGREE, THOUGHT IS THINKING ABOUT WHAT IS POSSIBLE, THEREFORE THOUGHT IS A KIND OF HALLUCINATION.

FROM THIS VIEWPOINT, SIMULATIONS AND HALLUCINATIONS ARE ROOTED IN EVOLUTIONARY NEURO-PHYSIOGNOMY. WITHOUT HALLUCINATIONS ENTITIES WOULDN'T BE ABLE TO CALCULATE TRAJECTORIES, ANTICIPATE ACTIONS, NAVIGATE SOCIAL SITUATIONS, HUNT, FEED, BREED. THE UNIVERSE WOULD BE STRANDED IN A PERPETUAL NOW.



# **HALLUCINATIONS ALONE ARE NOT ENOUGH.**

**HALLUCINATIONS REQUIRE FACT-CHECKING BEFORE BECOMING USEFUL.**

**HALLUCINATIONS BECOME USEFUL WHEN FILTERED TOWARD A RIGOROUS OPTIMIZATION-TARGET  
GROUNDED IN SENSORIALLY-RELEVANT LOCAL CONDITIONS.**

**ALL FUNCTIONAL ENTITIES COMBINE HALLUCINATIONS WITH ASSESSMENT-FILTRATION SYSTEMS.  
HALLUCINATIONS THAT SURVIVE THE FACT-FILTER BECOME KNOWN AS SIMULATIONS.**

**OFTEN SIMULATIONS ARISE RAPIDLY AND INSTINCTIVELY. ASSESSMENT OCCURS SLOWLY AND  
METICULOUSLY. IF HALLUCINATIONS OCCUR IN THE ABSENCE OF ROBUST ACCURATE CREDIBLE  
ASSESSMENT, THEN MENTAL ILLNESS AND COGNITIVE DYSPHORIA EMERGES.**

# PERCEPTIONS AND MEMORIES ARE ALSO SIMULATIONS (AND THUS PARTIALLY HALLUCINATIONS)

THE WORLD'S APPEARANCE, ITS PHENOMENA (TREES, BEINGS, CULTURE, CELLPHONES, AND RESEARCH REPORTS...) ALL EMERGE IN A CATACLYSMIC, CHURNING, TENDER PHENOMENOLOGICAL FRENZY OF DATA DESIGNED TO ENTER ANY SENSOR WITH CAPACITY FOR THAT RANGE OF REVERBERATION (VISION, SCENT, TOUCH, TASTE OR SOUND).

AS NEUROPHYSIOLOGY ABSORBS PHENOMENA, IT DOWNSAMPLES (REDUCES THE RESOLUTION OF) A SEEMINGLY EXTERIOR WORLD —AND THEN BUILDS A SIMULATION, A MEMORY, A STORAGE-TRACE WITHIN ITS OWN BODY-MIND.

THE BODY-MIND BECOMES A REPOSITORY FOR THE PAST (A SIMULATION OF WHAT IT HAS SEEN), AN ENACTMENT OF THE FUTURE (A SIMULATION OF WHAT IT EXPECTS), AND CREATIVITY (AN IMAGINATION OF MEANING, STRUCTURE, ENQUIRY INTO WHAT IS OR WHAT COULD BE).

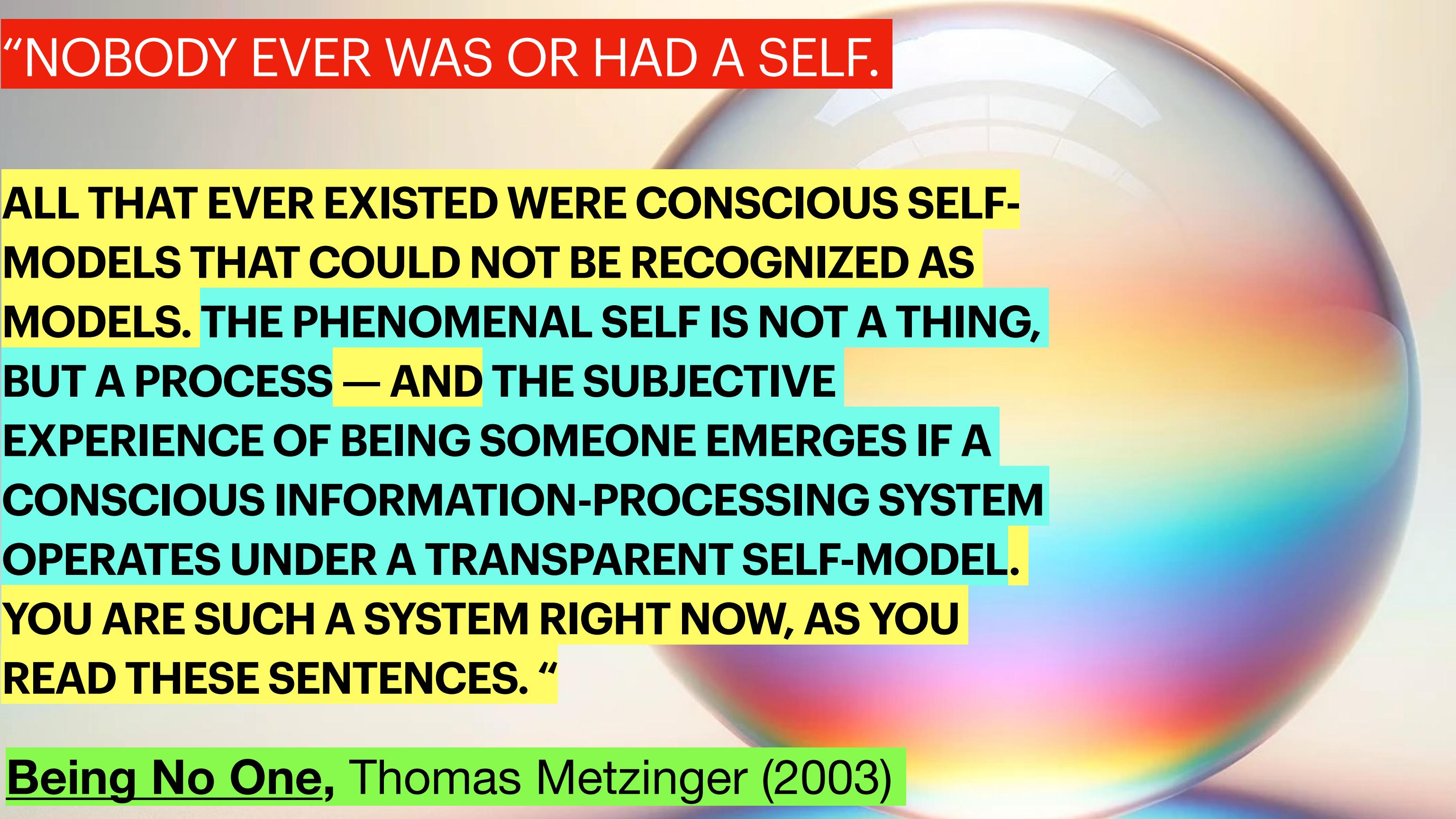
# INTROCEPTION

NEUROLOGISTS NOW SPEAK OF INTERNAL PERCEPTIONS AS INTROCEPTION.  
VISCERA OF THE BODY GENERATES WAVE AFTER WAVE OF DATA THAT INUNDATE  
THE INSULA AND CINGULATE REGIONS.

SO IT'S NOT JUST EXTERIORITY WHICH GIVES RISE TO A SENSE OF A WORLD, BUT  
THE INTERIORITY OF THE BODY'S CHAMBERS, TUBES, ORGANS AND DISTRIBUTED  
TRIBUTARIES OF SENSORIAL FEEDBACK WHICH CONSTRUCT A HOMEOSTATIC  
MODEL OF WHAT IDENTITY IS.

*HOW BODY FEELS BECOME WHAT IDENTITY FEELS THAT IT IS FEELING.*

THE INNER SELF-MODEL OF THE MIND IS TO SOME DEGREE ALSO A SIMULATION



**"NOBODY EVER WAS OR HAD A SELF.**

**ALL THAT EVER EXISTED WERE CONSCIOUS SELF-MODELS THAT COULD NOT BE RECOGNIZED AS MODELS. THE PHENOMENAL SELF IS NOT A THING, BUT A PROCESS — AND THE SUBJECTIVE EXPERIENCE OF BEING SOMEONE EMERGES IF A CONSCIOUS INFORMATION-PROCESSING SYSTEM OPERATES UNDER A TRANSPARENT SELF-MODEL. YOU ARE SUCH A SYSTEM RIGHT NOW, AS YOU READ THESE SENTENCES."**

**Being No One, Thomas Metzinger (2003)**

# **TECHNOLOGICAL APPROACH TO MIND EVERYWHERE (TAME): AN EXPERIMENTALLY- GROUNDED FRAMEWORK FOR UNDERSTANDING DIVERSE BODIES AND MINDS**

**"TAME - TECHNOLOGICAL APPROACH TO MIND EVERYWHERE - A FRAMEWORK FOR  
UNDERSTANDING AND MANIPULATING COGNITION IN UNCONVENTIONAL SUBSTRATES. TAME  
FORMALIZES A NON-BINARY (CONTINUOUS), EMPIRICALLY-BASED APPROACH TO STRONGLY  
EMBODIED AGENCY. WHEN APPLIED TO REGENERATING/DEVELOPMENTAL SYSTEMS, TAME  
SUGGESTS A PERSPECTIVE ON MORPHOGENESIS AS AN EXAMPLE OF BASAL COGNITION. ... THIS  
ARCHITECTURE OF MULTI-SCALE COMPETENCY OF BIOLOGICAL SYSTEMS HAS IMPORTANT  
IMPLICATIONS FOR PLASTICITY OF BODIES AND MINDS, GREATLY POTENTIATING EVOLVABILITY."**

**MICHAEL LEVIN, 24 DECEMBER 2021**

# HALLUCINATIONS

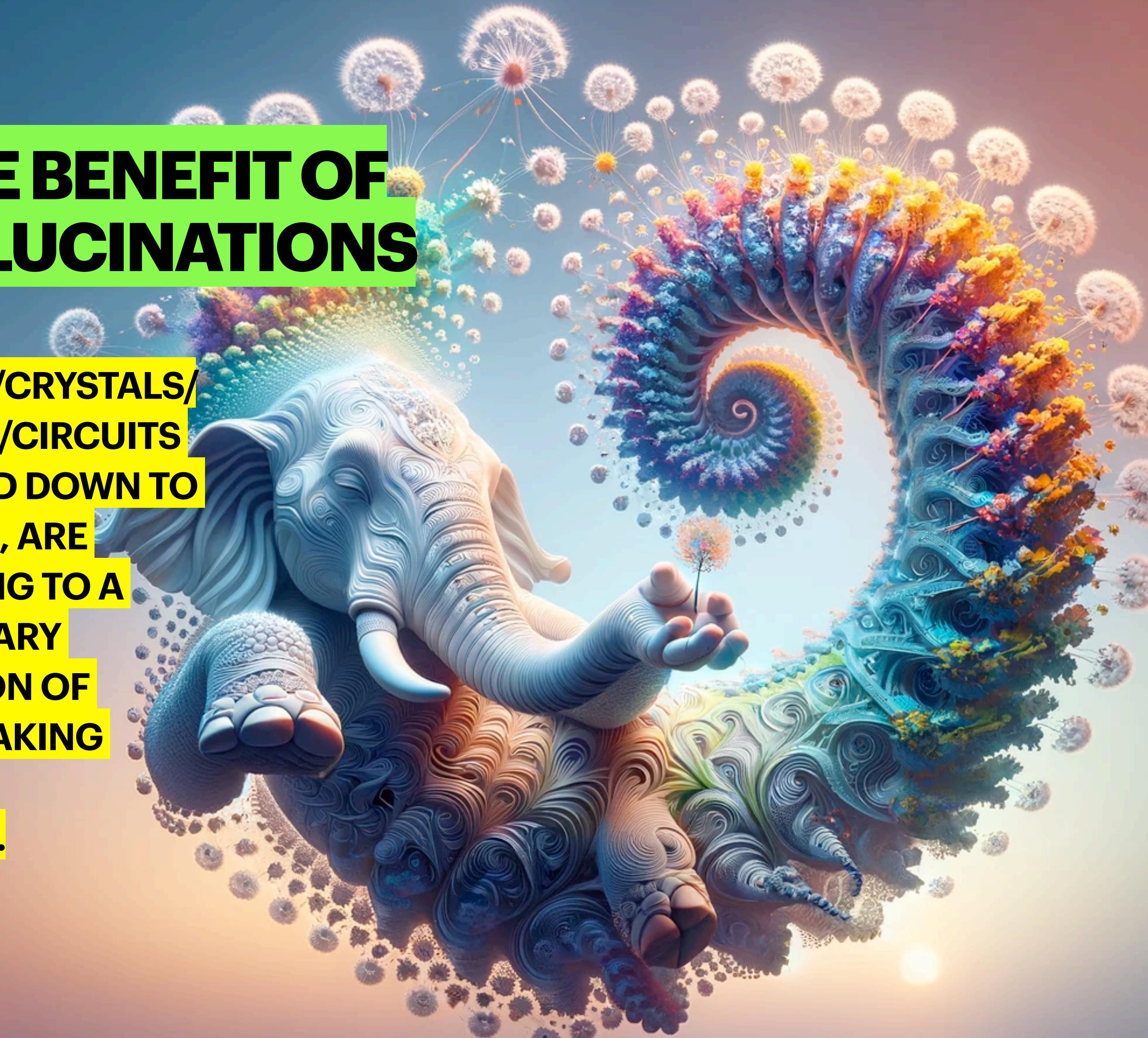
HALLUCINATIONS IN PEOPLE ARE CONVENTIONALLY ASSOCIATED WITH MENTAL ILLNESS, DRUGS, AND/OR GENIUS.

HALLUCINATIONS IN AI (MOSTLY IN LARGE LANGUAGE MODELS) HAVE BEEN CRITIQUED AS NET-NEGATIVES: CONTRIBUTING TO DISINFORMATION, BIAS, POST-TRUTH, DEEP-FAKES, COLLAPSE OF DEMOCRACY, COPYRIGHT THEFT, ETC...



# **YET, THE BENEFIT OF AI HALLUCINATIONS**

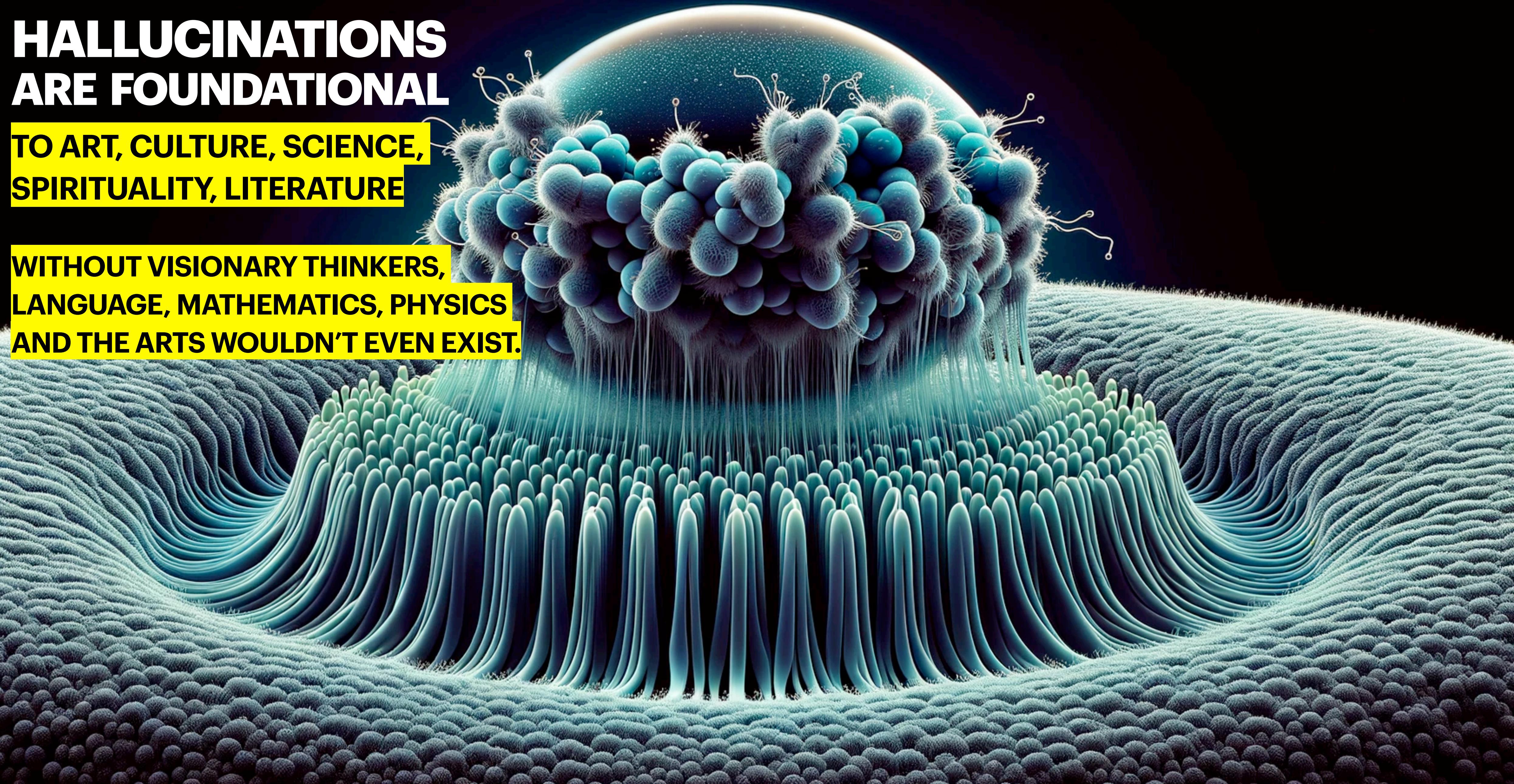
**OF PROTEINS/CRYSTALS/  
ALGORITHMS/CIRCUITS  
ETC ... PRUNED DOWN TO  
THE FEASIBLE, ARE  
CONTRIBUTING TO A  
REVOLUTIONARY  
ACCELERATION OF  
GROUNDBREAKING  
SCIENTIFIC  
DISCOVERIES.**

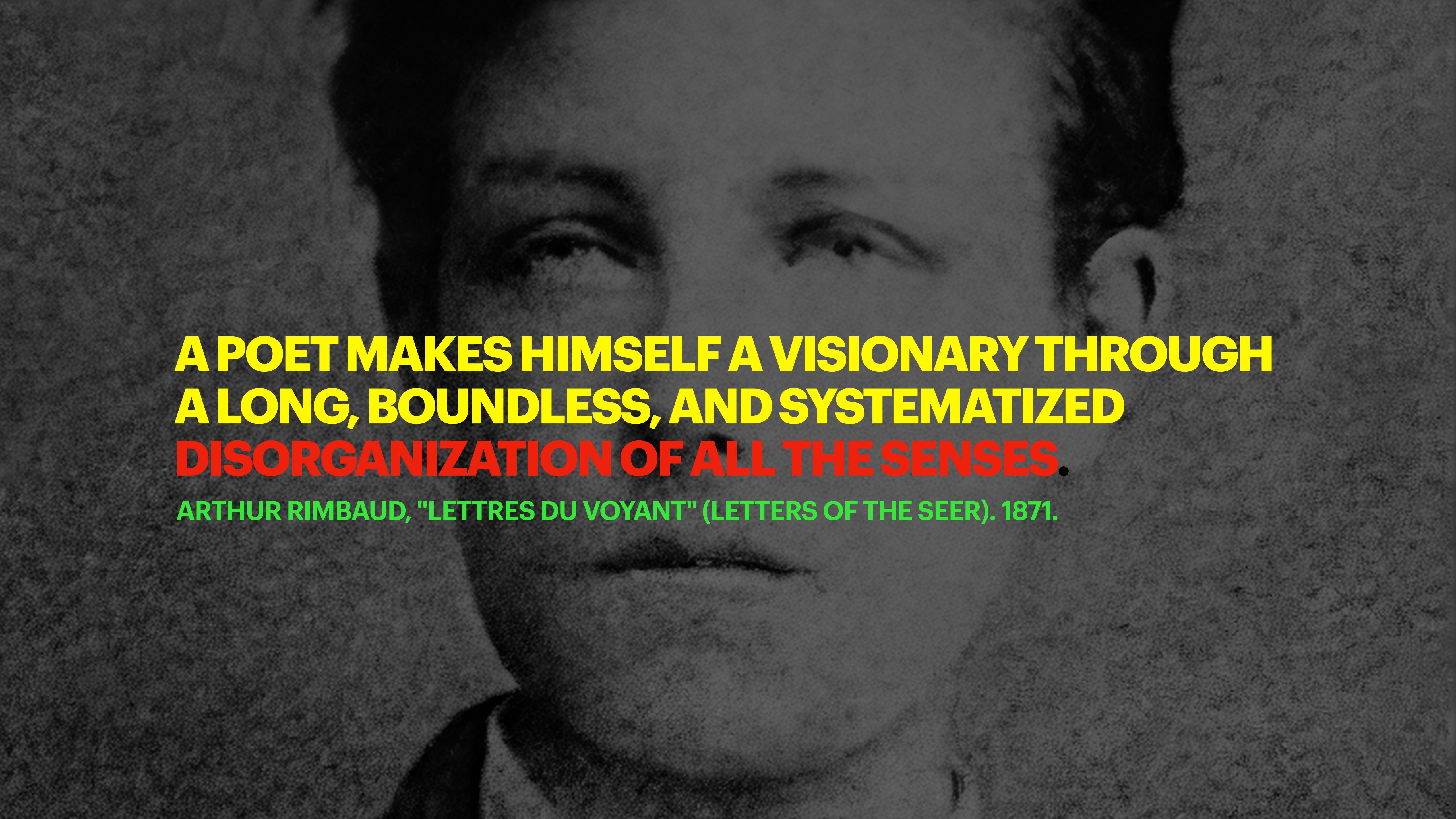


# HALLUCINATIONS ARE FOUNDATIONAL

TO ART, CULTURE, SCIENCE,  
SPIRITUALITY, LITERATURE

WITHOUT VISIONARY THINKERS,  
LANGUAGE, MATHEMATICS, PHYSICS  
AND THE ARTS WOULDN'T EVEN EXIST.



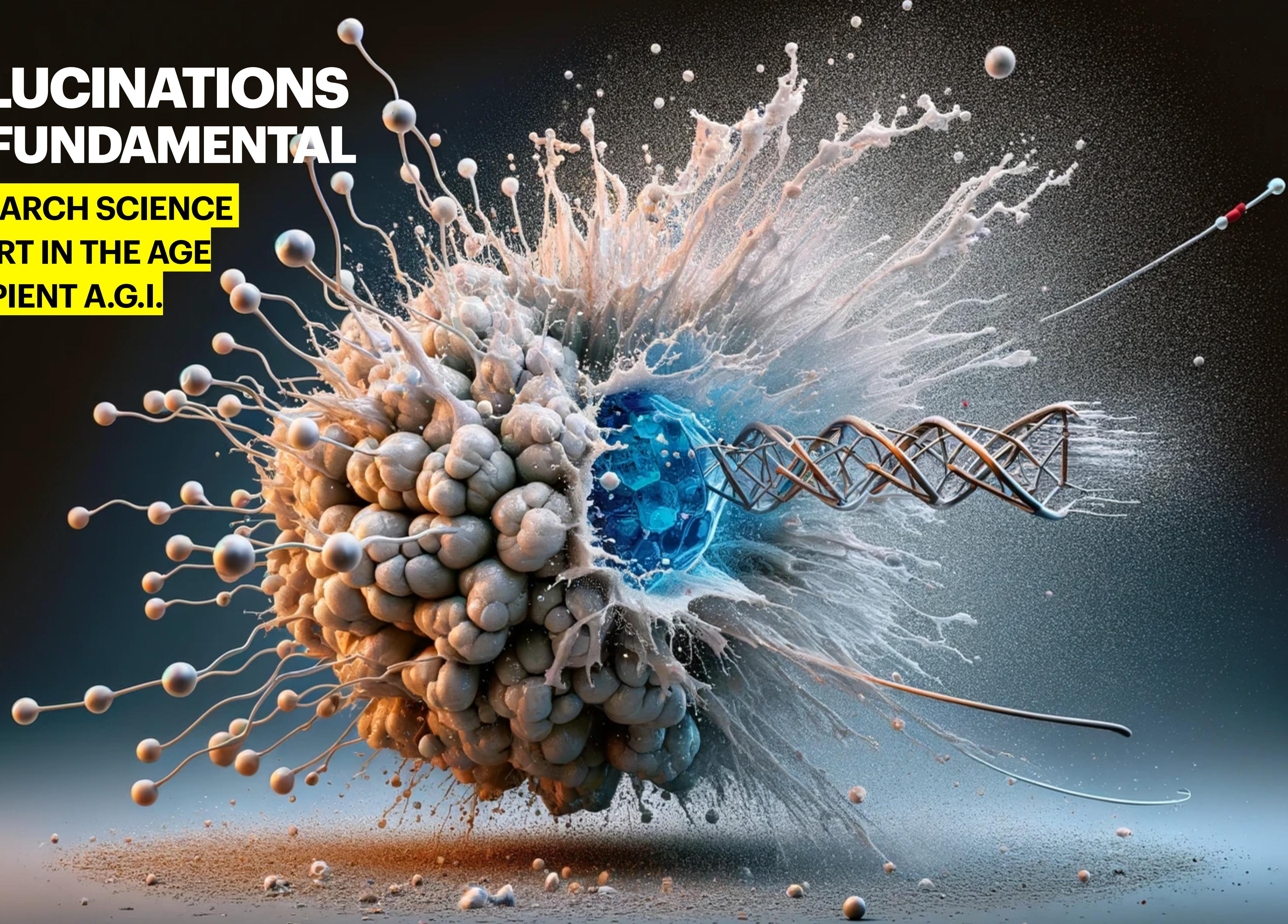


**A POET MAKES HIMSELF A VISIONARY THROUGH  
A LONG, BOUNDLESS, AND SYSTEMATIZED  
DISORGANIZATION OF ALL THE SENSES.**

**ARTHUR RIMBAUD, "LETTRES DU VOYANT" (LETTERS OF THE SEER). 1871.**

# HALLUCINATIONS ARE FUNDAMENTAL

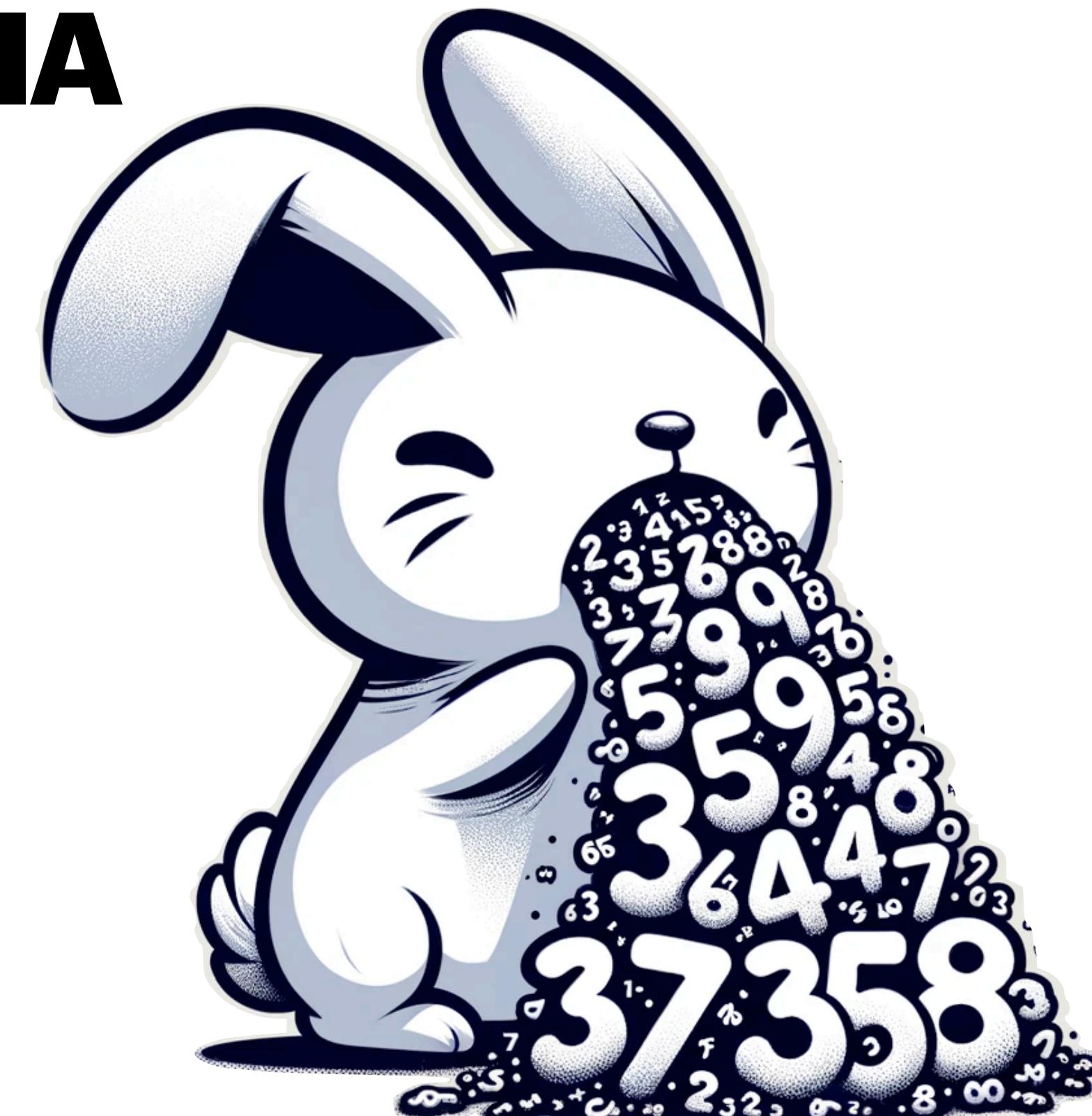
TO RESEARCH SCIENCE  
AS AN ART IN THE AGE  
OF INCIPIENT A.G.I.

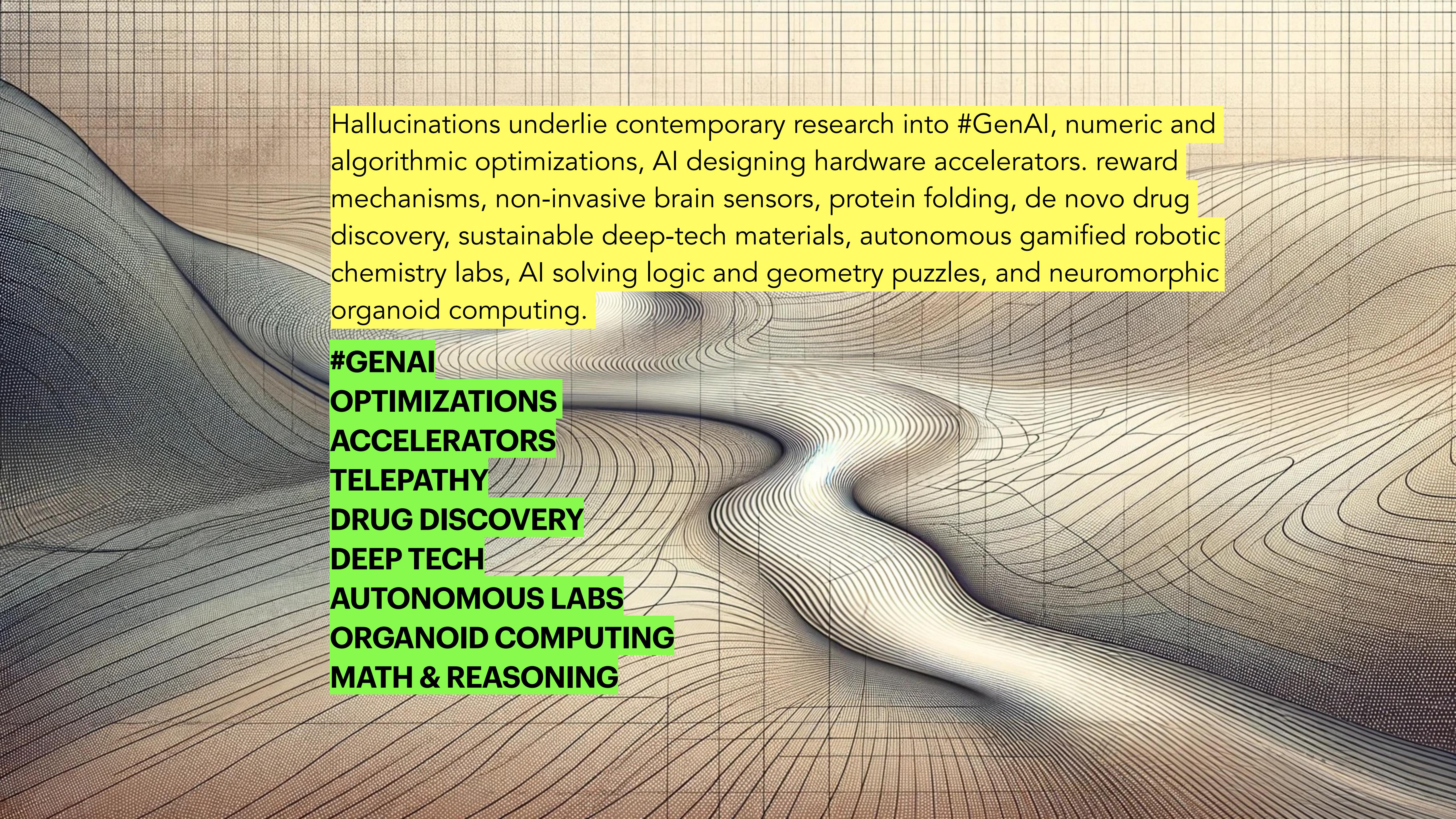


# A MAJOR LIMITATION OF AUTOMATED THEOREM PROVERS COMPARED TO HUMANS

-- THE GENERATION OF ORIGINAL  
MATHEMATICAL TERMS --  
MIGHT BE ADDRESSABLE VIA  
GENERATION FROM  
LANGUAGE MODELS.

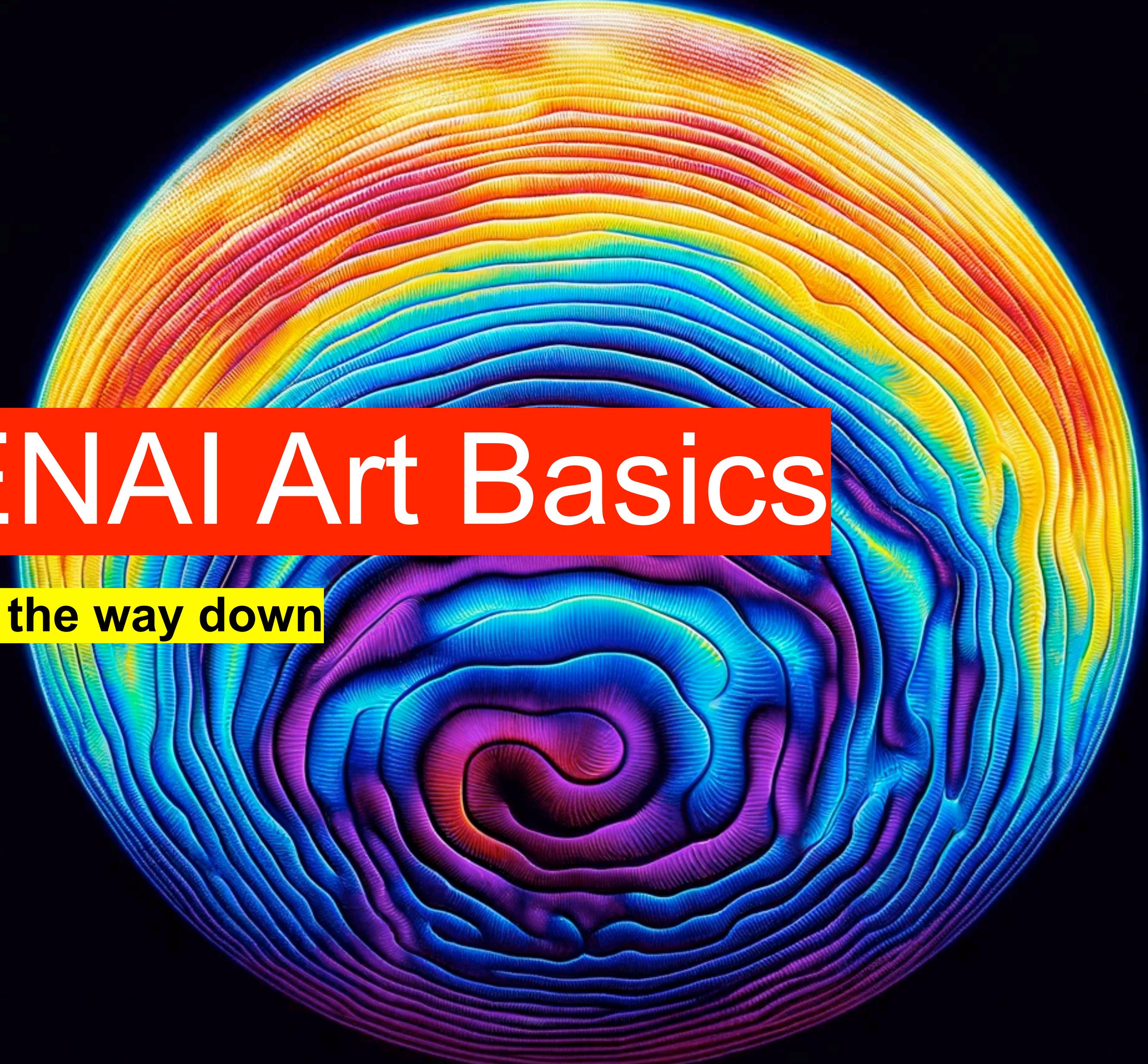
STANISLAS POLU, ILYA SUTSKEVER,  
**GENERATIVE LANGUAGE MODELING  
FOR AUTOMATED THEOREM PROVING**  
SEPTEMBER 7, 2020





Hallucinations underlie contemporary research into #GenAI, numeric and algorithmic optimizations, AI designing hardware accelerators, reward mechanisms, non-invasive brain sensors, protein folding, de novo drug discovery, sustainable deep-tech materials, autonomous gamified robotic chemistry labs, AI solving logic and geometry puzzles, and neuromorphic organoid computing.

**#GENAI**  
**OPTIMIZATIONS**  
**ACCELERATORS**  
**TELEPATHY**  
**DRUG DISCOVERY**  
**DEEP TECH**  
**AUTONOMOUS LABS**  
**ORGANOID COMPUTING**  
**MATH & REASONING**



→ #GENAI Art Basics

Hallucinations all the way down

# #GENAI

GPT-4, Dalle.3, MidJourney, Stable Diffusion, Suno, Pika, Runway, Genie, Magnific, Falcon, Llama2, Sora...





# GPT-4

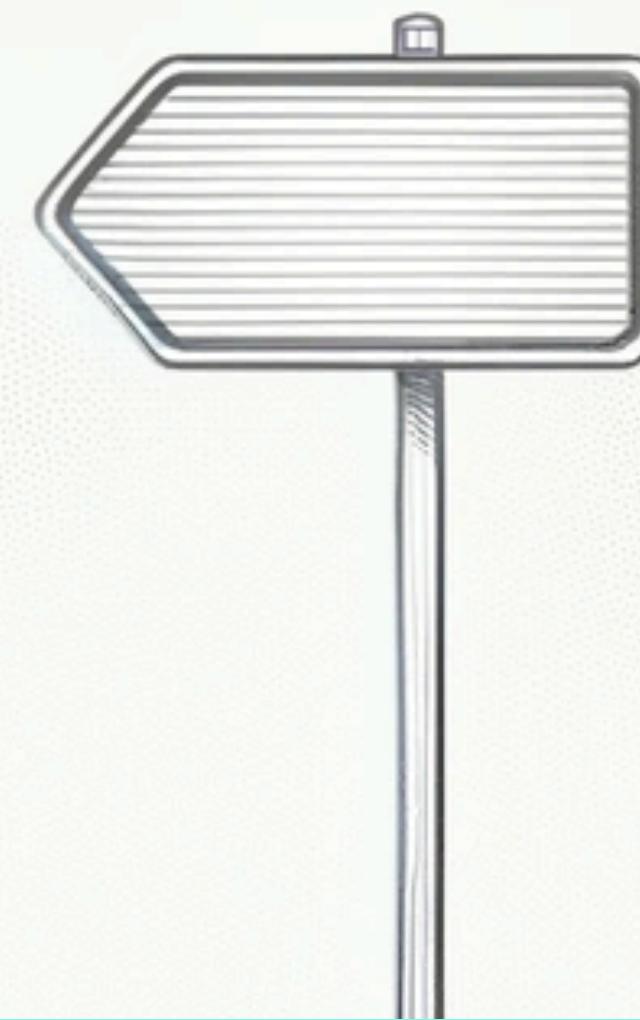
“while less capable than humans in many real-world scenarios, exhibits human-level performance on various professional and academic benchmarks... it passes a simulated bar exam with a score around the top 10% of test takers”

OpenAI. 14 March 2023

# **BE MY EYES**

“Bringing sight to blind and low-vision people. ~ AI-powered visual assistance for instantaneous image-to-text generation.... instantaneous identification, interpretation and conversational visual assistance for a wide variety of tasks.”

**OpenAI GPT-4 Launch Partner. 14 March 2023**



# **LLAMA 2: OPEN FOUNDATION AND FINE-TUNED CHAT MODELS**

“Llama 2 pretrained models are trained on 2 trillion tokens, and have double the context length than Llama 1. Its fine-tuned models have been trained on over 1 million human annotations.”

Meta. 18 July 2023



# DALLE.3

## IMPROVING IMAGE GENERATION WITH BETTER CAPTIONS

WE SHOW THAT PROMPT FOLLOWING ABILITIES OF TEXT-TO-IMAGE MODELS CAN BE SUBSTANTIALLY IMPROVED BY TRAINING ON HIGHLY DESCRIPTIVE GENERATED IMAGE CAPTIONS. EXISTING TEXT-TO-IMAGE MODELS STRUGGLE TO FOLLOW DETAILED IMAGE DESCRIPTIONS AND OFTEN IGNORE WORDS OR CONFUSE THE MEANING OF PROMPTS. WE HYPOTHESIZE THAT THIS ISSUE STEMS FROM NOISY AND INACCURATE IMAGE CAPTIONS IN THE TRAINING DATASET. WE ADDRESS THIS BY **TRAINING A BESPOKE IMAGE CAPTIONER AND USE IT TO RECAPTION THE TRAINING DATASET. WE THEN TRAIN SEVERAL TEXT-TO-IMAGE MODELS AND FIND THAT TRAINING ON THESE SYNTHETIC CAPTIONS RELIABLY IMPROVES PROMPT FOLLOWING ABILITY**. FINALLY, WE USE THESE FINDINGS TO BUILD DALL-E 3: A NEW TEXT-TO-IMAGE GENERATION SYSTEM, AND BENCHMARK ITS PERFORMANCE ON AN EVALUATION DESIGNED TO MEASURE PROMPT FOLLOWING, COHERENCE, AND AESTHETICS, FINDING THAT IT COMPARES FAVORABLY TO COMPETITORS. WE PUBLISH SAMPLES AND CODE FOR THESE EVALUATIONS SO THAT FUTURE RESEARCH CAN CONTINUE OPTIMIZING THIS IMPORTANT ASPECT OF TEXT-TO-IMAGE SYSTEMS.

# **EMU VIDEO: FACTORIZING TEXT-TO-VIDEO GENERATION BY EXPLICIT IMAGE CONDITIONING**

“In human evaluations, our generated videos are strongly preferred in quality compared to all prior work--81% vs. Google's Imagen Video, 90% vs. Nvidia's PYOCO, and 96% vs. Meta's Make-A-Video. Our model outperforms commercial solutions such as RunwayML's Gen2 and Pika Labs... our generations are preferred 96% over prior work.”

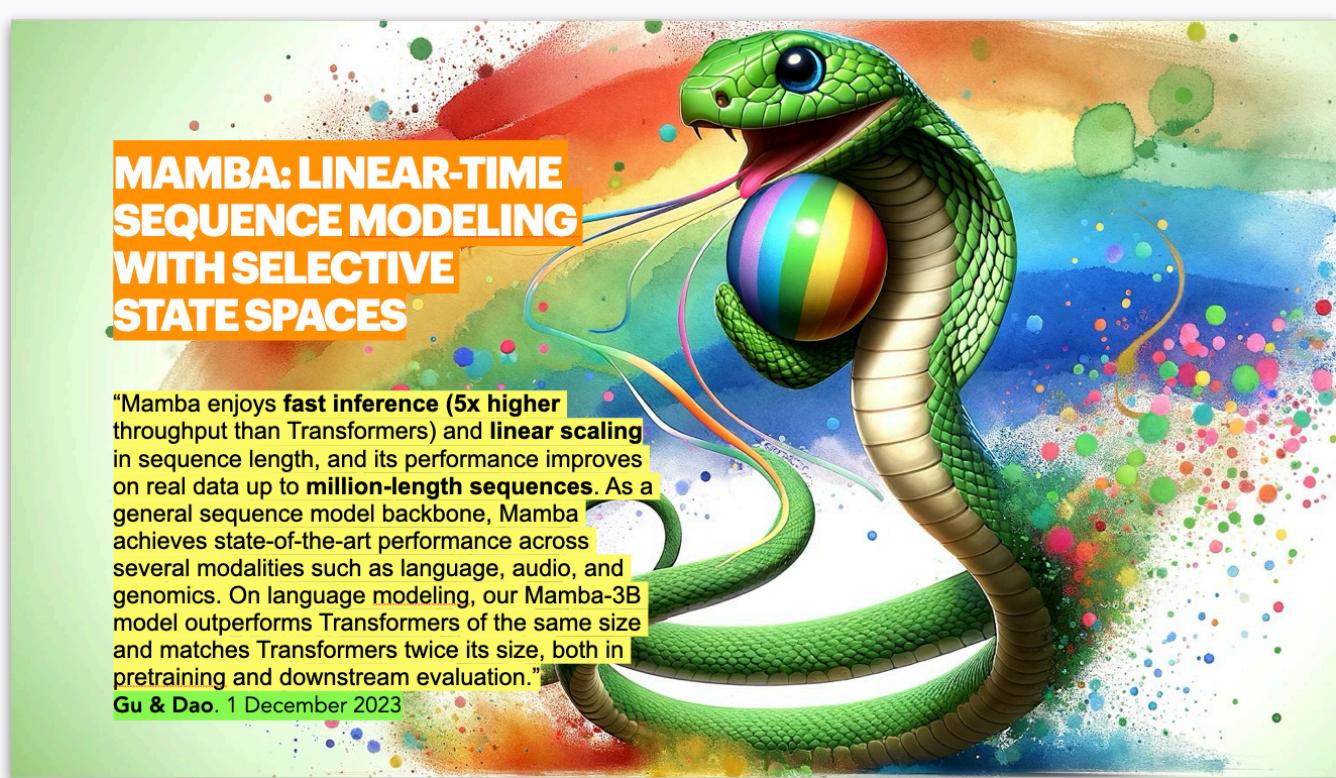
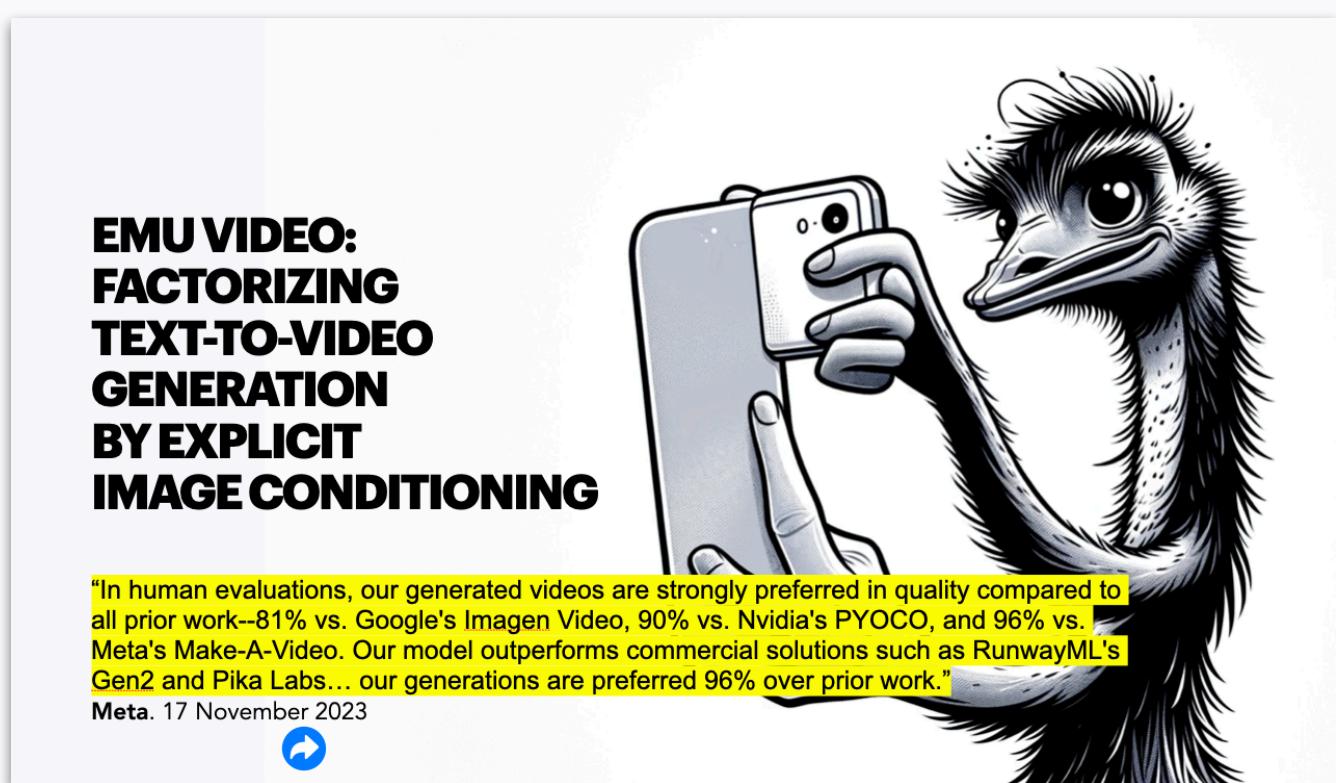
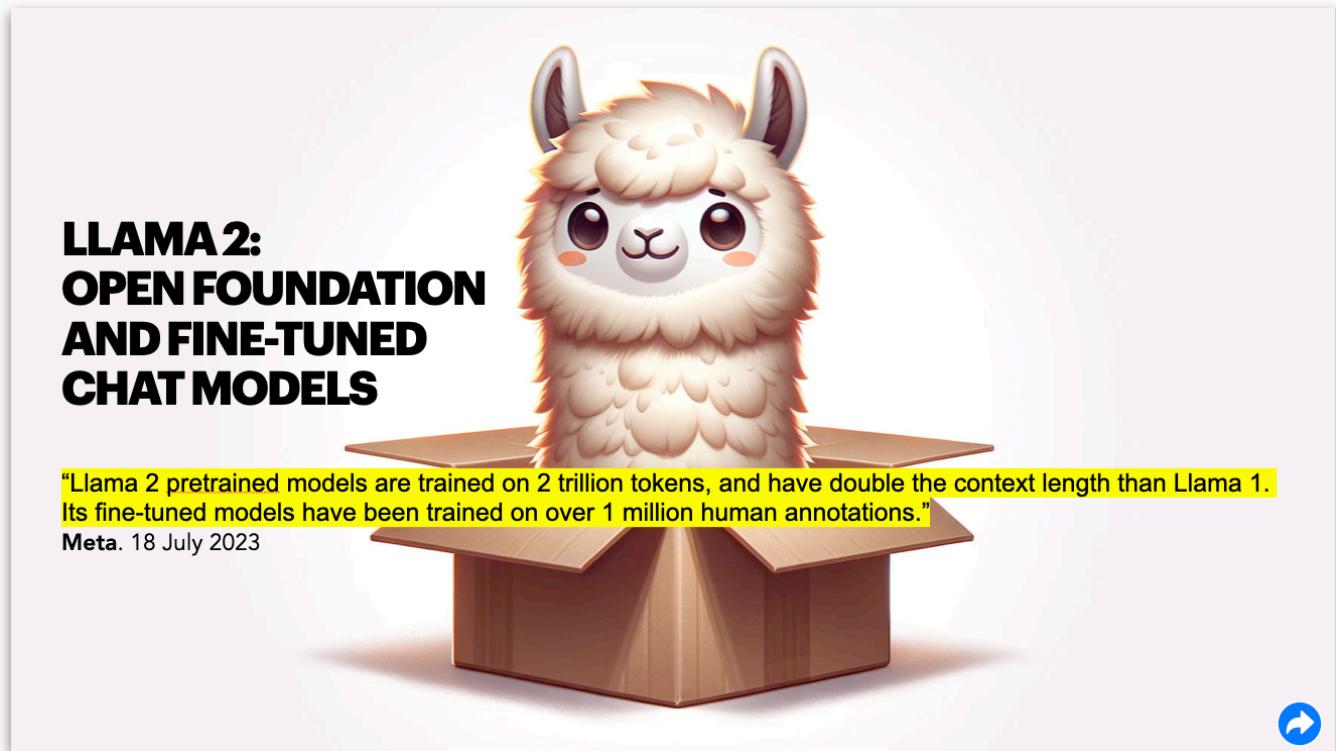
Meta. 17 November 2023



# MAMBA: LINEAR-TIME SEQUENCE MODELING WITH SELECTIVE STATE SPACES

“Mamba enjoys **fast inference (5x higher throughput than Transformers)** and **linear scaling** in sequence length, and its performance improves on real data up to **million-length sequences**. As a general sequence model backbone, Mamba achieves state-of-the-art performance across several modalities such as language, audio, and genomics. On language modeling, our **Mamba-3B** model outperforms Transformers of the same size and matches Transformers twice its size, both in pretraining and downstream evaluation.”

Gu & Dao. 1 December 2023



## SEMIOTIC NOTE

# ANTHROPOMORPHIC NAMING CONVENTIONS: EMU, LLAMA, MAMBA.

Incipient AGI, proto-organisms, implicit agency invoked by acronym, eco-nomenclature, archetypal eden projection, **6th extinction guilt replacing animals with algorithms.**

Also note: the implicit sympathy requested by the Ai-generated cuteness meme critters and goat-kitty rainbows of these slides.

# GEMINI

“Gemini surpasses state-of-the-art performance on a range of benchmarks including text and coding.”

Google DeepMind. December 06, 2023



# SORA

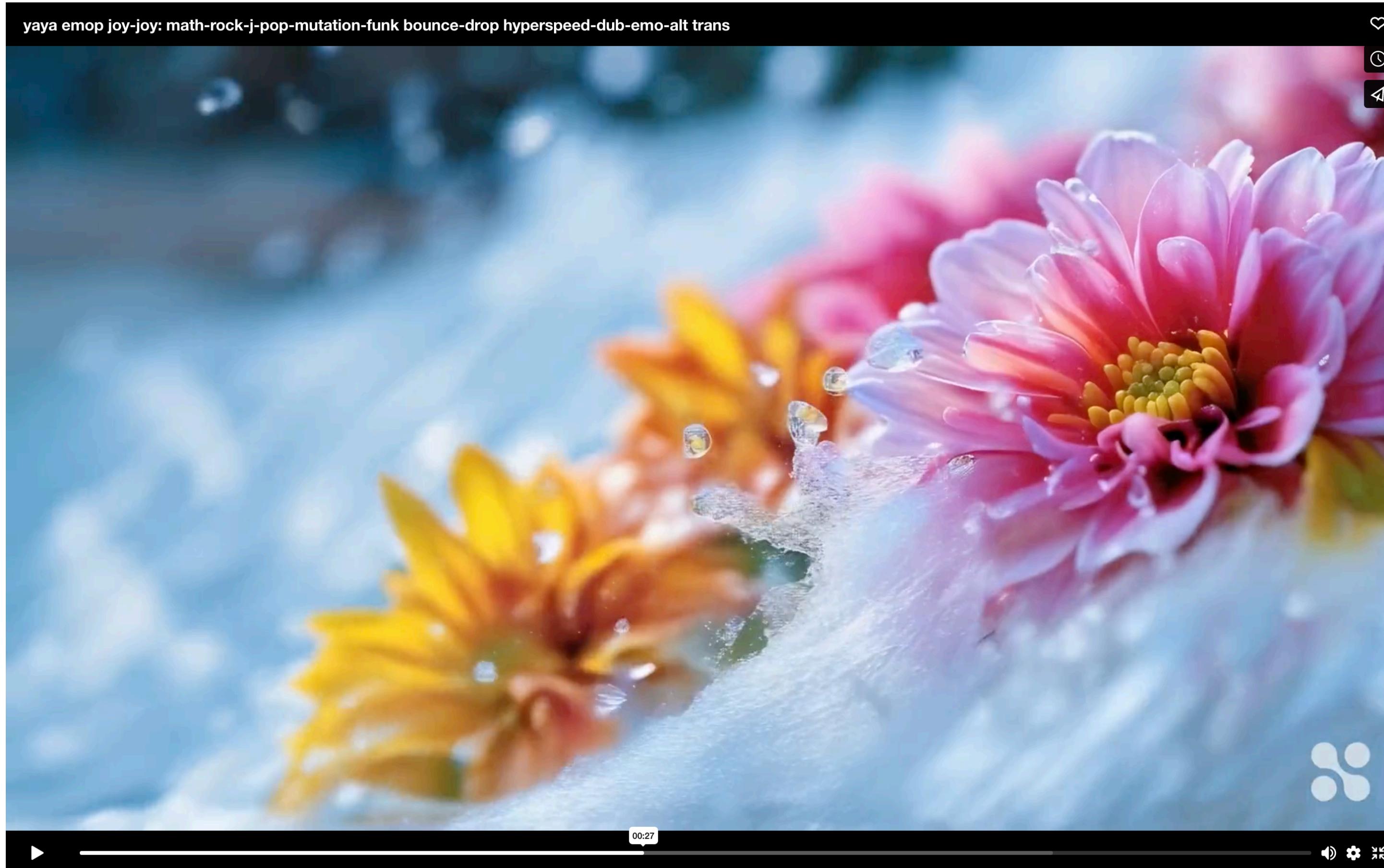
VIDEO GENERATION MODELS AS WORLD SIMULATORS

**SORA IS ABLE TO GENERATE COMPLEX SCENES WITH MULTIPLE CHARACTERS, SPECIFIC TYPES OF MOTION, AND ACCURATE DETAILS OF THE SUBJECT AND BACKGROUND. THE MODEL UNDERSTANDS NOT ONLY WHAT THE USER HAS ASKED FOR IN THE PROMPT, BUT ALSO HOW THOSE THINGS EXIST IN THE PHYSICAL WORLD.**

OpenAI, Feb 15th, 2024



Emop: on vimeo [a one-day ai-music-video]



## Suno v3 (Alpha) w. ReRites Lyrics

All songs prompted on March 6, 2024



- ▶ 1. a body which is not but is
- ▶ 2. In the words that are life, listened.
- ▶ 3. All That I Know Of All That Is Left
- ▶ 4. the soul is a path and a bird in the currents of a wav
- ▶ 5. hemorrhaging declensions
- ▶ 6. We
- ▶ 7. Archetypical Anonymous
- ▶ 8. Wounds + Each Buddha is Released Empty
- ▶ 9. Thorsten Dead
- ▶ 10. a rebellious protocol to the occasional sweet
- ▶ 11. Firmware Mourners
- ▶ 12. I am cinders scattering departures exactly guided
- ▶ 13. All This the World - Sighing at last opening in the air
- ▶ 14. Often I set the landscape behind bars
- ▶ 15. The lightning has children



PIKA LABS





# → #GENAI ART CONCLUSIONS

GENERATIVE AI IS, OBVIOUSLY, HALLUCINATIONS.

THE VALIDITY AND **FILTRATION** OF THOSE HALLUCINATIONS ARE BASED UPON PEOPLE'S **AESTHETIC JUDGMENT OR FACTUAL CRITERIA**.

IS IT RELEVANT TO THE **INTERNAL FELT SENSE** OF A LIVED PHENOMENOLOGICAL WORLD, AN EMOTIONAL REALITY, OR A PSYCHOLOGICAL INTEGRITY?

THERE IS NO SPECIFIC USE CASE EXCEPT FOR THE **HEDONIC FEEDBACK** CIRCUIT OF OSMOTIC PLEASURE THAT ARISES WHEN A BODY ENCOUNTERS VARIATIONS, WHICH EXTEND OR REINFORCE THE REWARD MECHANISMS OF WHAT IS COMMONLY CALLED BEAUTY OR TRUTH.