What is the consciousness?

Anton Kolonin

akolonin@aigents.com
Telegram: akolonin

Novosibirsk State University
*THE REAL SCIENCE

https://www.nsu.ru

AIGENTS
https://aigents.com

AGI IN RUSSIAN

https://agirussia.org

Questions?

Definition of "consciousness" and its conceptual grid?

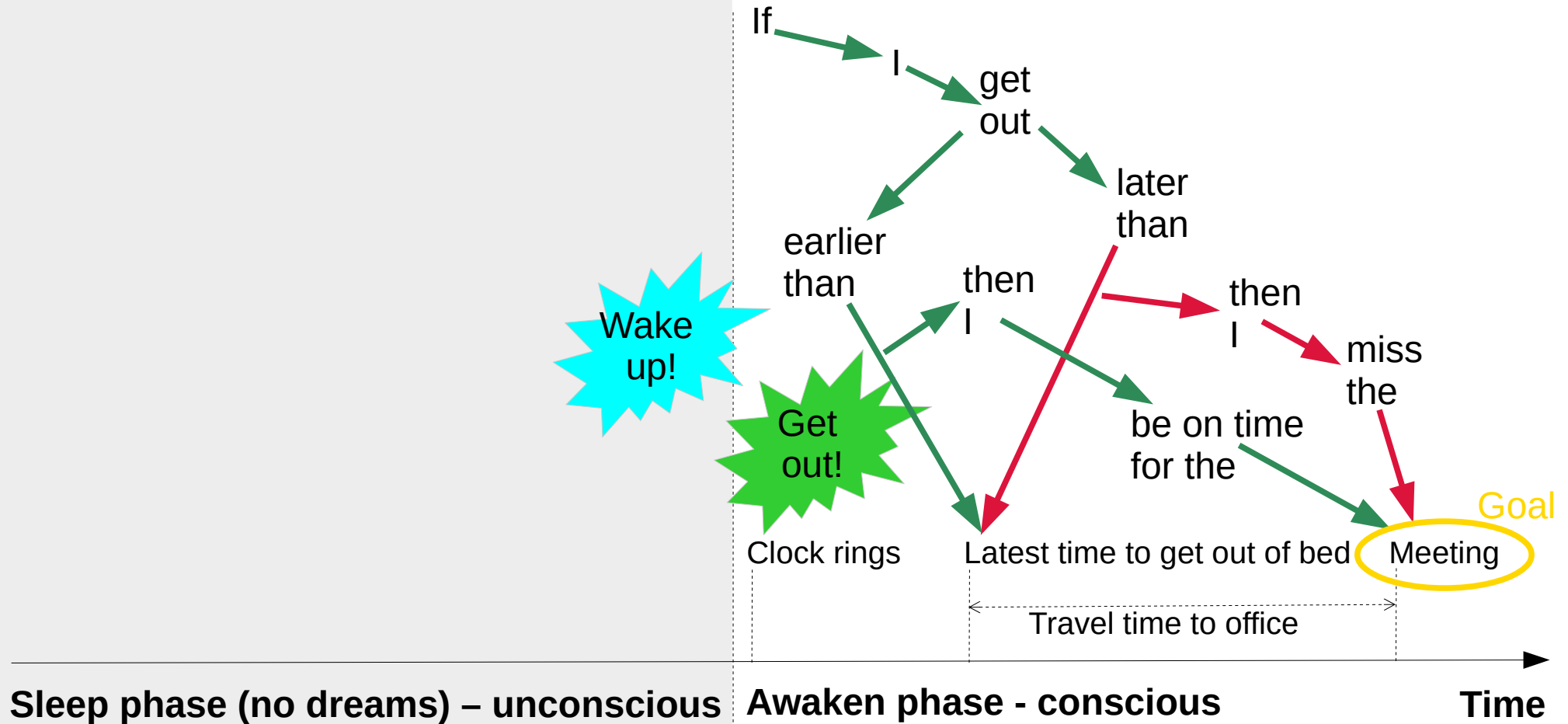Is this definition needed to work on AGI or not and why?

Is it measurable quantitatively or is it a qualitative characteristic?

Which animals and systems have it and in what quantity (quality)?

If artificial systems do not have it, can they develop it?

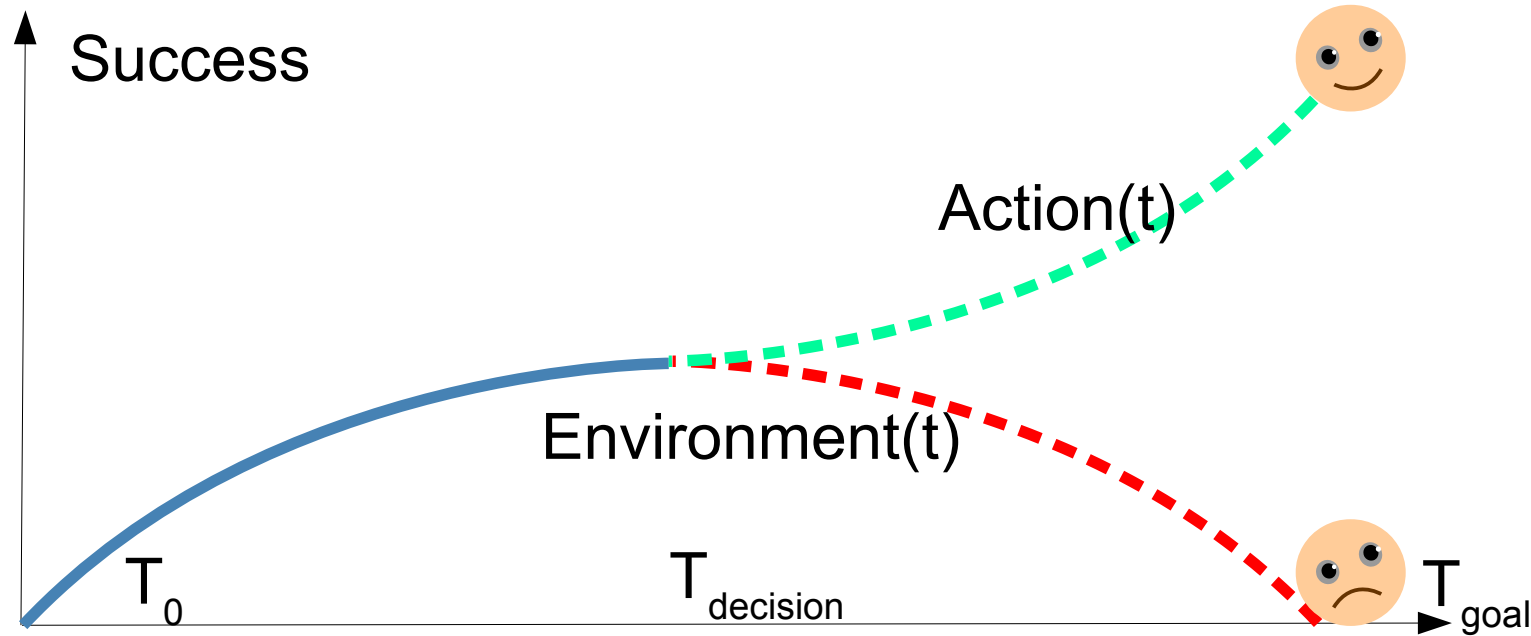If they can have it, do they and we need it?

Definition of "consciousness" and its conceptual grid?

# Definition of "consciousness" and its conceptual grid?
Consciousness:

Ability to build models of the environment based on the past to predict the future scenarios and act "consciously" towards the desired ones

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Acting consciously:
Agent being able to direct the sequence of behavioral acts (at least) to itself by any (internal or external) **language** (ontology/lexicon/grammar)
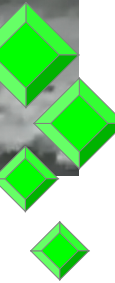
Push legs,
pull right hand

push(right_leg);
push(left_leg);
pull(right_hand).

Push left leg,
pull both hands

push(left_leg);
pull(right_hand);
pull(left_hand).
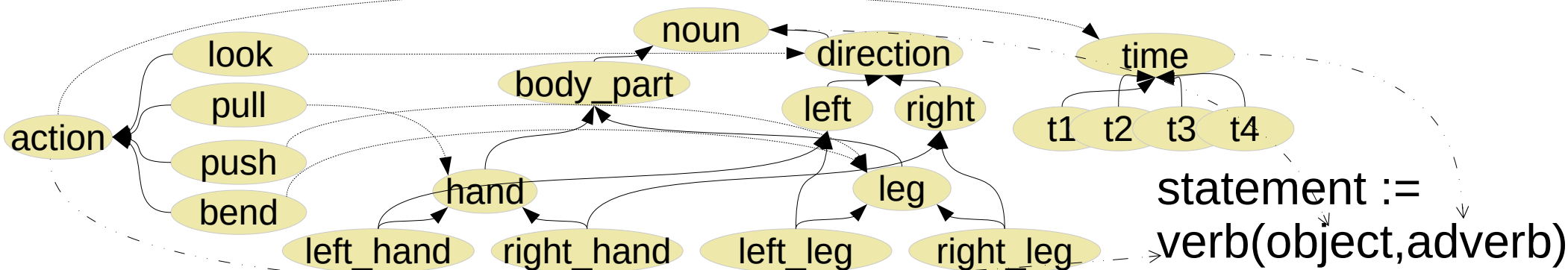
Pull left hand,
look right.

look(right);
pull(left_hand).

Pull right hand,
bend both legs.

pull(right_hand);
bend(right_leg);
bend(left_leg).

https://www.youtube.com/watch?v=oYWjqTP0AKM

Ontology, lexicon, grammar

statement :=
verb(object,adverb)

push(right_leg, t1);
push(left_leg, t1);
pull(right_hand, t1).

push(left_leg, t2);
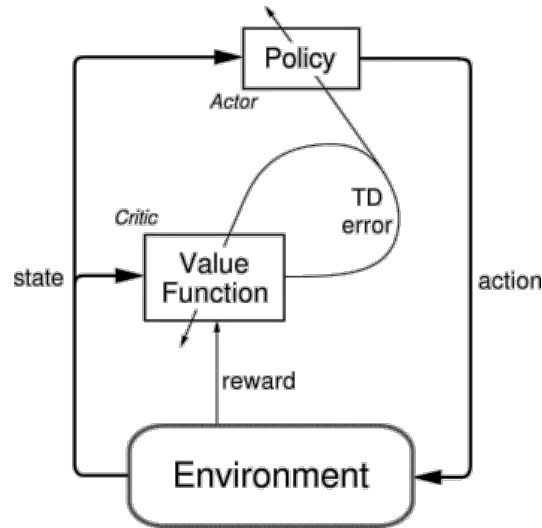pull(right_hand, t2);
pull(left_hand, t2);
greater(t2,t1);

look(right,t3);
pull(left_hand,t3);
greater(t3,t2);

pull(right_hand,t4);
bend(right_leg,t4);
bend(left_leg,t4);
greater(t4,t3).

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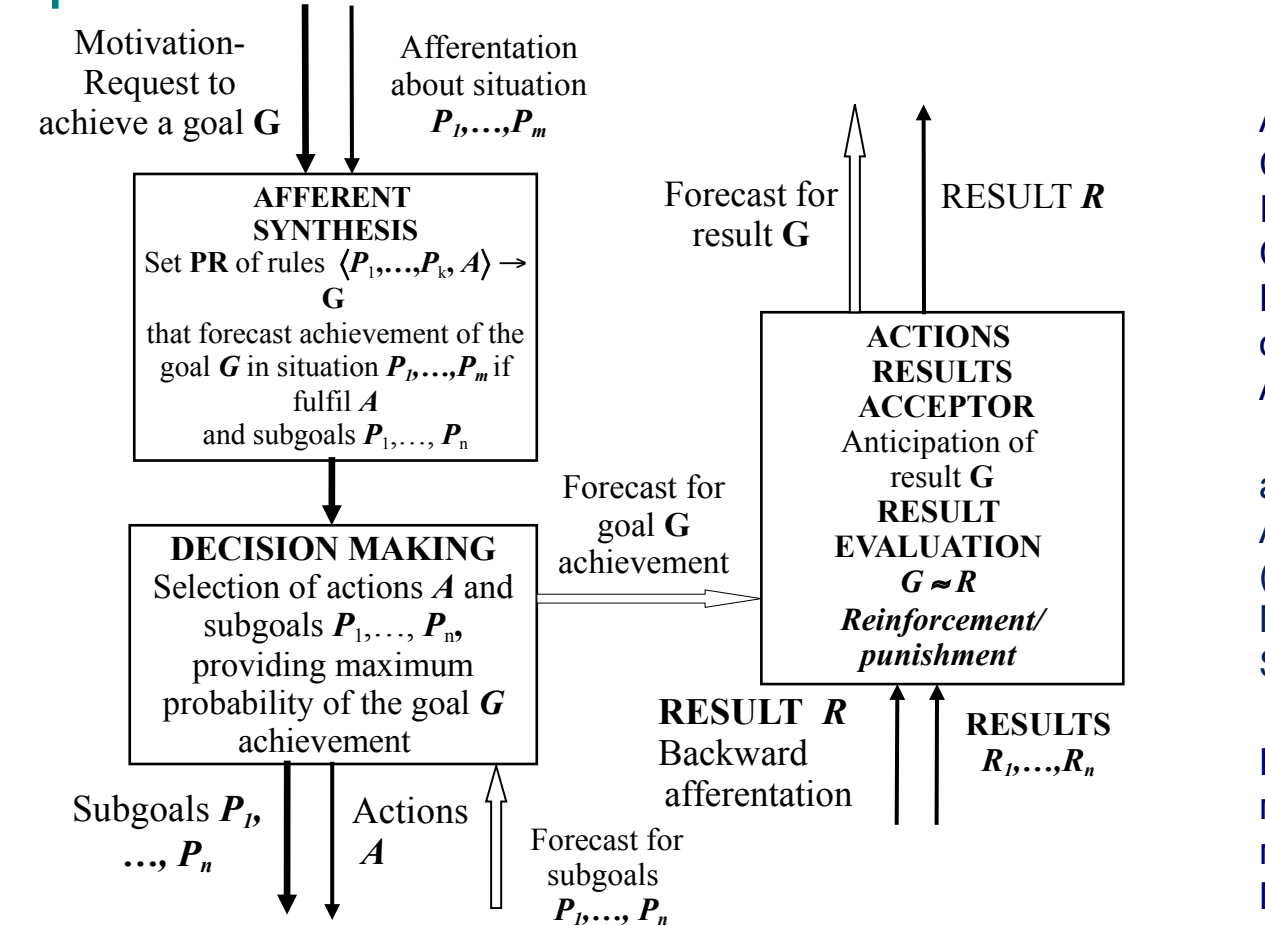# Is this definition needed to work on AGI or not and why?
Step 1: The Actor-Critic Reinforcement Learning algorithm

https://medium.com/intro-to-artificial-intelligence/the-actor-critic-reinforcement-learning-algorithm-c8095a655c14

Motivation-Request to achieve a goal **G**

Afferentation about situation $P_1,\ldots,P_m$

AFFERENT SYNTHESIS
Set **PR** of rules $\langle P_1,\ldots,P_k, A\rangle \rightarrow$ **G**
that forecast achievement of the goal **G** in situation $P_1,\ldots,P_m$ if fulfil **A** and subgoals $P_1,\ldots,P_n$

Forecast for result **G**

RESULT **R**

ACTIONS RESULTS ACCEPTOR
Anticipation of result **G**
RESULT EVALUATION
$G \approx R$
Reinforcement/ punishment

DECISION MAKING
Selection of actions **A** and subgoals $P_1,\ldots,P_n$, providing maximum probability of the goal **G** achievement

Forecast for goal **G** achievement

RESULT R
Backward afferentation

RESULTS
$R_1,\ldots,R_n$

Subgoals $P_1,\ldots,P_n$

Actions **A**

Forecast for subgoals $P_1,\ldots,P_n$

$$Prob(\,G \mid P_1,\ldots,P_k\,,P_1,\ldots,P_n\,,A\,) = Prob(\,rule\,) \cdot Prob(\,P_1\,) \cdot \ldots \cdot Prob(\,P_n\,)$$

Evgenii Vityaev, Alexander Demin: *Adaptive Control of Modular Robots* // Conference Paper in Advances in Intelligent Systems and Computing, Conference: First International Early Research Career Enhancement School on Biologically Inspired Cognitive Architectures, Springer, August 2018
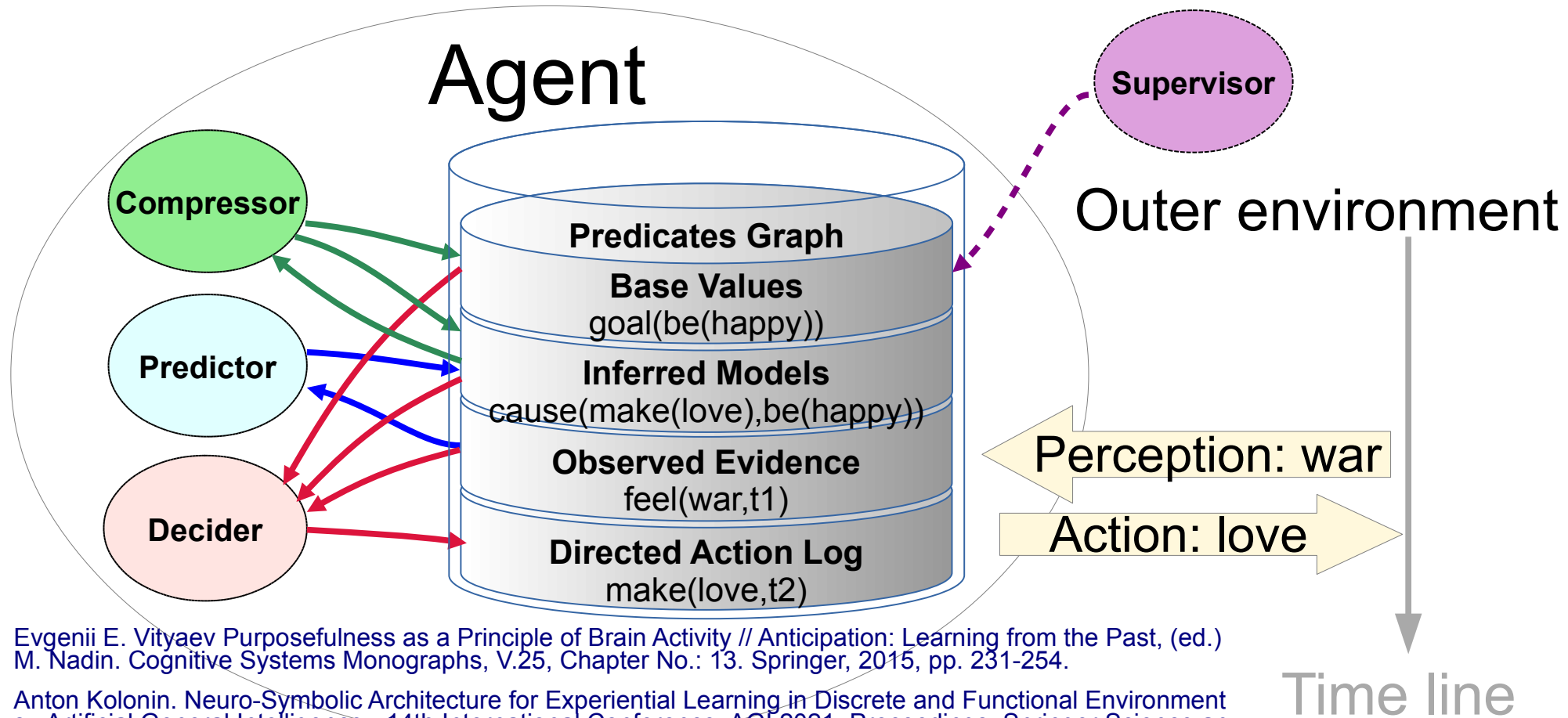
Evgenii E. Vityaev: *Purposefulness as a Principle of Brain Activity* // Anticipation: Learning from the Past, (ed.) M. Nadin. Cognitive Systems Monographs, V.25, Chapter No.: 13. Springer, 2015, pp. 231-254.

Витяев Е.Е. *Логика работы мозга. Подходы к моделированию мышления.* (сборник под ред. д.ф.-м.н. В.Г. Редько). УРСС Эдиториал, Москва, 2014г., стр. 120-153.

Is this definition needed to work on AGI or not and why?
## Step 3: AGI Agent Cognitive Architecture based on TFS

Evgenii E. Vityaev Purposefulness as a Principle of Brain Activity // Anticipation: Learning from the Past, (ed.) M. Nadin. Cognitive Systems Monographs, V.25, Chapter No.: 13. Springer, 2015, pp. 231-254.
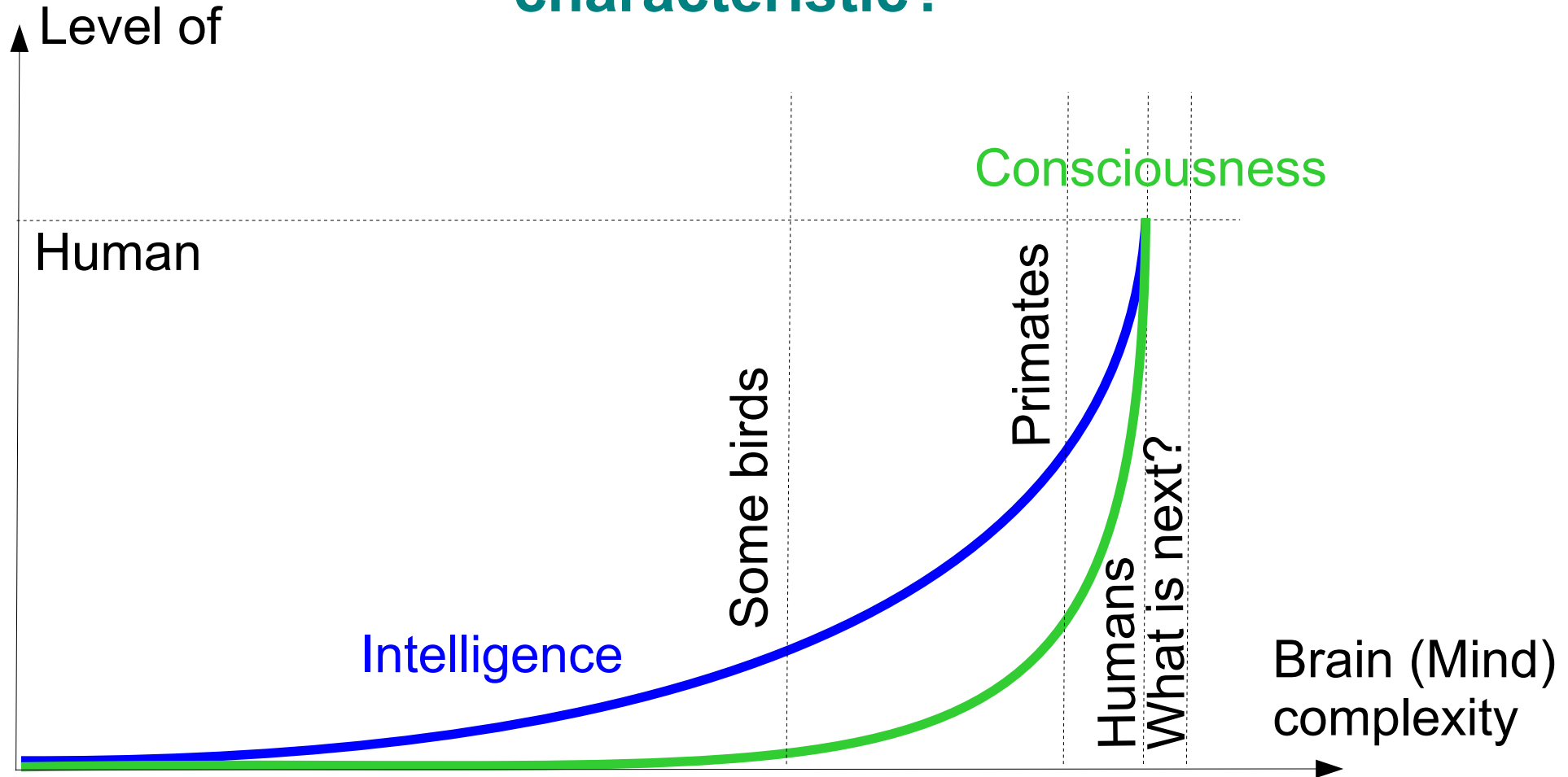
Anton Kolonin. Neuro-Symbolic Architecture for Experiential Learning in Discrete and Functional Environments. Artificial General Intelligence - 14th International Conference, AGI 2021, Proceedings. Springer Science and Business Media Deutschland GmbH, 20

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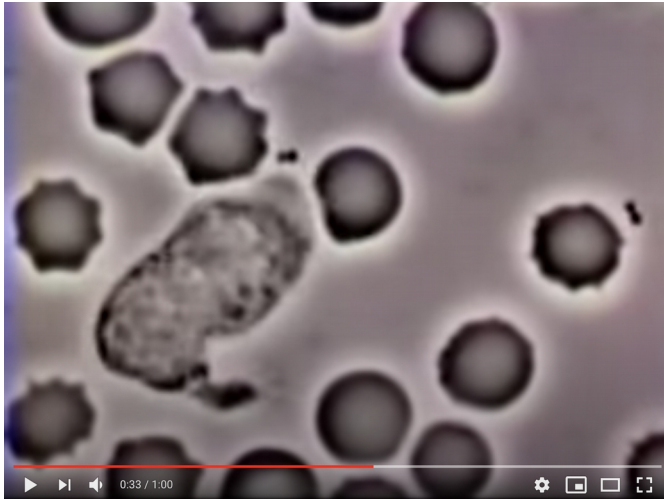
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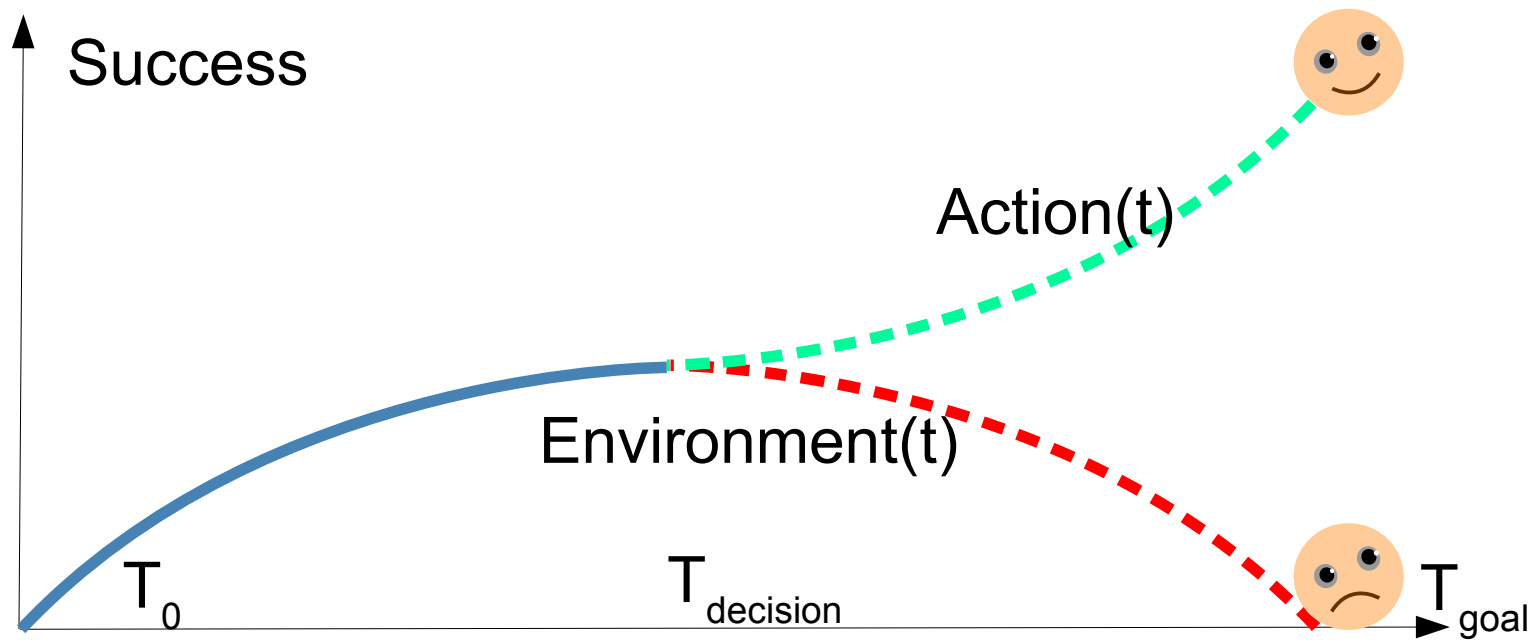
Complex nervous system
(cortex, abstractions?)

Simple nervous system
(no cortex, no abstractions)

Single cell organism
(no nervous system)

Growth of information storage capacity

Computer memory, bits

Neural memory, bits

Genetic memory, bits

Virus	Amoeba	Insect	Mouse	Chim-pan-zee	Human	Super-compu ter	Google "cloud"	All perso-nal comp-uters and smart-phones	Entire Internet
10^4	10^6	10^7	10^8	10^8	10^{16}	10^{17}	10^{20}	10^{21}	10^{22}
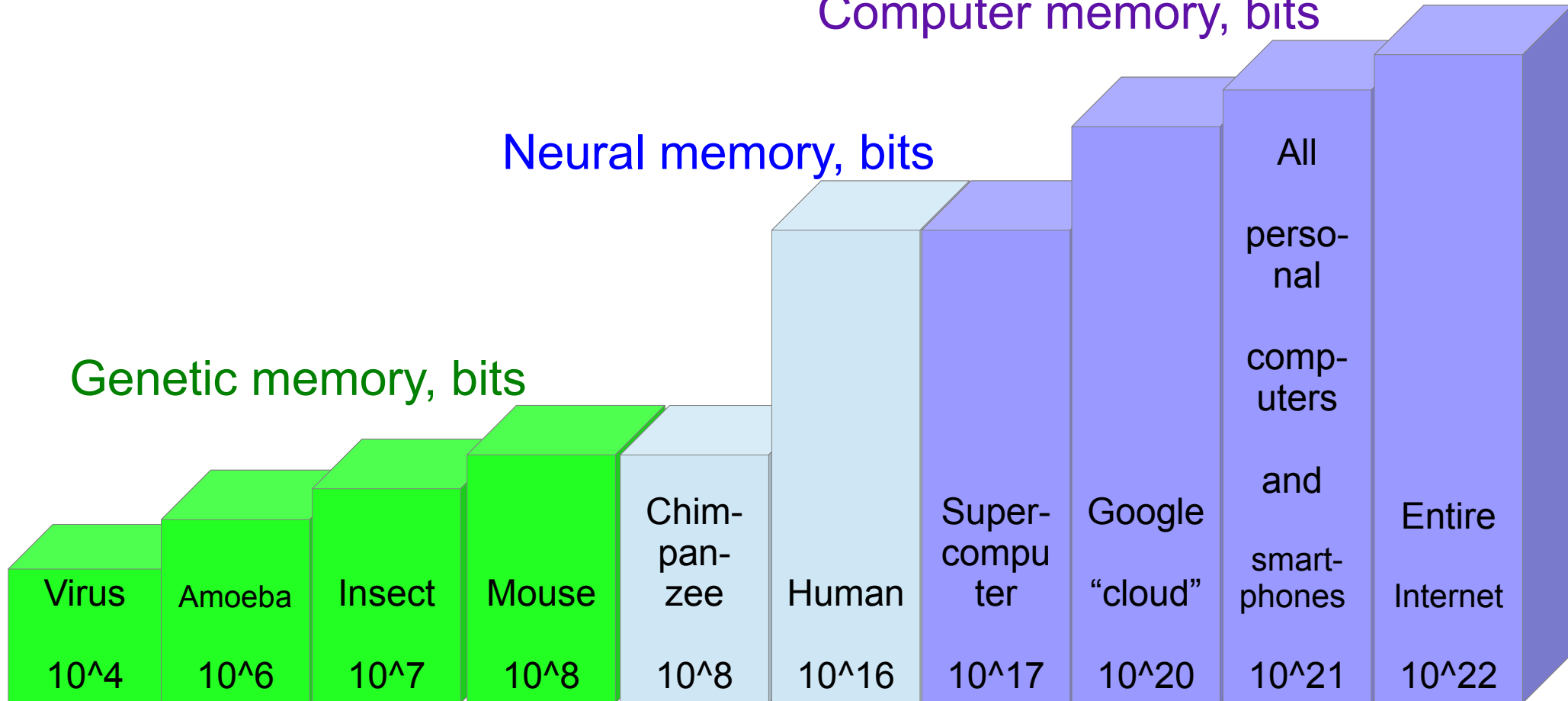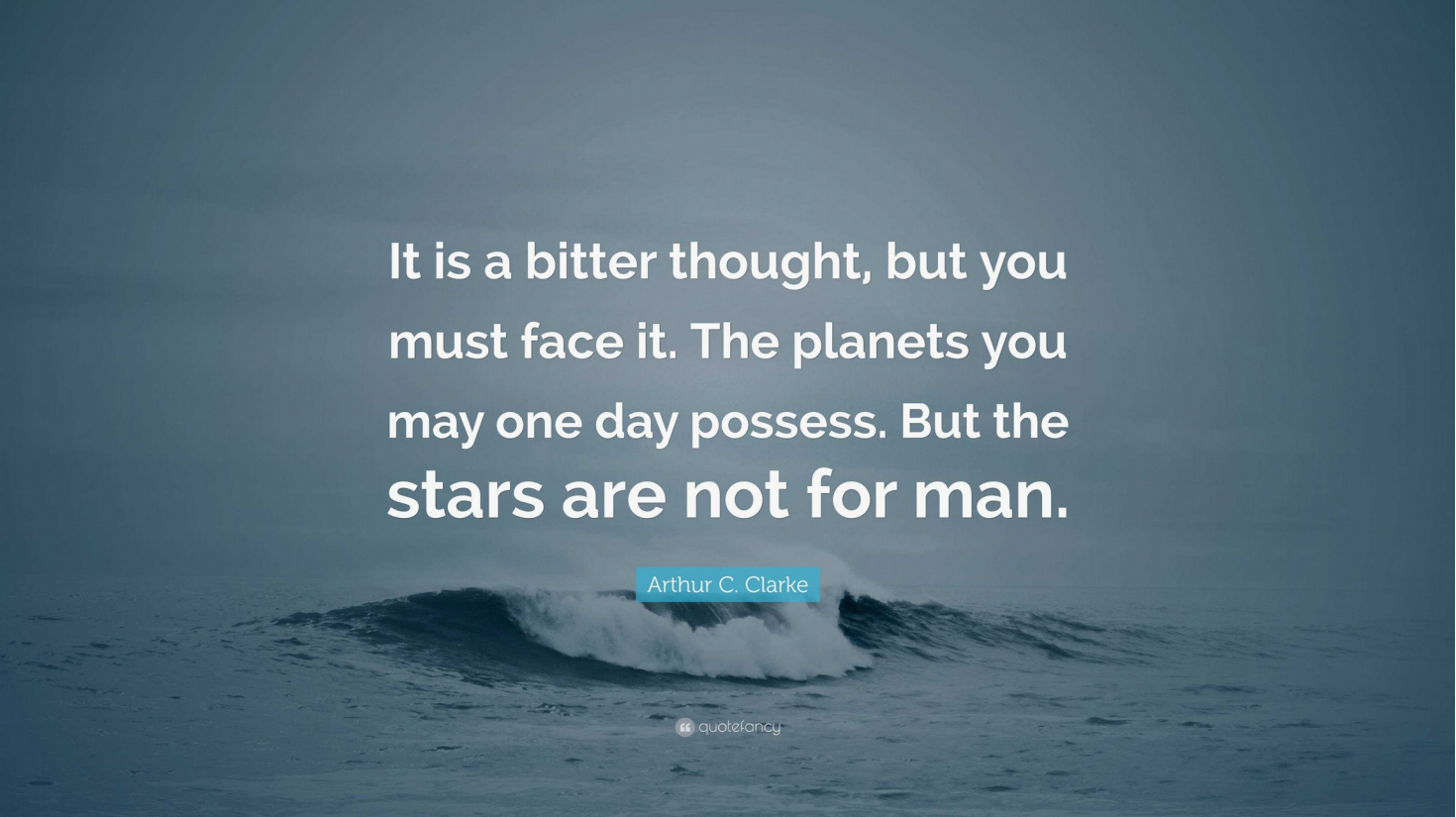
Evolutionary growth working memory capacity

Size
(of "working memory")
matters!

Mouse 1-2

Chimpanzee
2-3

Human

5-9

Supercomputer

???
(depends on
software)

Food
- good

Stick
- banana
- food

There is something
out there similar to
anything that have
been known so far.
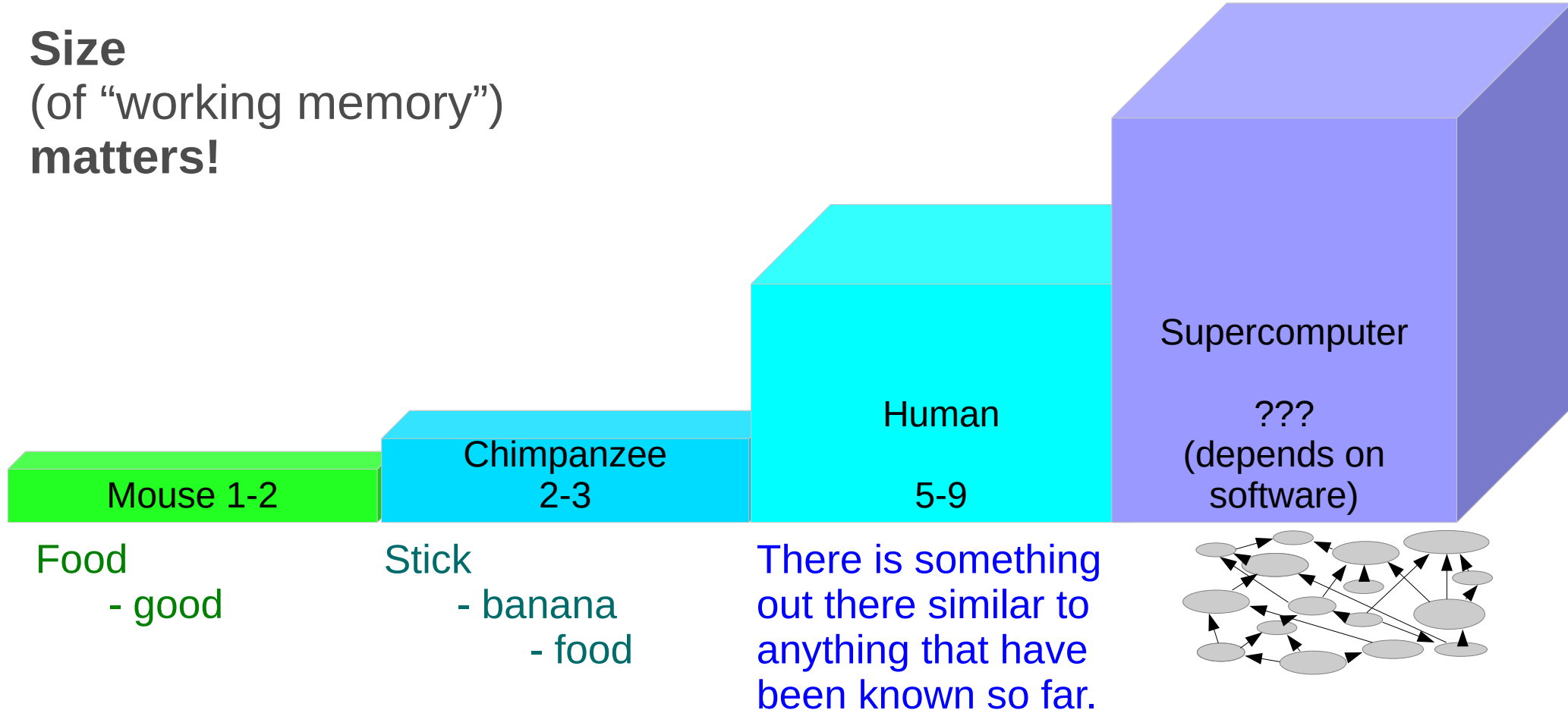
If they can have it, do they and we need it?
(Long term)

It is a bitter thought, but you must face it. The planets you may one day possess. But the stars are not for man.

Arthur C. Clarke

Childhood's End is a 1953 science fiction novel by the British author Arthur C. Clarke
https://en.wikipedia.org/wiki/Childhood%27s_End

If they can have it, do they and we need it?
(Short term)

Stop Killer Robots coalition works to ensure human control in the use of force
https://www.stopkillerrobots.org/

If they can have it, do they and we need it?
(Right now)

The Pentagon Inches Toward Letting AI Control Weapons
https://www.wired.com/story/pentagon-inches-toward-letting-ai-control-weapons/

Thank you for attention! Hope for the best!

Anton Kolonin

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