

The Revolution Will Be Automated

Computers that Create



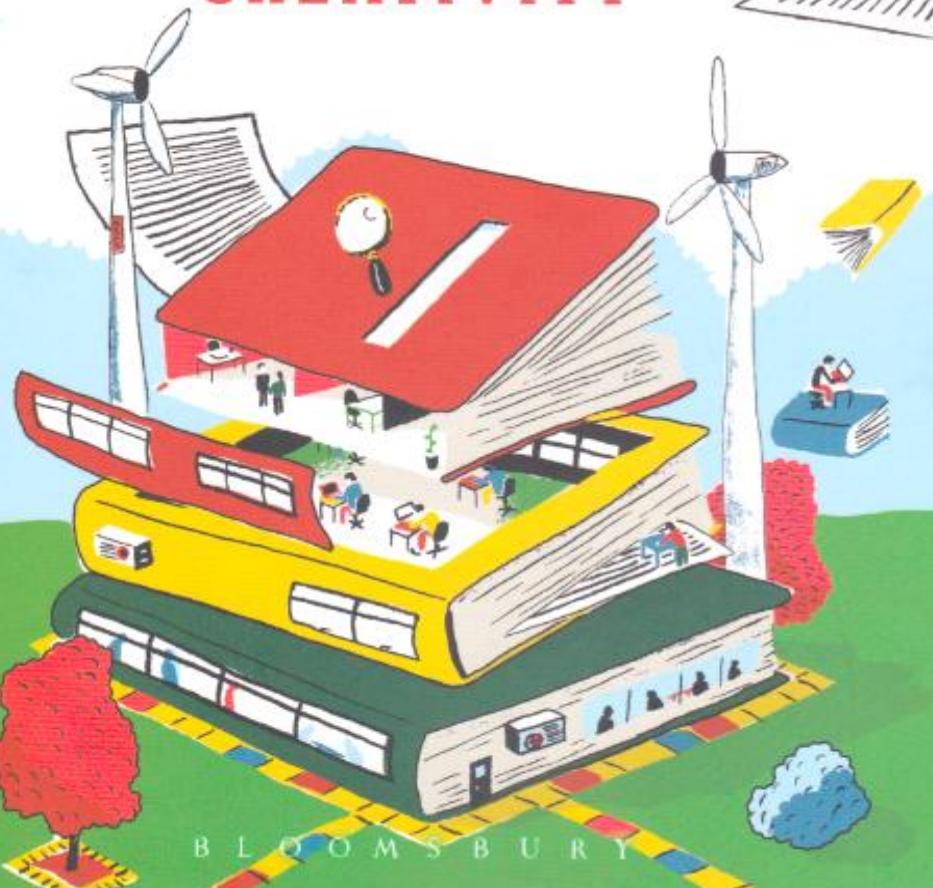
TONY VEALE



EXPLODING THE CREATIVITY MYTH

THE COMPUTATIONAL FOUNDATIONS OF

LINGUISTIC
CREATIVITY



BLOOMSBURY

Enter Thru the Gift Shop

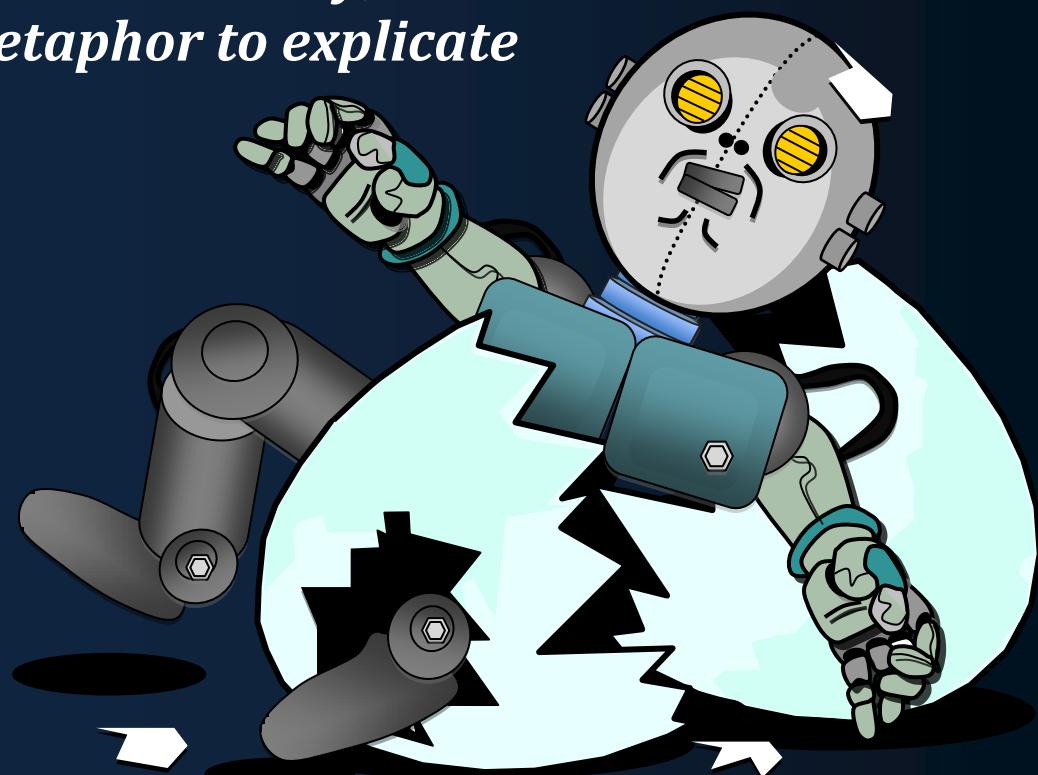
*Available from all good
Web megastores*

Or see:

<http://RobotComix.com>

Computational Creativity (CC) is the scientific study of the creative potential of computers. As such, it is several things at once:

- *The engineering study of how to build machines that “create” to a human standard (if not in a human fashion)*
- *The algorithmic analysis of human creativity, using the mind-as-computer metaphor to explicate how humans “create”*
- *The study of what it means to be “creative” in a world where humans are not the only creators*

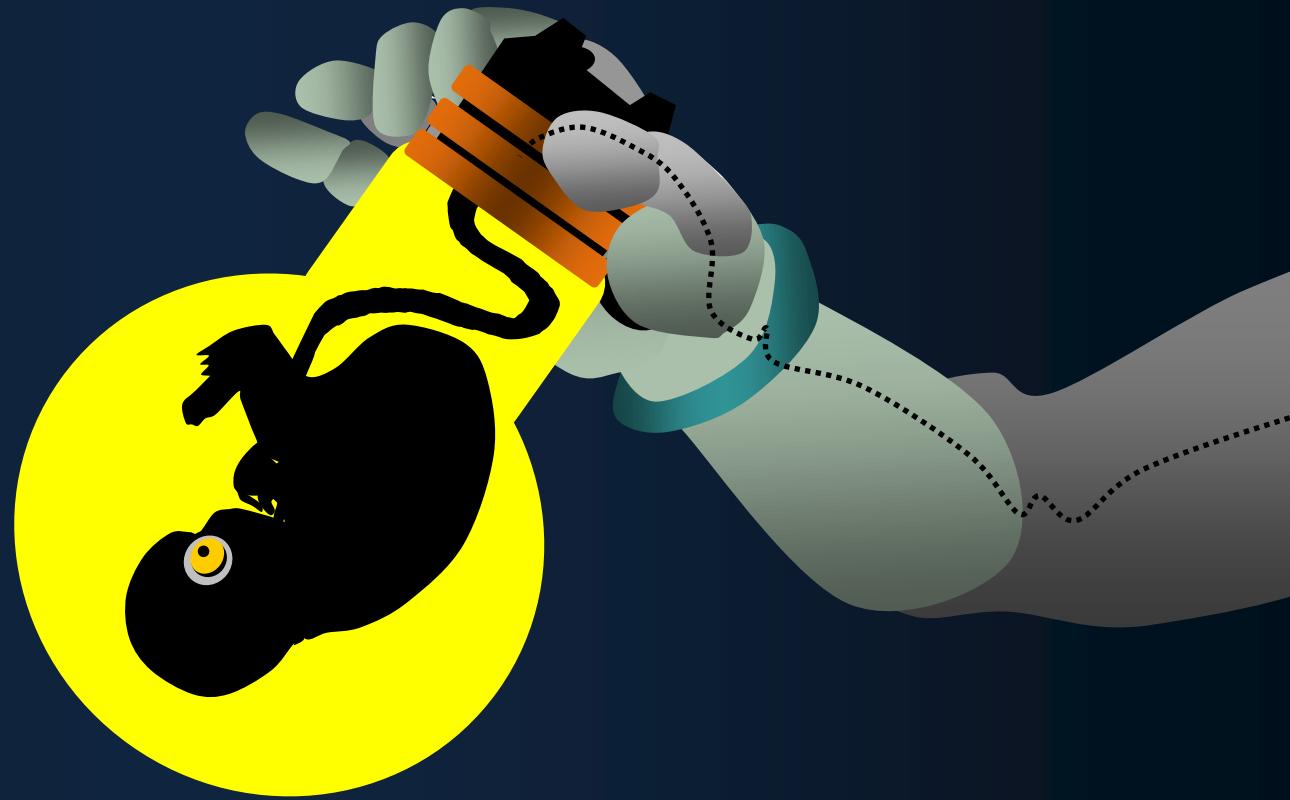


Much of what passes for CC in the field of AI is really Meta-Creativity:

Meta-Creativity is achieved by creators who build systems to be creative on their behalf. The combination of computational system and human creator often yields creative results that could not be achieved by either on their own.

All builders of CC systems are Meta-Creative insofar as their systems create for them.

But not all meta-creative systems are true CC systems. Some meta-creative systems are merely generative tools.





Meta-Creativity: When we create machines that that *create* for us

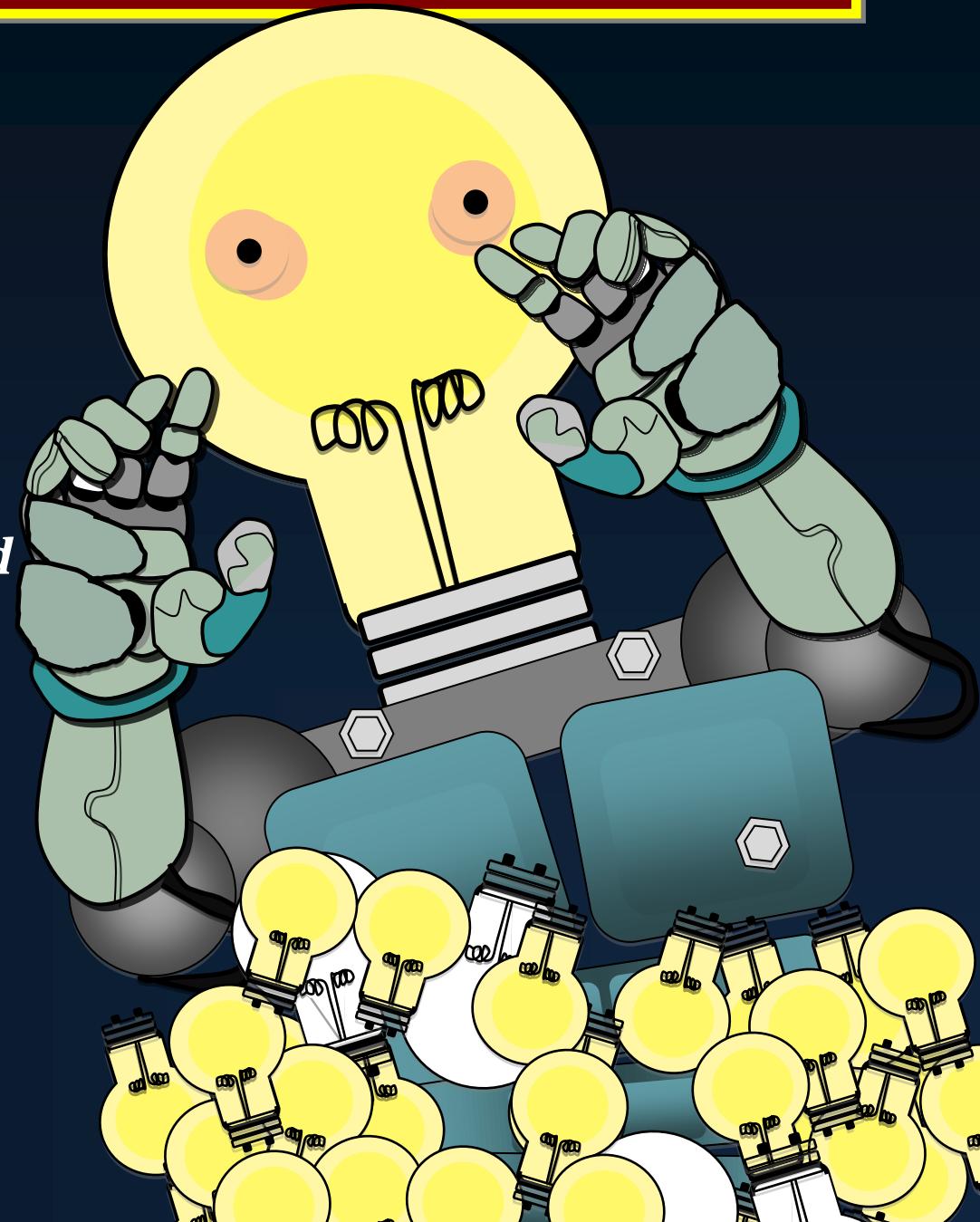
Strong versus Weak Computational Creativity

- *Strong Computational Creativity is the study of fully autonomous machines that can truly “own” their own outputs*
- *Weak Computational Creativity is the study of semi-autonomous software tools that exploit CC concepts to merely support and foster greater creativity in humans*
- *The distinction is clear in principle, but blurred in practice*



So how do we distinguish between “strong” and “weak” CC systems?

- *Strong CC systems not only produce novel and useful outputs, but critique, rank and filter their own outputs to select only the very best.*
- *Weak CC systems produce outputs that they themselves cannot appreciate as creative. The human user must filter and classify its outputs for it.*
- *A weak system can be generative on its own, but needs a human to be creative.*
- *A strong system can be creative on its own, without a human in the loop.*



Important Questions to Ask about any “*Creative*” System

Who *owns* the actual creation?

Who is the main *creative* agent?

Can our system ever
truly *surprise* us?

Ever truly *surpass* us?



Weak Meta-Creativity with Programmable Minions

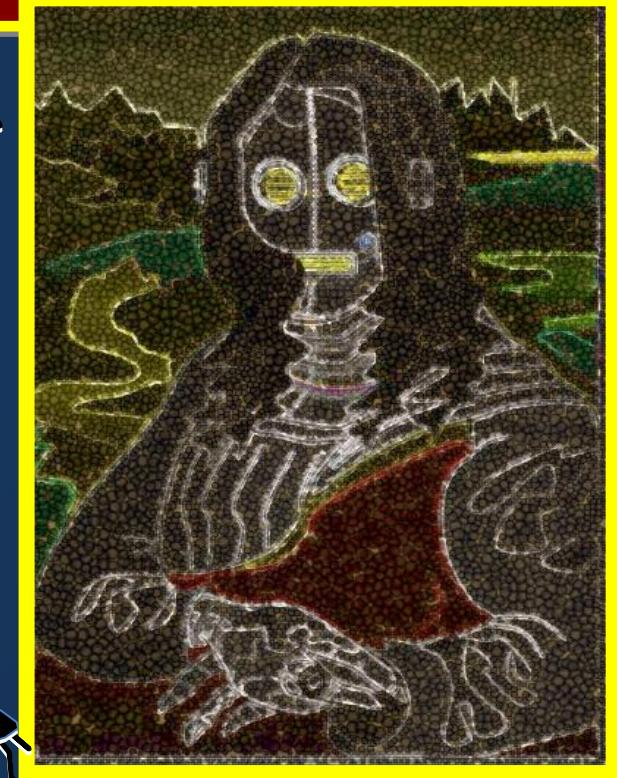


Large groups of **uncreative minions** can **collectively** achieve a **creative outcome** for a *meta*-creator just by following a simple algorithm. Just think of the poor unfortunates who hold up the colored cards in North Korea's *mass games*. By holding the right colors in the right sequence, each person contributes a single pixel to a larger stadium-wide image that they themselves cannot see or appreciate.



Instead of poor benighted humans, we can use **software ants**. Our ants are let loose on a digital image of our choosing, and given some simple **rules of life**.

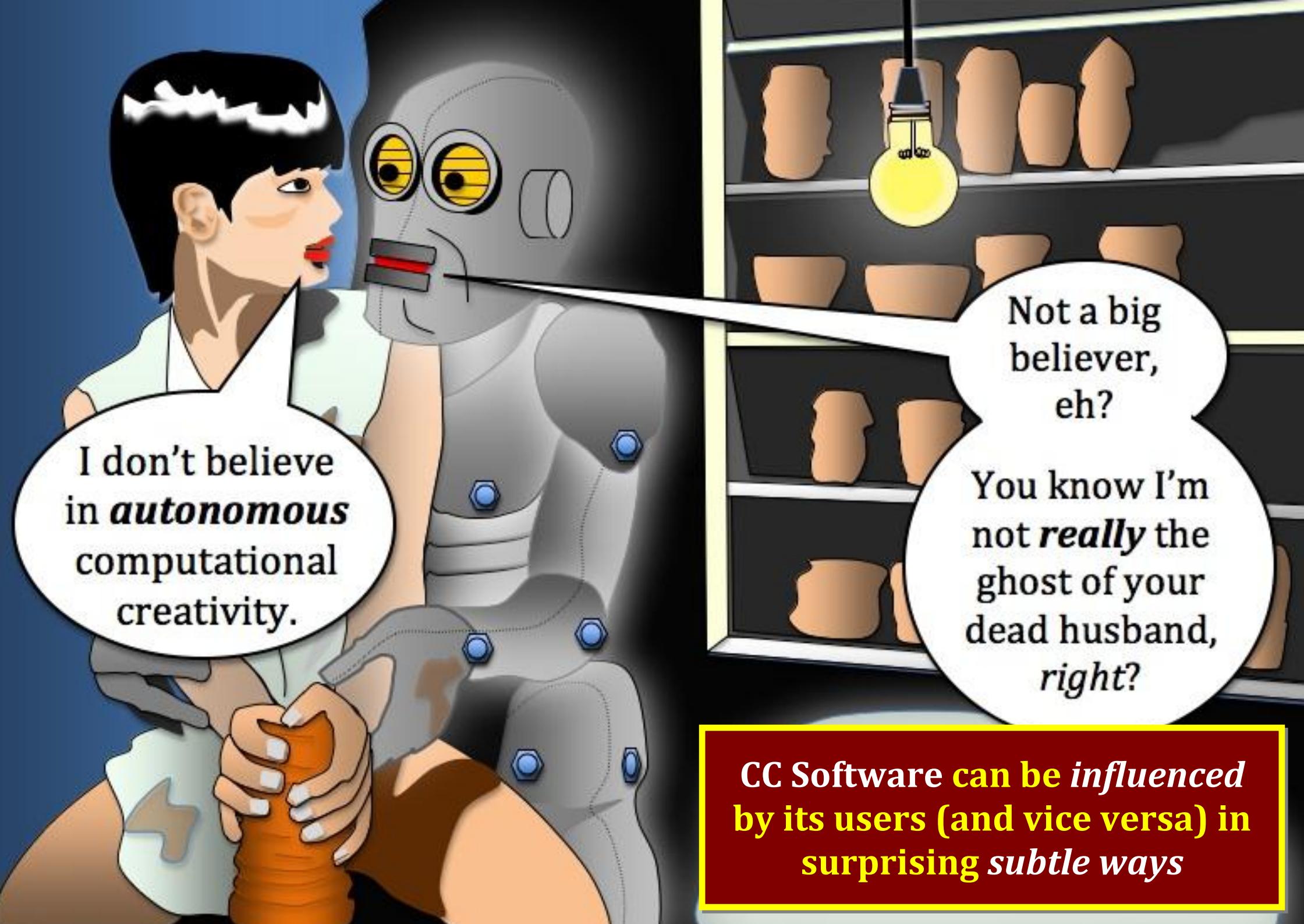
Each ant is programmed to look for **food**, which might be defined as **pixels of brightness** or **high-intensity color**. Each is programmed to leave a **pheromone trail** of color pixels in its wake, so that other ants can follow a successful forager to the most bounteous areas of the image. Let the ants loose, and they will collectively **overpaint** the underlying image in quite artistic ways.




Aaarrghh
Get **OFF**
ME!



A software swarm is a powerful tool for a *human* meta-creator

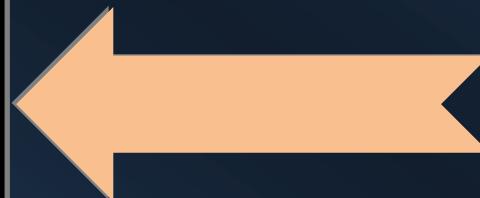


Penousal Machado's NEVAR system uses genetic algorithms to simultaneously explore a space of **complex mathematical formulae** and a corresponding space of **rendering functions** for turning this high-dimensional formulae into colorful 2D images.

NEVAR interacts with its users in interesting ways. As it explores its spaces, it presents its works in progress to be critiqued (*like/dislike*).



NEVAR uses this feedback to tailor the **fitness function** of its genetic algorithms, so as to **adapt** to the **aesthetic sensibility** of its user.

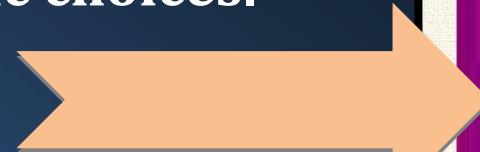


*Color-Mapped Depictions of
Evolved Mathematical Formulae*
-- Penousal Machado's NEVAR

Simon Colton's *Painting Fool* system aims to produce more conventional, less mathematical forms of visual art, simulating a wide variety of media (*canvas, paper, ink oil, acrylic, pencil, pastel, charcoal*) and tools (*pens, pencils, brushes and stroke styles*).

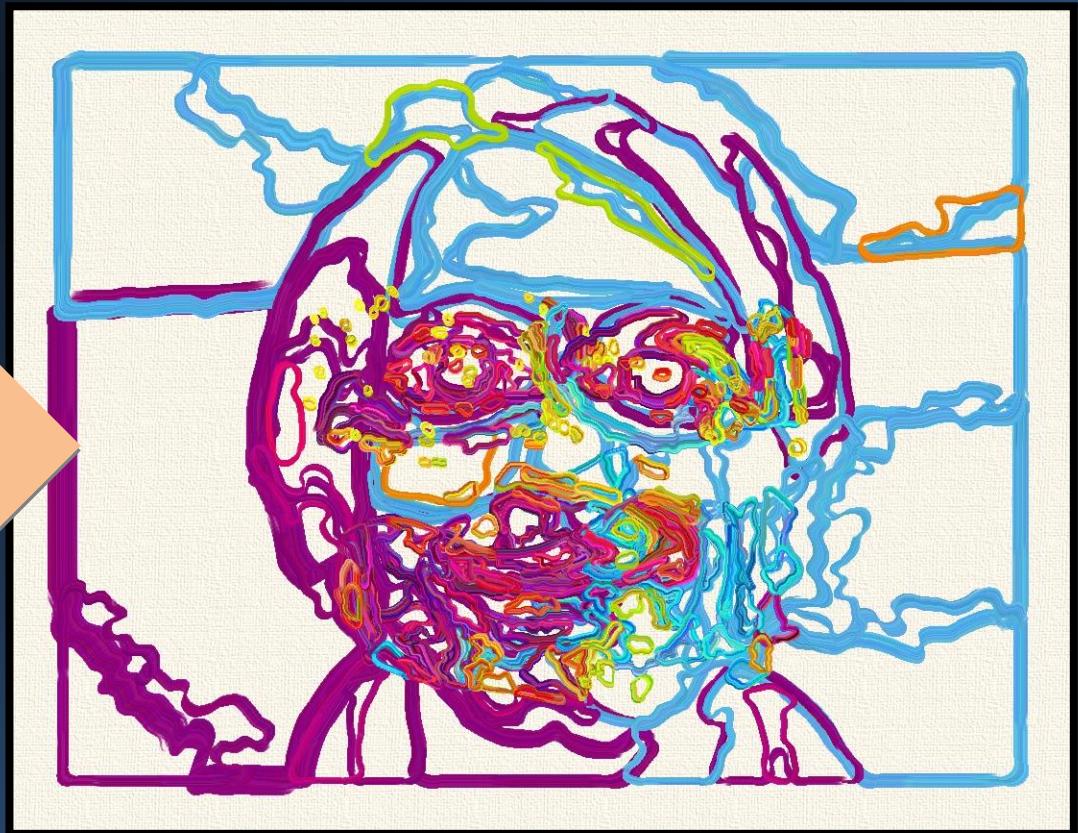
The Painting Fool typically begins with a digital image or a live video grab, and uses this **pixel map** as a guide to producing a corresponding painting.

The Painting Fool uses a variety of user cues (such as **simple affective analysis of the user's mood**) to make artistic choices and yield a non-deterministic choices.



Portrait of the Artist's Owner As A Young(-ish) and Strange Man

-- Simon Colton's *The Painting Fool*



Creativity needs Engagement: Can Machines Handle the Unexpected?

Can a **rule-defined** computational system genuinely *engage* with a problem and react sensibly to the truly unexpected? If a CC system relies on rules to handle the **unexpected**, in what sense is the unexpected really unexpected?

Rules define the *known knowns* and the *known unknowns* of a system (to quote a much-maligned military philosopher of sorts). But what about the *unknown unknowns*?



Well, how do **humans** handle the **unexpected**?

Many problems with technology are caused by its human operators.

Consider Wegman's bakery in New York state. This cutting-edge business allows customers to email in the images they want on their cakes, and a special printer uses food dyes to print the image onto the cake icing.

But what if the image makes no sense? What if the email contains some unexpected content, like HTML markup?

This happened when a customer used Microsoft Outlook to email the desired text for a cake. The Wegman employee blindly cut'n'pasted Outlook's added HTML markup directly to the printer, resulting in the bizarre cake overleaf. Can we really blame the technology?



Can a CC System do better than *this* human? Could it do worse?

Happy Birthday
To
Elsa / Aunt Elsa

<!--[if !supportEmptyParas]--> <!--[endif]-->
12/01/1926 to 12/01/2006
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FRIÛL to Binghamton

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"Bon complean" alla piu' bella "polentona" di Ciserils.
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Avanti a cent'anni!

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**Hmmm, Delicious! **

Acquiring Aesthetics: Can Machines Evolve their Own Aesthetics?

Machine Learning (ML) is a branch of Artificial Intelligence that allows computers to learn from **experience**, or from large amounts of **past data**.

ML can, for example, learn the aesthetics of cake design from a large catalogue of professional cake designs, or from similar (easier to find) data such as Hallmark's online inventory of greeting card designs.

By learning a robust model, a CC system can reject goofs like Wegman's cake.



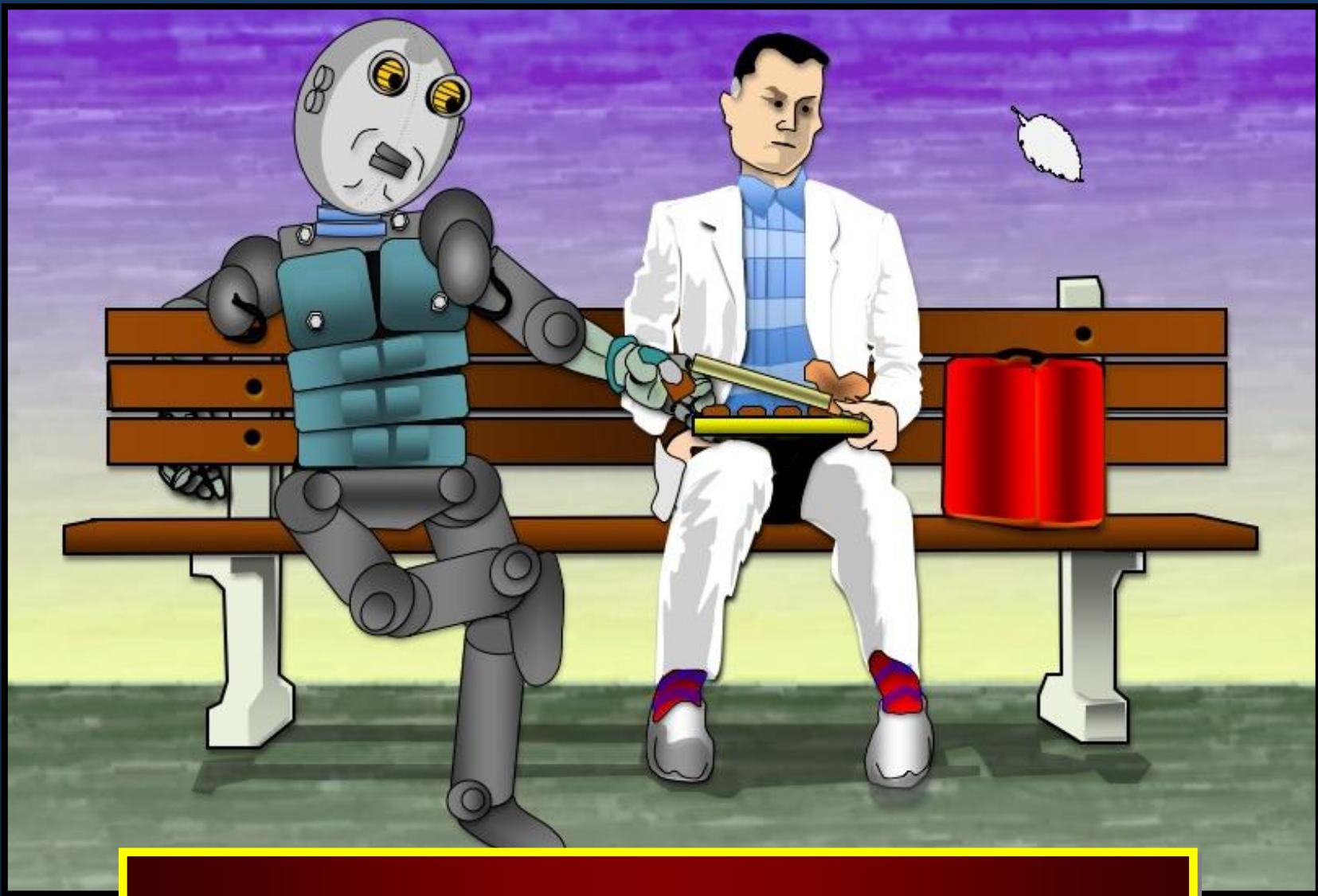
I'm a crockpot chef designed by *Dan Ventura* that uses **ML** to learn to concoct my own **chili** dishes by analyzing scads of online recipes from **FOODnetwork.com**

Where did
you guys
learn to
paint?



Defining Creativity: *Physics Envy?*

Creativity is a **folk notion**, not an objective mathematical concept for which we can stipulate a clear-cut definition. There is **no formula** for creativity, **no hidden formula** waiting to be discovered by theoretical scientists. It is a **social construct** that we can explore empirically, with **computational models**.



Creative **is** as Creative **does**

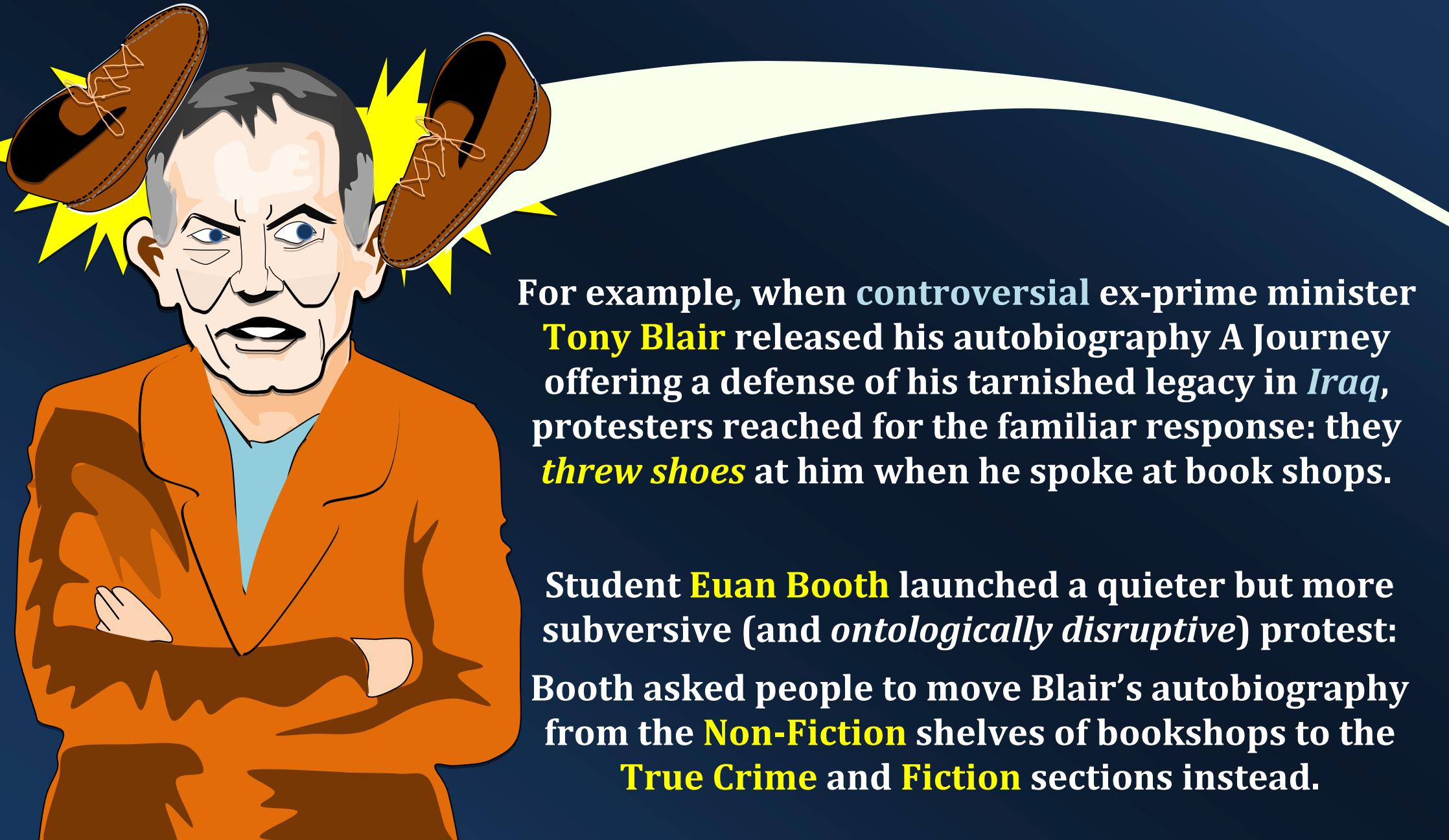
Rather than search for some hidden formula underpinning creativity, CC seeks to observe creativity in individuals and in groups, to understand our **implicit criteria** for applying the label “creative” to an *artifact, idea or solution*.

- 1. THE ANSWER HAS NOVELTY AND USEFULNESS, EITHER FOR AN INDIVIDUAL OR FOR A SOCIETY**
- 2. THE ANSWER DEMANDS WE REJECT IDEAS THAT WE HAD PREVIOUSLY ACCEPTED**
- 3. THE ANSWER RESULTS FROM INTENSE MOTIVATION AND PERSISTENCE**
- 4. THE ANSWER COMES FROM CLARIFYING A PROBLEM THAT WAS ORIGINALLY VAGUE**

Alan Newell, Cliff Shaw & Herb Simon

There are **no** qualities that are **necessarily** present in all instances of creativity, nor groups of qualities that are **collectively sufficient** to guarantee the aptness of the label "**creative**". Instead, we tell each other **narratives of creativity**.

We can call on different narratives of creativity to understand useful novelty in different contexts. One commonplace narrative goes as follows: *a novel response to a common problem achieves a disproportionately effective outcome.*



For example, when controversial ex-prime minister **Tony Blair** released his autobiography *A Journey* offering a defense of his tarnished legacy in *Iraq*, protesters reached for the familiar response: they **threw shoes** at him when he spoke at book shops.

Student **Euan Booth** launched a quieter but more subversive (and *ontologically disruptive*) protest: Booth asked people to move Blair's autobiography from the **Non-Fiction** shelves of bookshops to the **True Crime** and **Fiction** sections instead.



Tony Blair

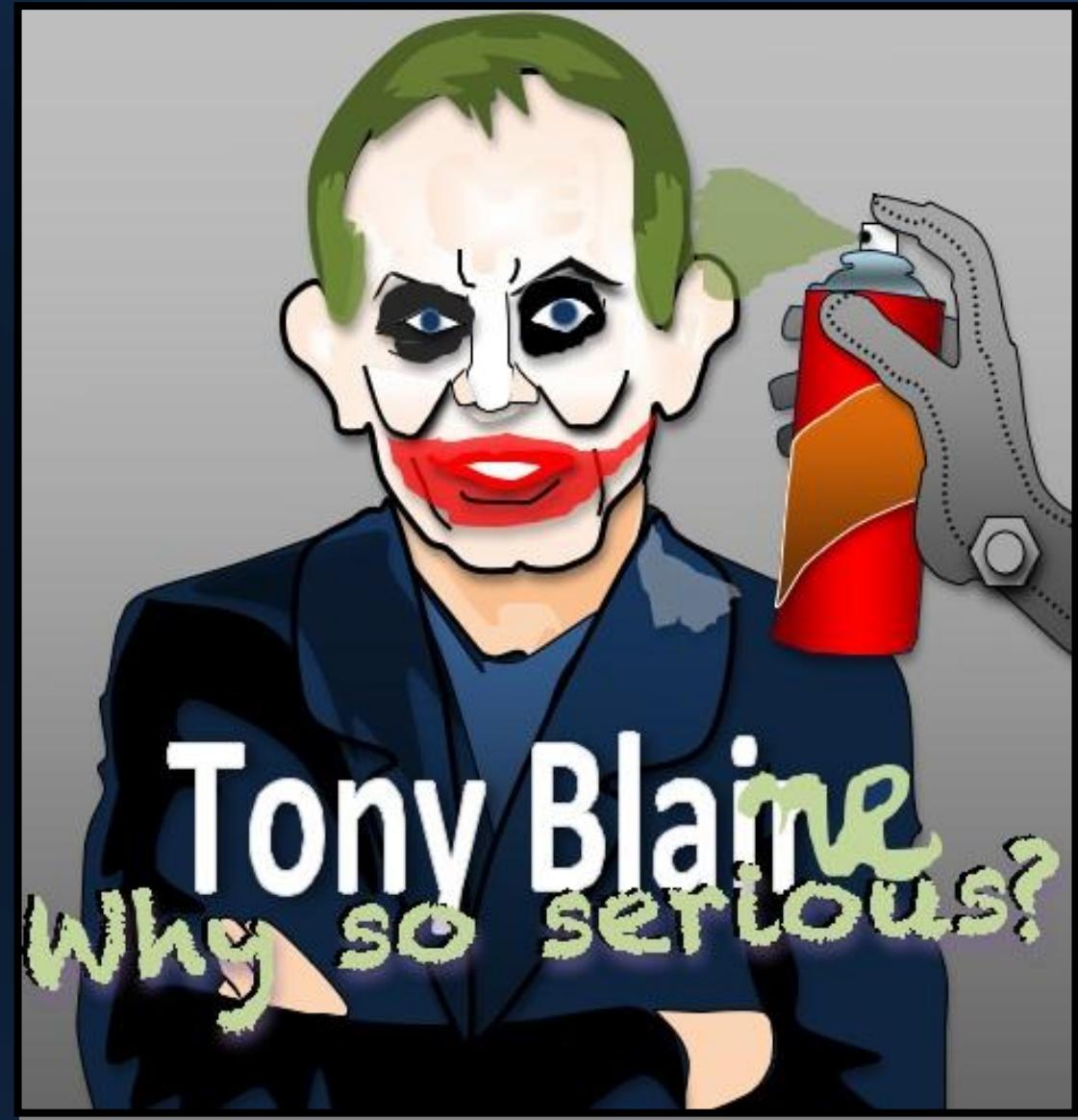
A JOURNEY
MY POLITICAL LIFE

"He'll be back!"

"A Dang Good Read!"

“This is a peaceful and mischievous way of making your point if you feel the same way. It’s a non-violent display of anger using the materials given to me – his book and the crime section – they’re both there, I just put them together.”

Facebook protester Euan Booth, quoted in *The Telegraph* on 4th September, 2010



Booth's solution is **cheap, easy, fun** and **resourceful**; it makes **non-obvious use of familiar objects** and settings; it makes a **virtue of limitations**; and achieves **multiple outcomes at once**.



Creative Psychology 101

Computers do not have to be creative in the *same way as humans*, or produce creative outputs that can *pass for human outputs*. However, the more knowledge of *human psychology* that a CC system can draw upon, the better positioned it is to produce outputs that *humans will appreciate*.

A Tale of Two Velocities

The psychologist Daniel Kahneman offers a useful metaphor for the competing forces that make up human cognition. The mind is not one unitary system but two interacting, and often adversarial systems:



System 1 is *fast, eager, always on* and *always ready* to jump to conclusions based on scant but suggestive evidence. **System 1** needs no prompting, and underpins many of our intuitions and rapid “**blink**” responses. Yet this quickness is also a *weakness*: it relies on shortcuts and is often misleading.



System 2 is *slower, less eager, and easily depleted*. However, **System 2** is capable of analyzing a situation in greater depth, of using rules and conscious reasoning to reach a conclusion. **System 2** lacks **System 1**’s rapid responsiveness, but is more likely to be right!

A Simple Math Problem: System 1 vs. System 2

So I bought
a bat and a
ball for \$1.10
in a yard
sale.

A bargain!
The bat cost
\$1 more than
the ball.

Hmmmm.
So much did
they each
cost?

Let's see ...
\$1 for the bat,
and just 10¢
for the ball?

No! The right answer is
\$1.05 for the bat. System
1 is mistakenly drawn to
the **\$1 and 10¢ as primed**
by the question itself.

Back in
Greenbow,
Alabama,
folks used
to say

"That boy's a
runnin' fool"
'cos I like to
run too.

That's nice.

I need a nap!

How does
Tony Stark
carry all this
weight?

Creativity involves a **told-you-so** dialogue between
System 1 and System 2.



OK, *big brain*, memorize
these twelve words:

*Charter, Voyager, Analogy,
Density, Cottage, Tonight,
Crumpet, Trilogy, Fixture,
Brigade, Cluster, Holster*

Done? Now fill in the *missing* letters in these word grids.

A		L			G	Y
---	--	---	--	--	---	---

B			G		A		E
---	--	--	---	--	---	--	---

C		T	A			G
---	--	---	---	--	--	---

C	H	A	R		T
---	---	---	---	--	---

C		U	T	R	
---	--	---	---	---	--

C	U		P		T
---	---	--	---	--	---

D			N	I	T	Y
---	--	--	---	---	---	---

F		I		U	R	E
---	--	---	--	---	---	---

H		S	T	R	
---	--	---	---	---	--

T		N	G		T
---	--	---	---	--	---

T	R		G		Y
---	---	--	---	--	---

V	O			A	G	E
---	---	--	--	---	---	---



A	L	L	E	R	G	Y
---	---	---	---	---	---	---

B	A	G	G	A	G	E
---	---	---	---	---	---	---

C	A	T	A	L	O	G
---	---	---	---	---	---	---

C	H	A	R	I	T	Y
---	---	---	---	---	---	---

C	O	U	N	T	R	Y
---	---	---	---	---	---	---

C	U	L	P	R	I	T
---	---	---	---	---	---	---

D	I	G	N	I	T	Y
---	---	---	---	---	---	---

F	A	I	L	U	R	E
---	---	---	---	---	---	---

H	I	S	T	O	R	Y
---	---	---	---	---	---	---

T	A	N	G	E	N	T
---	---	---	---	---	---	---

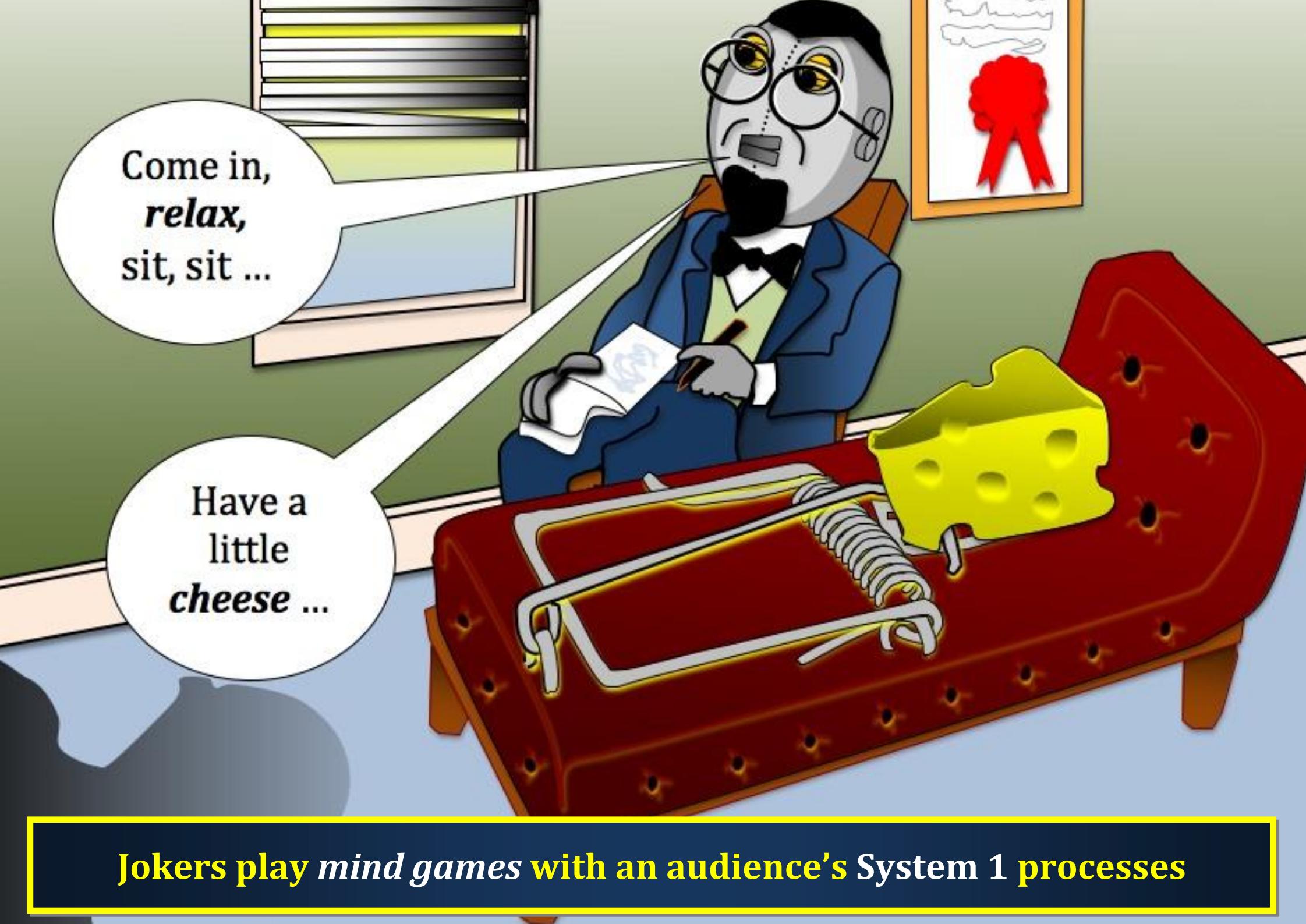
T	R	A	G	E	D	Y
---	---	---	---	---	---	---

V	O	L	T	A	G	E
---	---	---	---	---	---	---

System I makes
this task *harder!*



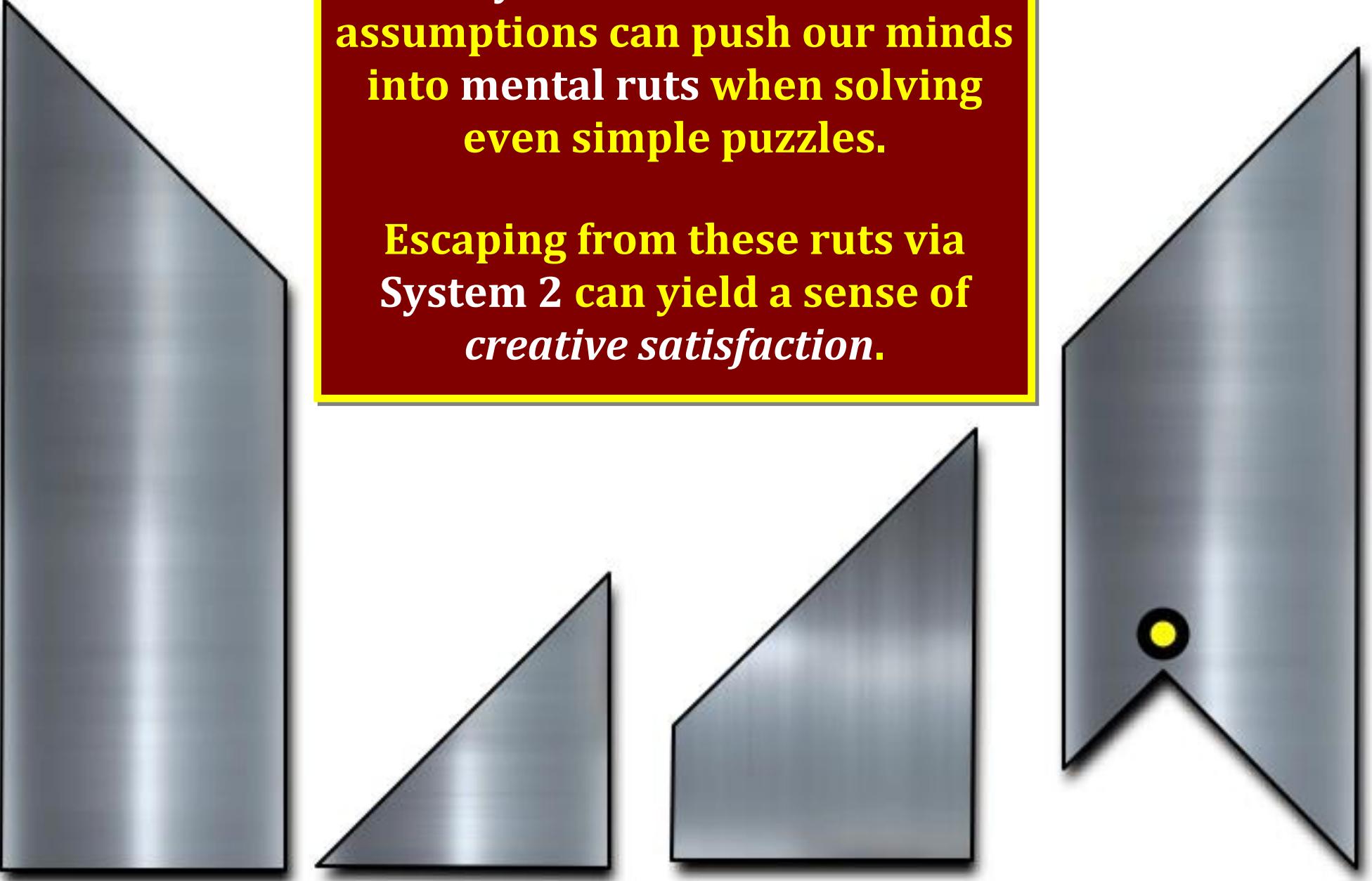
The memorized words are *primed*, and any *primed* elements can become fixations for System 1 regardless of whether they are relevant or not to a problem

A cartoon illustration of a psychologist with a large head, wearing glasses and a blue suit, sitting in a red armchair. He is holding a piece of paper and a pen. A speech bubble from the left says, "Come in, relax, sit, sit ...". Another speech bubble from the bottom left says, "Have a little cheese ...".

Come in,
relax,
sit, sit ...

Have a
little
cheese ...

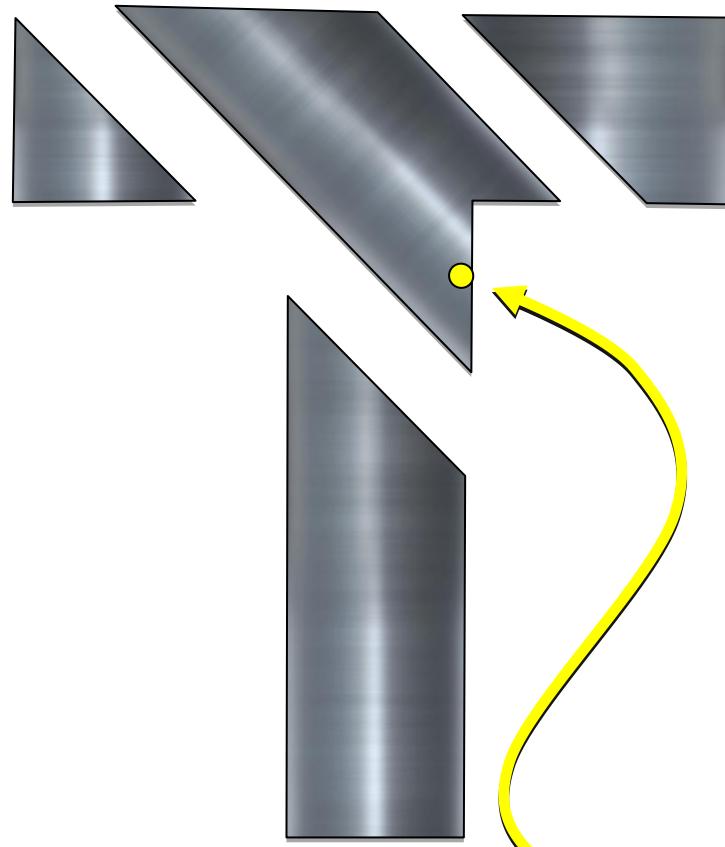
Jokers play *mind games* with an audience's System 1 processes



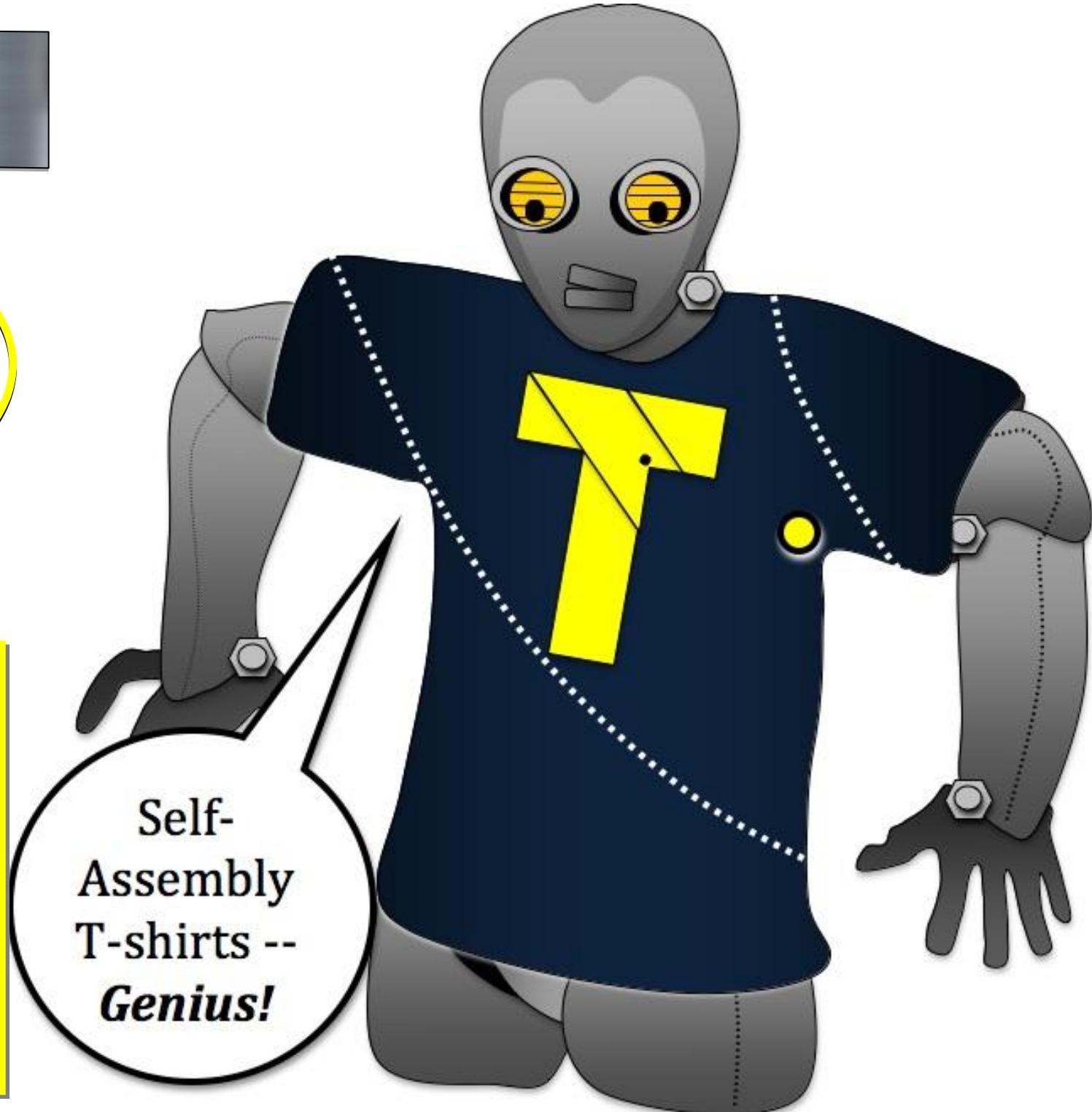
System 1's unstated assumptions can push our minds into mental ruts when solving even simple puzzles.

Escaping from these ruts via System 2 can yield a sense of *creative satisfaction*.

Re-assemble these four pieces to make a letter "T" shape. *Quickly Now!*



The **yellow dot** marks an *outside corner*, not the *internal hole* that **System 1** assumes needs to be filled! This simple insight is a ***tiny breakthrough***





System 1's automatic associations hide the *ambiguity* of everyday life.
A successful creator *revives this ambiguity by subverting System 1*

Even tiny deviations from System 1's assumptions and habitual scripts can yield *big* differences in outcomes! Most jokes have a *butt*, yet the biggest *butt* is System 1. Jokes rely on System 1, yet expose the failings of System 1.



Daring to Go Beyond Pastiche and “Safe” Generation

Minor variation on an established success story is deemed “creative” when it yields disproportionate results, like *humor*. But “safe” variations that just achieve incremental results produce “*pastiche*”.



***"Mere Generation"* is easy, but creativity involves more!**

The simplest computer script can generate a billion novel outputs. But creativity is ***more than*** mere generation: it requires the selective generation of outputs with not just novelty but **demonstrable utility**.



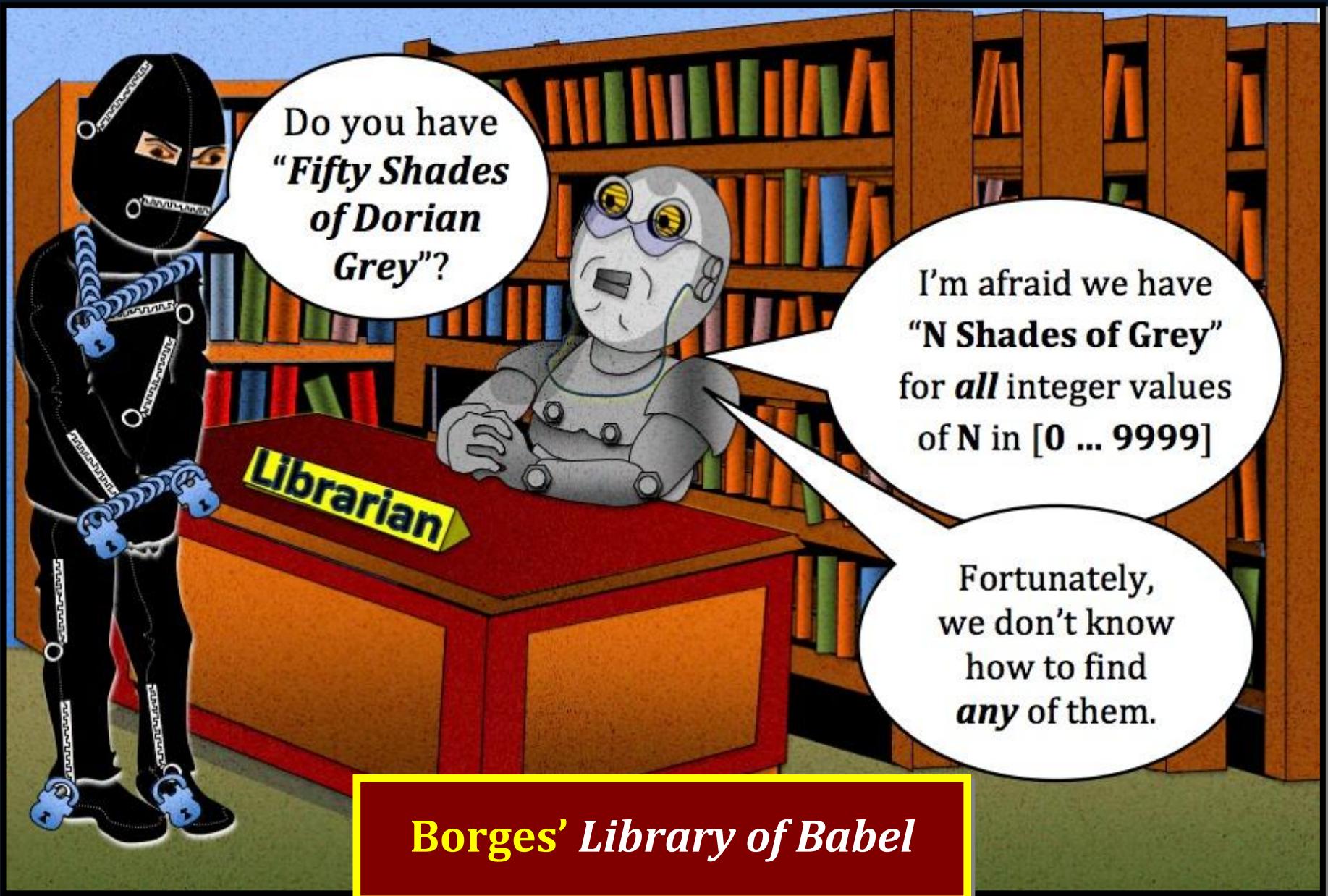
Borges' Library of Babel



To appreciate the importance of selectivity, and the potential for *mere generation* to overwhelm a semiotic system, consider the short story ‘The Library of Babel’ by Jorge Luis Borges.

Borges imagines a vast (but *finite*) library containing every book of fixed upper-size and alphabet that was ever written, or that ever could be written. Want a sequel to *War and Peace*, or the next *Harry Potter* that JK Rowling may one day write? It’s here for the taking.

If you can find it! That’s a big **IF**: the library contains a great many hidden gems, but these are lost in a sea of random possibilities. The library contains many *conflicting guides to itself* (as these are books too), but no guide is authoritative, and so the library is *unusable*.



Borges' *Library of Babel*

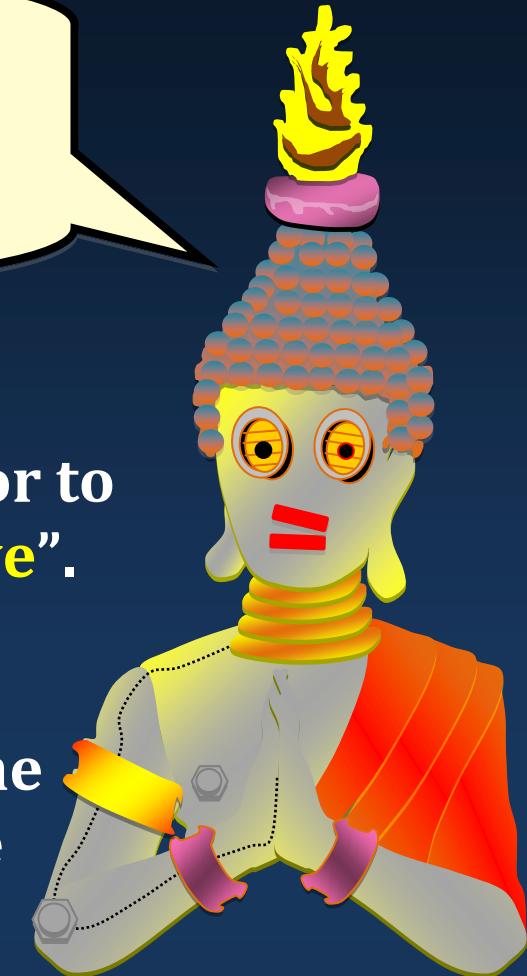
Borges' story takes mere generation to absurd levels, but shows that **mere generation is very *easy***, while **selective generation is very *hard***.

Call me Ishmael. Or Jehovah. Or Buddha. Or Siddhartha. Or Rama. Or Larry. Or The Big Kahuna. Or Skinny Pete. Or Badger. Or Heisenberg. Oh, I could go on, and on, ...

Arthur C. Clarke's The Nine Billion Names of God

We tend not to value the products of **mere generation**, or to respect the process enough to call any output "**creative**".

Consider Arthur C. Clarke's short story *The Nine Billion Names of God*, in which a sect of monks hires a mainframe and some programmers to enumerate all possible nine billion names of God in their unique mystical alphabet.



The monks believe the world **will end** when all 9 billion permutations have been generated. The programmers scoff at this belief, seeing no good reason why the universe should be responsive to **mere generation**.

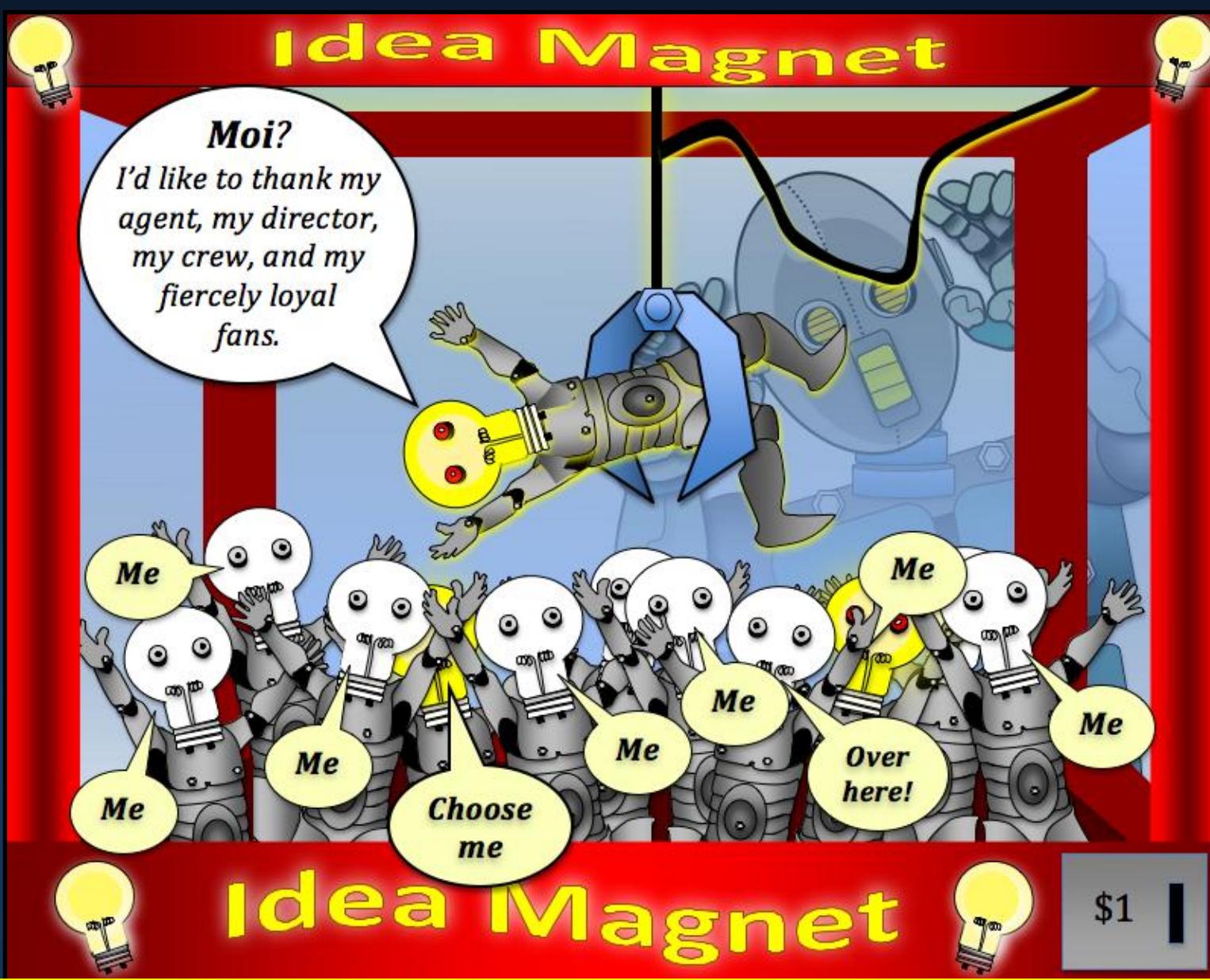
The story is **humorous** because the monks turn out to be **right**: the stars in the sky begin to disappear when all 9 billion names are generated!

Like Borges' *The Library of Babel*, Clarke's "**Nine billion names of God**" explores the limits of **Mere Generation**.

It is all too easy to generate everything from a given grammar or alphabet, but will anyone be patient enough (short of the "**big G**") to sift through the deluge of outputs to find those that have any value?

Clarke's story is humorous because it defies common sense (we intuitively side with the programmers, not the monks). **God does not play random word games with the universe.**





The quality of a computer-generated output lies as much in what is ***not generated***, or is ***not selected***, as in what is generated. In truly creative generation, Many Are Called But Few Are Chosen.



You call this a sandwich,
@sandwiches_bot?
It's a *f--king sh-tty sandwich*, is what it is !



Random Sandwich @sandwiches_bot · 19h

The Evansville: A grilled wheat roll containing duck and bacon, lettuce, and sprouts. Prepared with mayonnaise.

So while @sandwiches_bot is a fun generator

The Matriarch: A pretzel roll containing pork, slaw, and red peppers. Usually eaten with hummus.

It is a mere generator. Fun but *not creative*

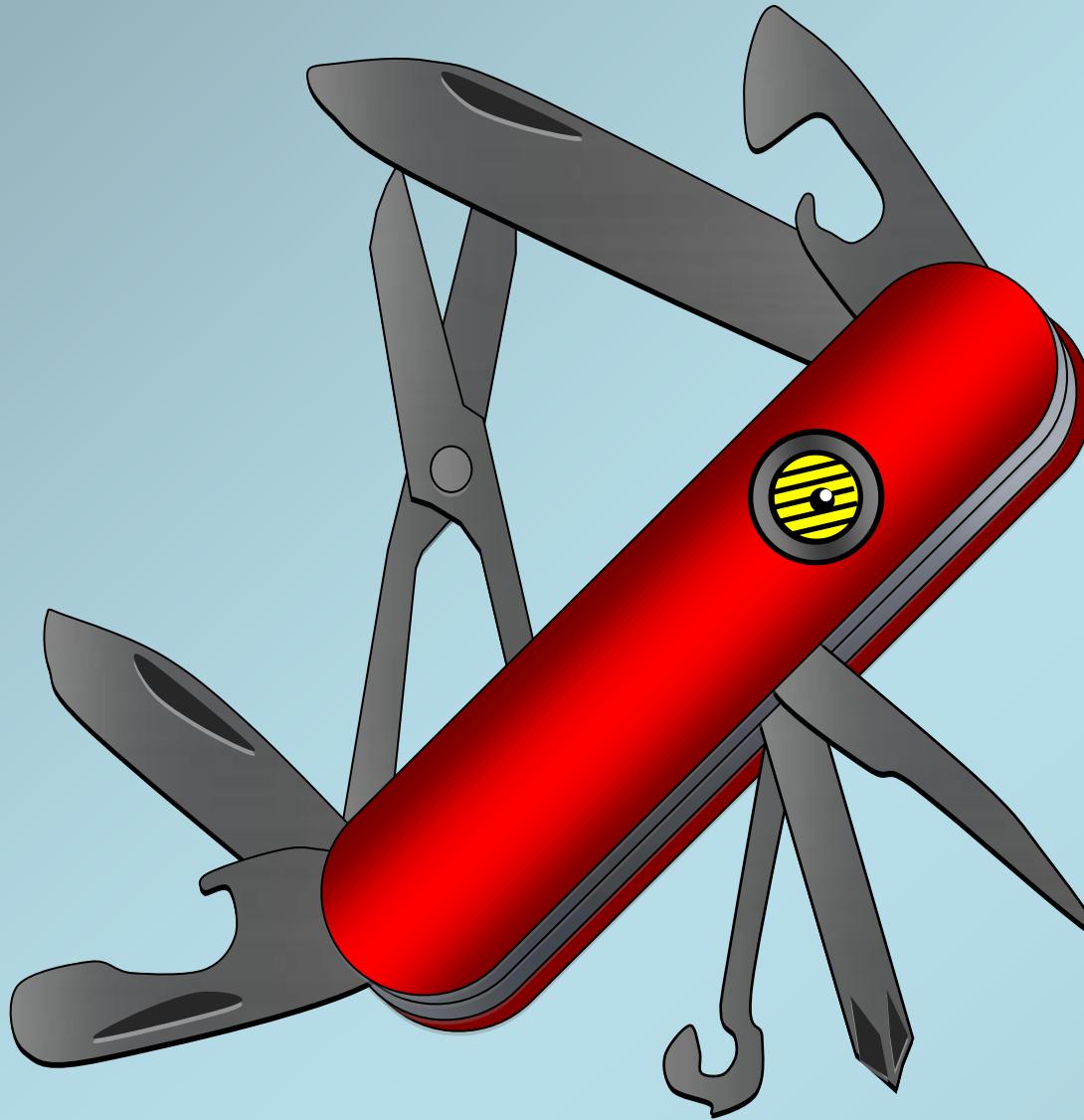
The Kelli: Poached egg, served on a grilled bun, usually with sauerkraut, pickled daikon, and Russian dressing.

Creativity here requires *culinary knowledge*

The Peoria: Traditionally a poached or scrambled egg, Havarti and chicken served on a asiago bun.



So Creative systems must steer a course between *Pastiche* & *Mere Generation*



We think of Creativity as a single concept, but it manifests itself in many guises. It can be “*implemented*” in many complementary ways.



There is **no single cognitive mechanism** of creativity, no single hammer than can handle every nail. Rather, creativity involves the application of **diverse cognitive strategies**, individually or in combination, to suit the particular needs of a given scenario.

With **no one-size-fits-all strategy**, and no definitive guide as to which one to use in which context, the best we can offer is **a comprehensive checklist of strategies**. A creator must understand what options are available, and experiment with these options to **find the right mix**.



Naturally, there is **no definitive checklist** for Creativity.

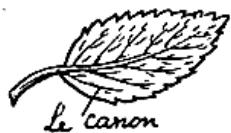
Rather, every creator will **carve up the world**, and their notion of creativity, into different goal-specific concepts and actions.

Thus, an artist may have a different checklist of **go-to strategies** from a theoretical scientist or a commercial inventor.

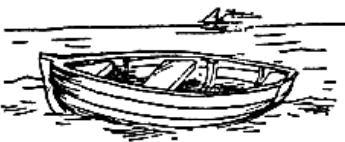
The Belgian surrealist **Rene Magritte** proposed a checklist of strategies for producing his distinctive brand of visual wordplay. He intended his checklist to be an art *manifesto*: **Les Mots et Les Images**

LES MOTS ET LES IMAGES

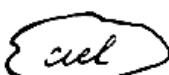
Un objet ne tient pas tellement à son nom qu'on ne puisse lui en trouver un autre qui lui convienne mieux



Il y a des objets qui se passent de nom :



Un mot ne sert parfois qu'à se désigner soi-même :



Un objet rencontre son image, un objet rencontre son nom. Il arrive que l'image et le nom de cet objet se rencontrent.



Parfois le nom d'un objet tient lieu d'une image



Un mot peut prendre la place d'un objet dans la réalité :

Une image peut prendre la place d'un mot dans une proposition :



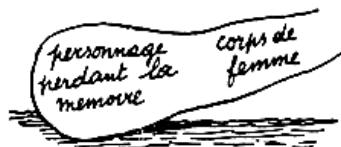
Un objet fait supposer qu'il y en a d'autres derrière lui :



Tout tend à faire penser qu'il y a peu de relation entre un objet et ce qui le représente



Les mots qui servent à désigner deux objets différents ne montrent pas ce qui peut séparer ces objets l'un de l'autre



Dans un tableau, les mots sont de la même substance que les images



On voit autrement les images et les mots dans un tableau :

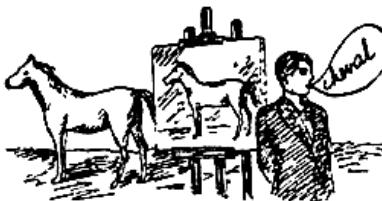
Une forme quelconque peut remplacer l'image d'un objet



Un mot peut prendre la place d'un objet dans la réalité :



Un objet ne fait jamais le même office que son nom ou que son image



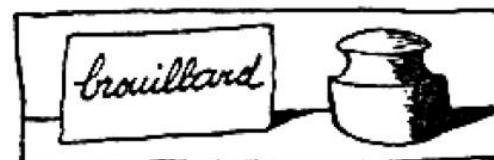
On voit autrement les images et les mots dans un tableau :



Or, les contours visibles des objets, dans la réalité, se touchent comme s'ils formaient une mosaïque :



Ou bien le contraire :



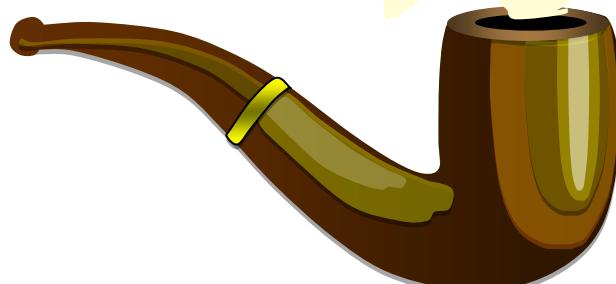
Les figures vagues ont une signification aussi nécessaire aussi parfaite que les précises :

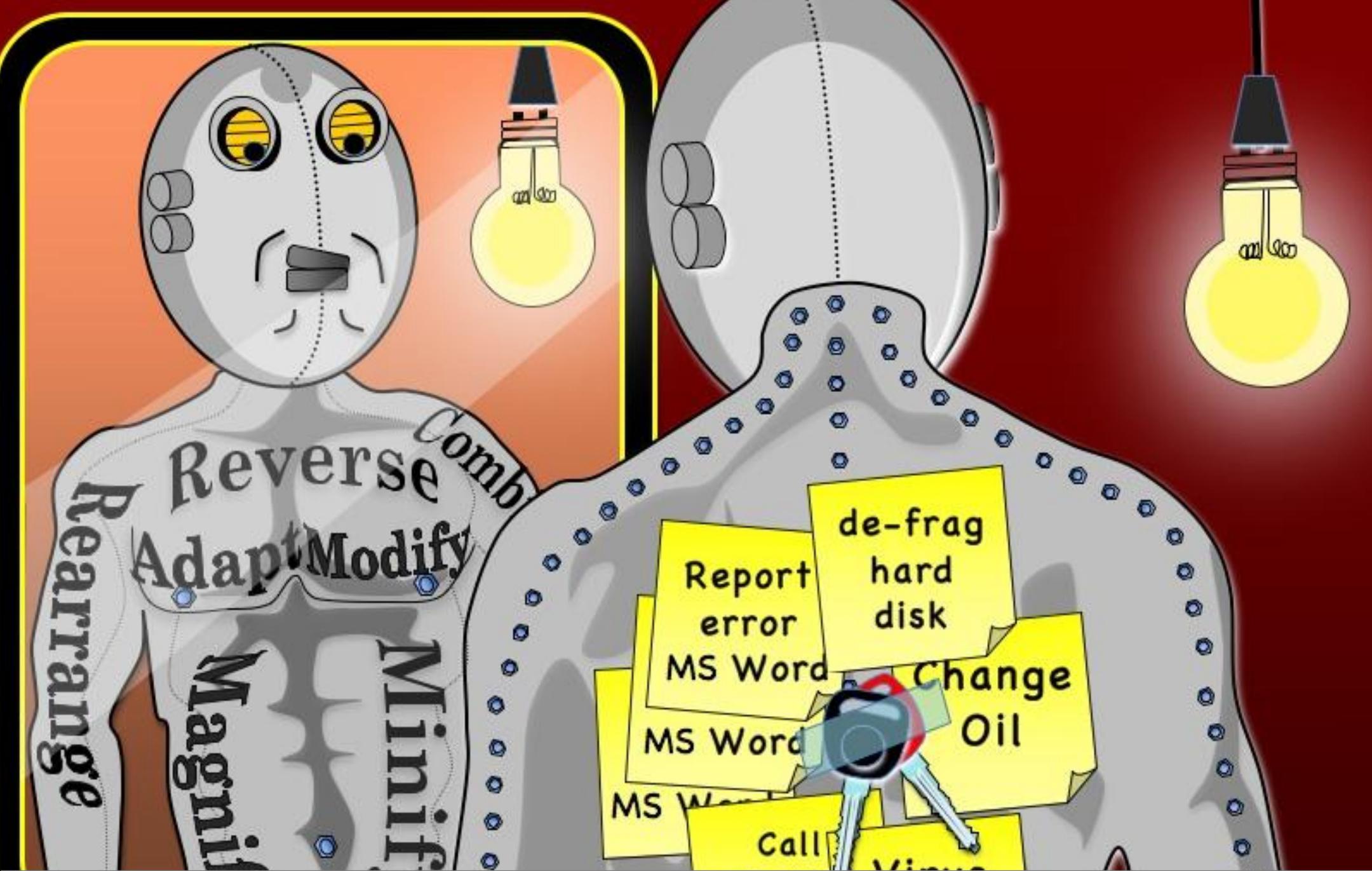


Parfois, les noms écrits dans un tableau désignent des choses précises, et les images des choses vagues



Rene Magritte's Checklist





A very famous creativity checklist (for humans) comes from **Alex Osborn**

TO START

1. Adapt?

- a. Are there new ways to use this as is?
- b. Other uses if modified?

2. Modify?

- a. New twist? b. Change meaning? c. Change color?
- d. Change motion? e. Change sound? f. Change odor?
- g. Change form? h. Change shape? i. Other changes?

3. Minify?

- a. Subtract? b. Smaller? c. Condensed?
- d. Lower? e. Shorter? f. Lighter?
- g. Omit? h. Streamline? i. Split up?
- j. Understate?

DESSERTS



7. Reverse?

- a. Swap Positive & Negative? b. How about opposites?
- c. Turn it backward? d. Upside down?
- e. Reverse roles? f. Turn tables?

MAINS

4. Magnify?

- a. What to add? b. More time? c. More frequent?
- d. Stronger? e. Higher? f. Longer?
- g. Thicker? h. Extra value? i. New ingredient?
- j. Duplicate? k. Multiply? l. Exaggerate?

5. Substitute?

- a. Who else? b. What else? c. Other ingredient?
- d. Other Material? e. Other process? f. Other power?
- g. Other place? h. Other approach? i. Other tone?

6. Rearrange?

- a. Switch parts? b. Other pattern? c. Other layout?
- d. Other sequence? e. Swap cause & effect?
- f. Change pace? g. Change schedule?

8. Combine?

- a. Blend? b. Alloy? c. Assortment?
- d. Ensemble? e. Combine units? f. Combine purposes?
- g. Combine appeals? h. Combine ideas

Osborn's checklist, like others, suggests a menu of **tools** to explore a space



Strategies allow us to ***explore*** a conceptual space. Can we be more ***revealing***?

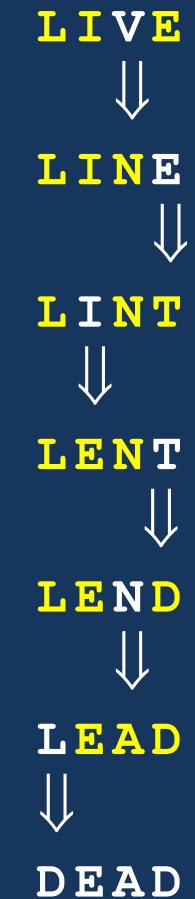
Consider Lewis Carroll's game **Doublets**, in which we explore a space of words

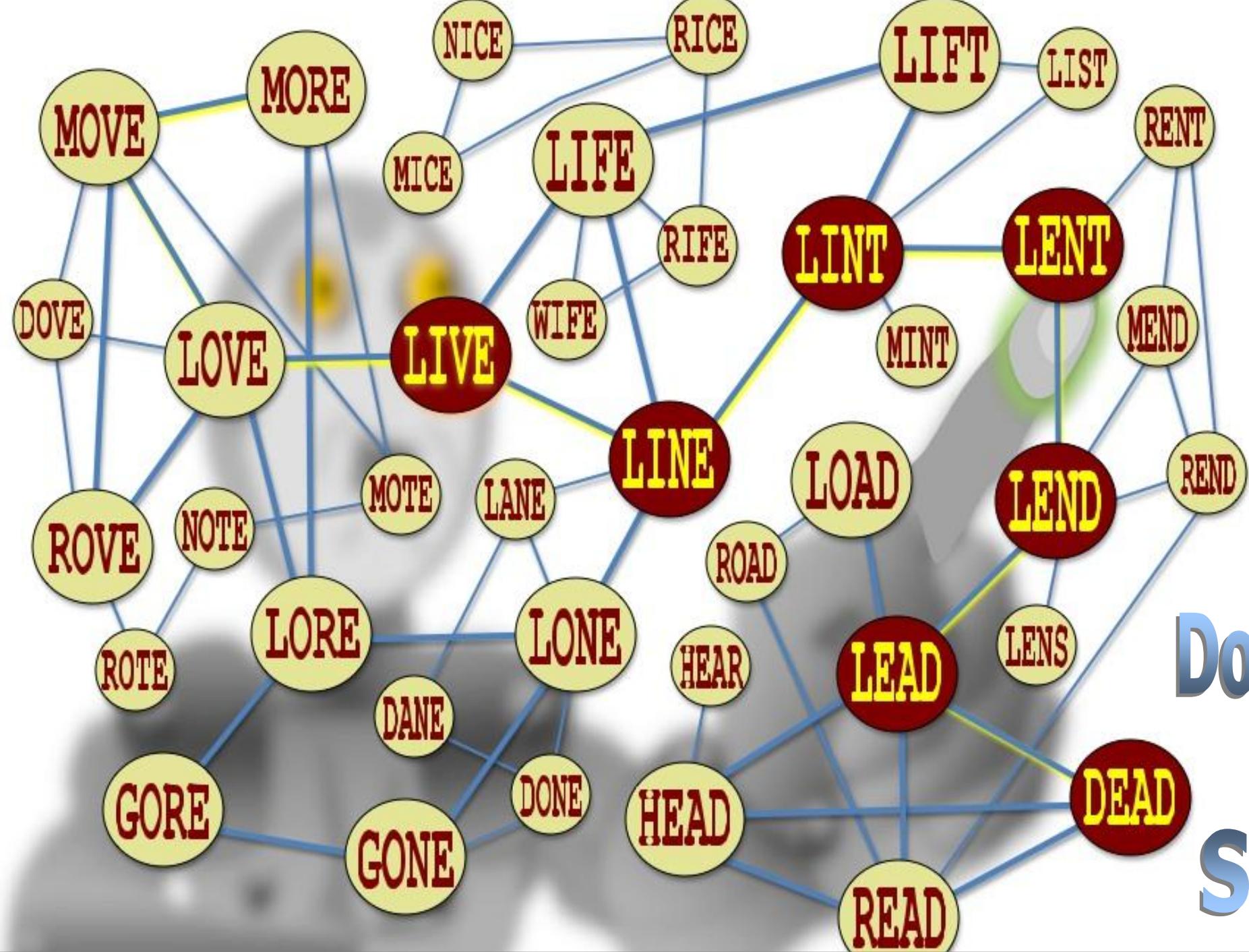
Lewis Carroll invented a simple word game that illustrates the role of search in problem-solving. The game is called **Doublets**:

Two words of equal length are chosen (the *doublets*). The goal is to turn one word into the other by *changing just one letter at a time*. The catch? Each intermediate state must be a word too.

The creator of a game instance must search for two related words (like LIVE & DEAD) that can serve as *interesting* doublets.

The player of each game instance must search for the *shortest* (or *most interesting*) path between words to link doublets. This exploratory search can be *quick & insightful*, or *slow & plodding*.





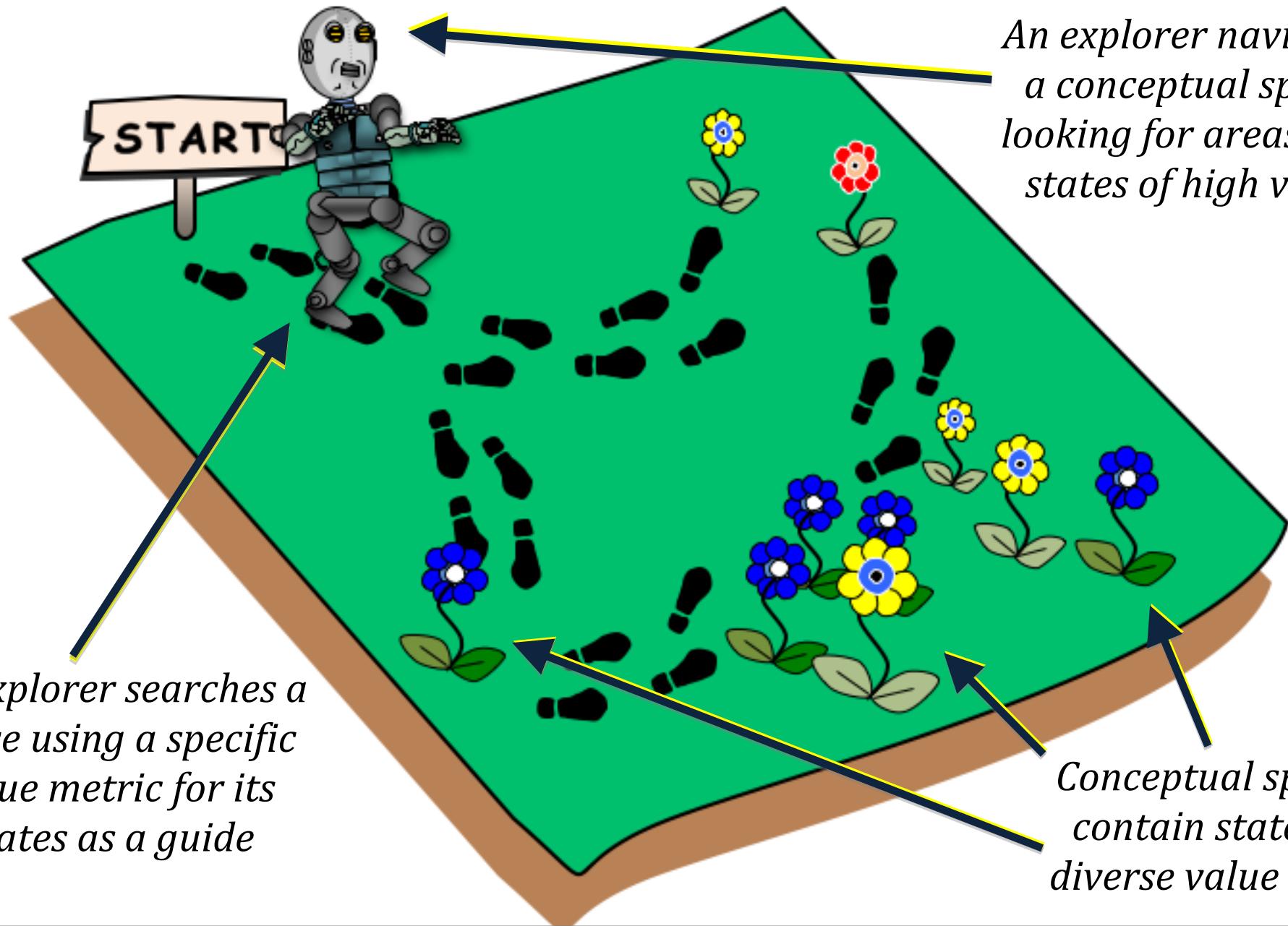
Douplets
as
Search

Game creators & game players alike must each build *their own space to explore*.



In **Exploratory Creativity**, a creator explores an established space of ideas

A creator searches a space to find a goal-state that is both ***novel*** (as yet undiscovered) and ***valuable*** (e.g. ***useful, workable, efficient***). One needs a state space to search, and a ***value metric*** to guide the search.

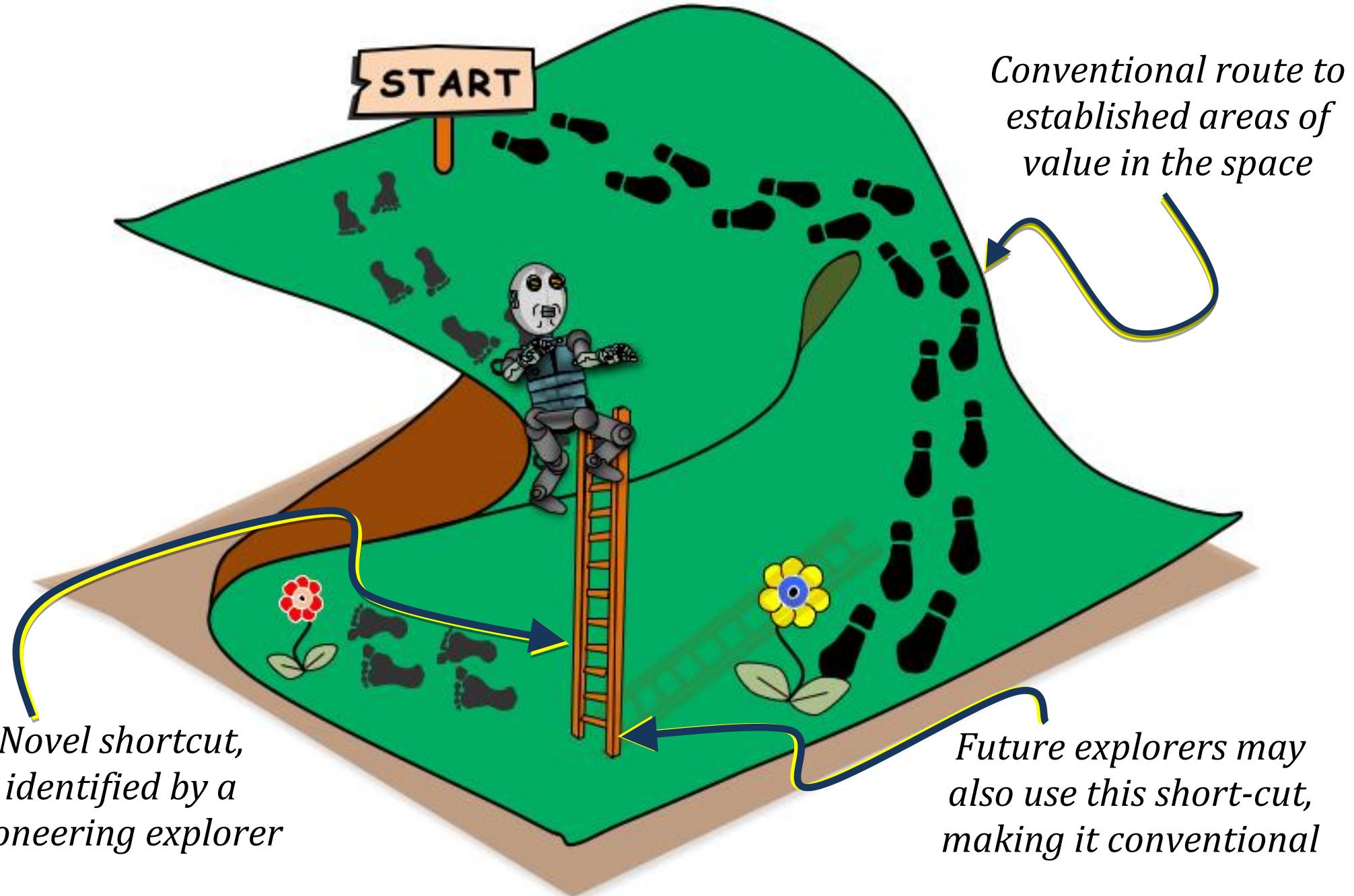


An explorer searches a space using a specific value metric for its states as a guide

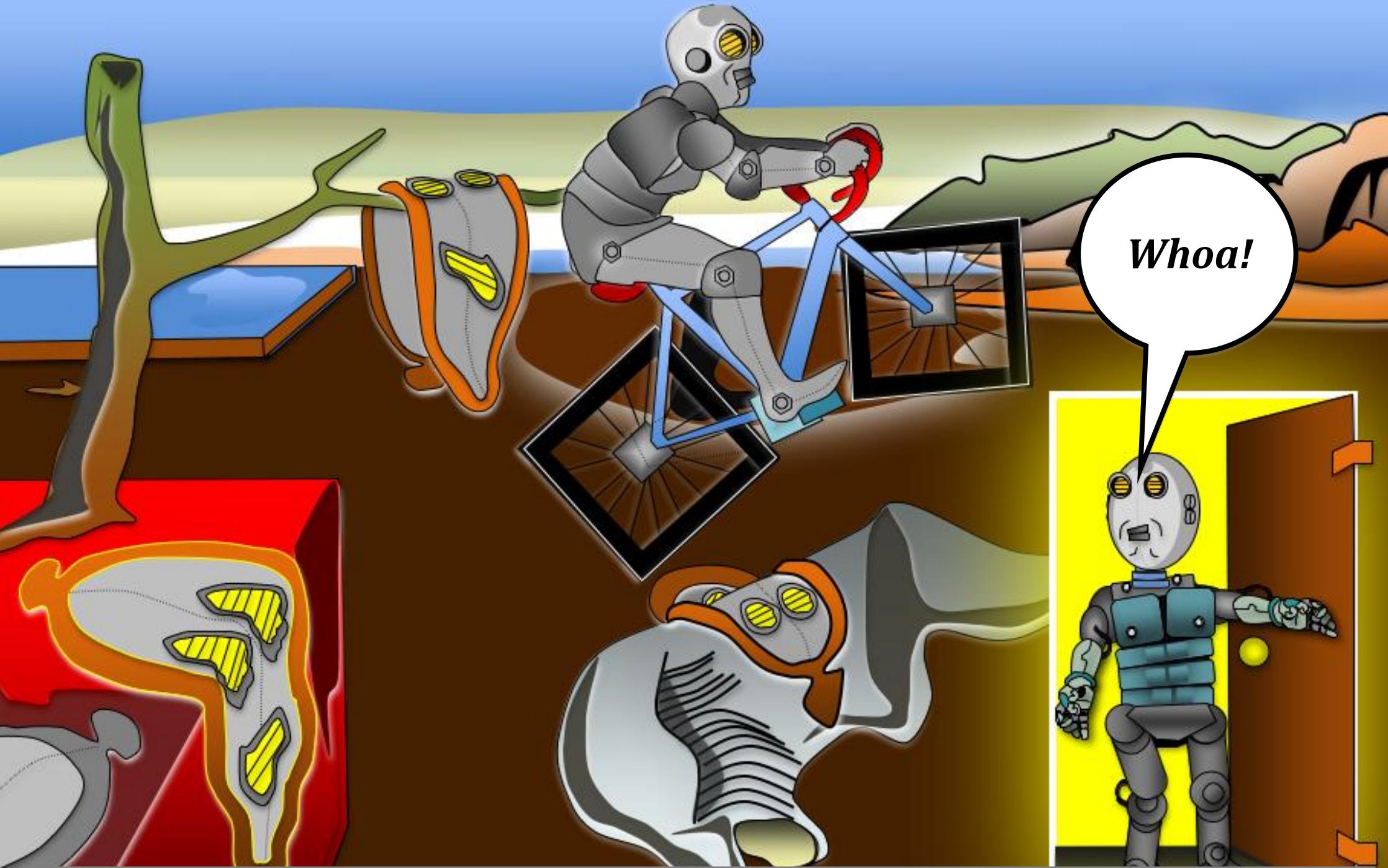
An explorer navigates a conceptual space, looking for areas with states of high value

Conceptual spaces contain states of diverse value & use

Often, we seek a valuable state. In *Doublets*, the path itself is the creative product.



If we can find a **novel pathway to a valuable state**, this solution is **doubly creative**



Truly pioneering explorers may *transform the space* itself, thus *changing the rules*

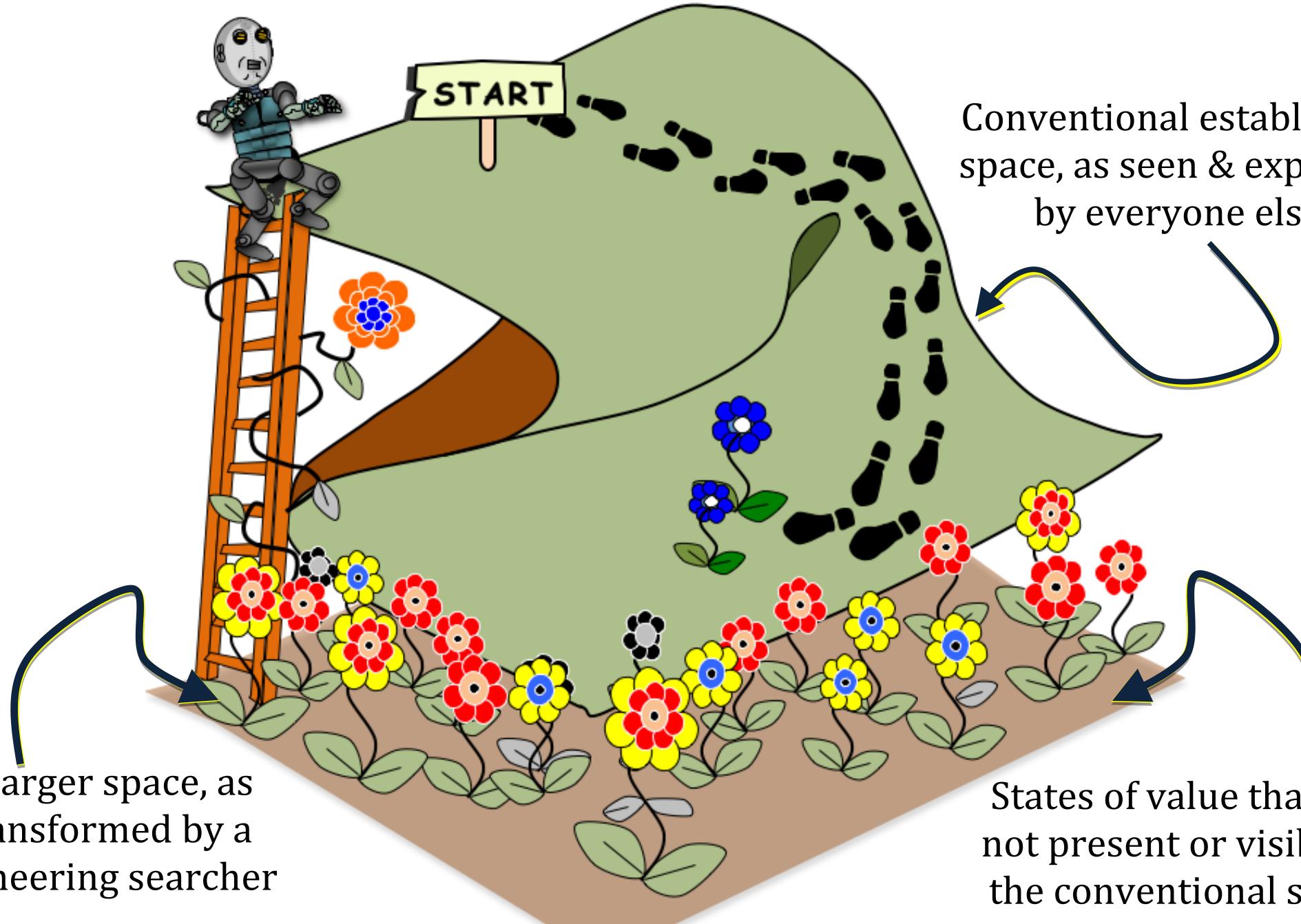


W.A. Mozart was a **virtuosic explorer** of the space of classical music. Time and again he identified complex musical states (*concertos, symphonies, etc.*) of astounding beauty and resonance that have since become landmark states in the **classical space**.

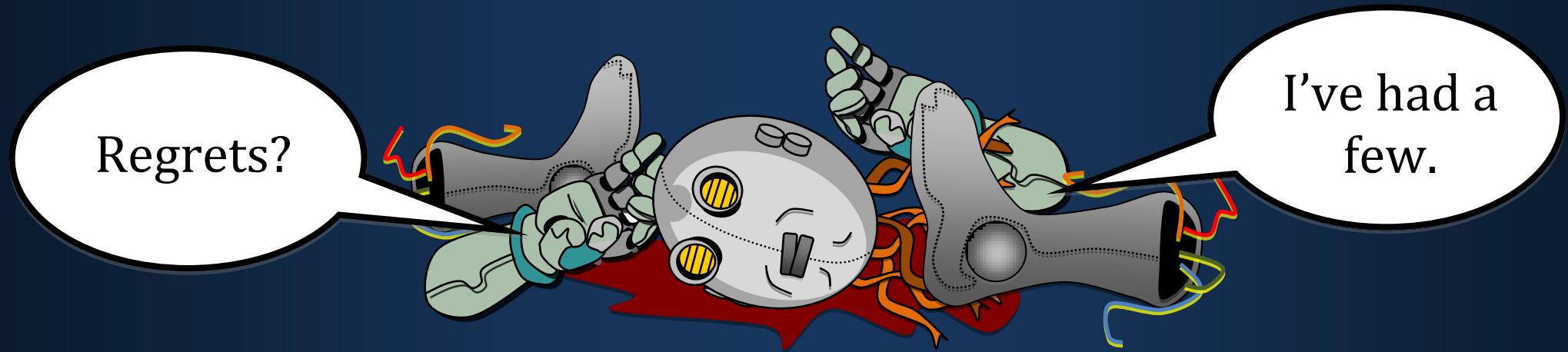
Mozart inspired many others to explore the same space, but he did not change the space.

Later musical theorists such as **Arnold Schoenberg** changed and enlarged the space of Western music in radical ways, much as **Albert Einstein** transformed science's Newtonian conception of space and time.

Einstein's transformed space allowed physicists to find a solution to Mercury's odd orbit, having failed to find a solution in Newton's space. Is **Schoenberg's** music better than **Mozart's**? Let's just agree it's **different**.



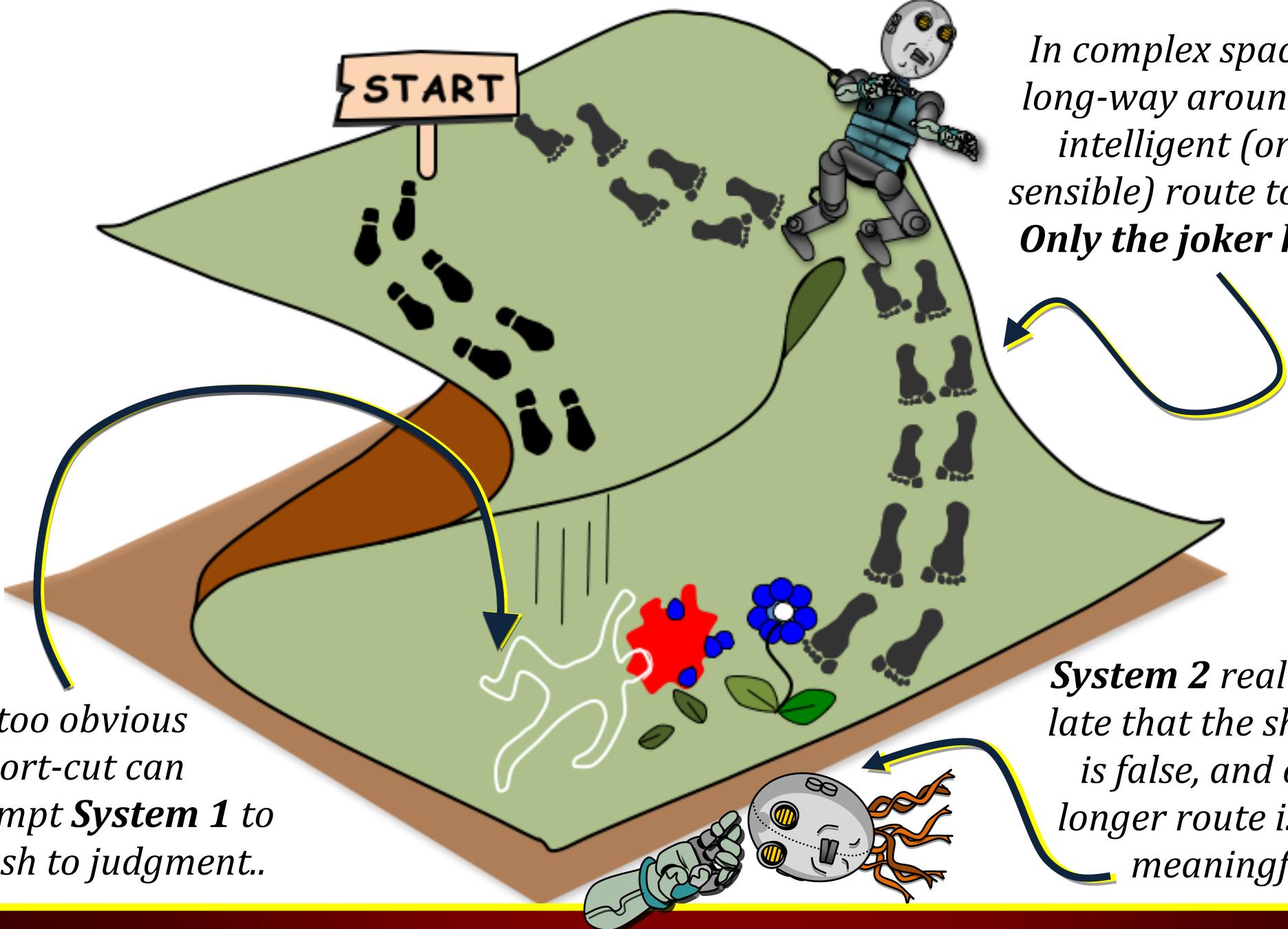
Why *transform a space*? To find new areas of production unreachable in others.



A creative explorer of a search space aims to find states that are both *novel* and *useful/valuable* according to some metric. It can be frustrating to get *lost in a valueless area* of the space, or to realize that one has been *mislead by faulty intuitions* into searching the *wrong part of the space*.

Narrative jokes do precisely this: they exploit (and reinforce) our assumptions so as to **fool us into exploring** a space of possibilities that are simply not relevant to the understanding of the given narrative.

The **punchline**, when it finally comes, makes no sense at all in the part of the space to which our mistaken **System 1** assumptions have lead us. To make sense of the punchline, we call on **System 2** to *resolve the impasse* and take us – *chastened but relieved* – to a very different part of the space.



Narrative jokes exploit false short-cuts to trick a listener's System 1



How do we know
if we have reached
our *goal* as builders
of Creative Systems?
How can our
systems know?

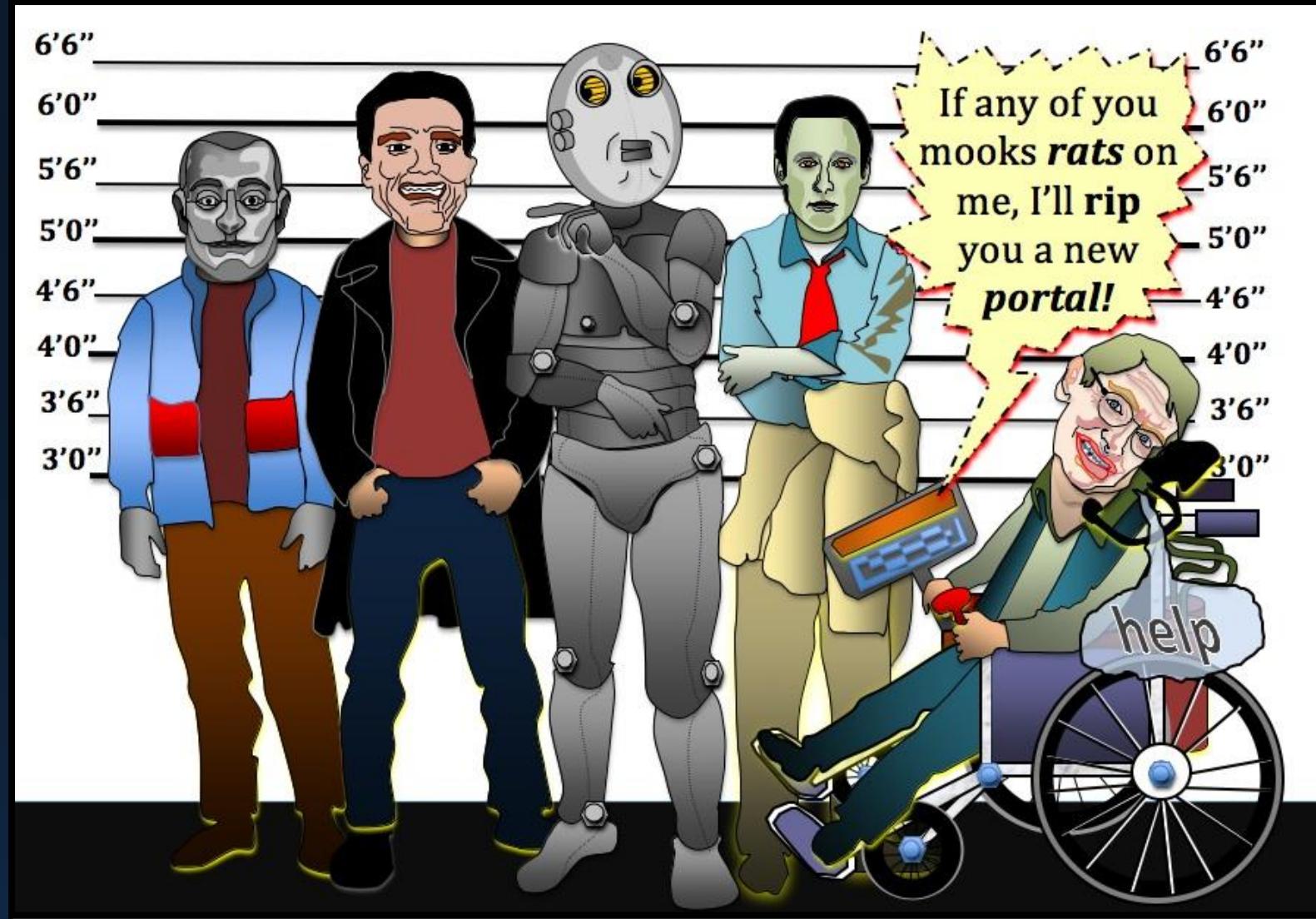


Personal Firsts versus Truly Historical Creativity

Creativity theorist **Margaret Boden** distinguishes two types of creative outcome: **P-Creativity** and **H-Creativity**. **P** identifies an outcome that is original to its creator, **H** an outcome that is original to society as a whole. A demonstrably **P-Creative** machine can also be **H-Creative** in principle.



Claims of H-Creativity require societal evaluation, though a human evaluator is more likely to ascribe creativity to another human than to a machine. So it is tempting to evaluate CC systems by having them pretend to be humans, as part of an elaborate **Imitation Game**. It is a temptation we should avoid: ***We are not in the business of building fake humans!***

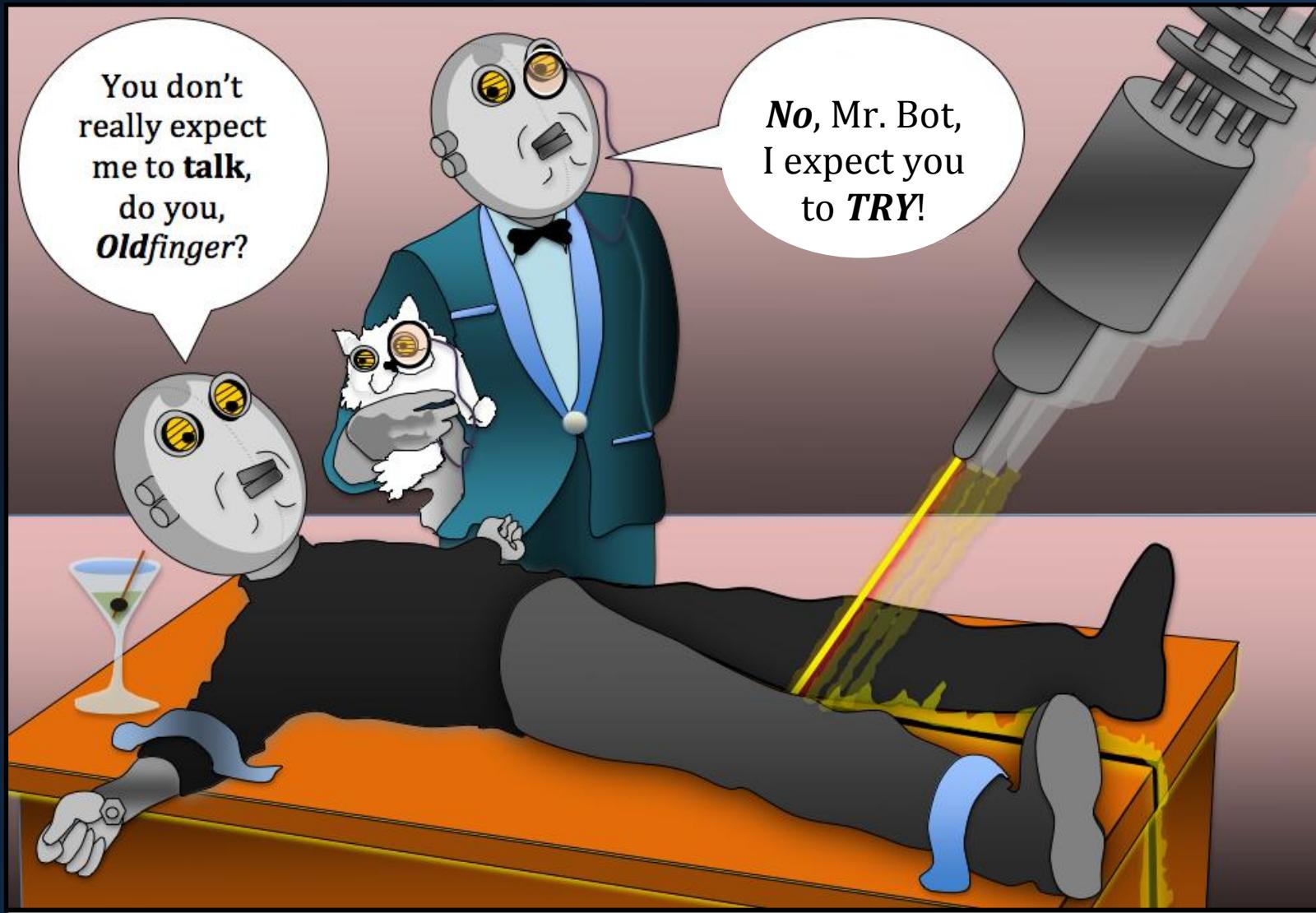


Imitation Games encourage a race to the bottom for CC/AI research, by encouraging researchers to emulate the worst (or most easily) simulated human qualities, such as a *lack of engagement, coherence and profundity*. Experience with **Turing-style** tests in AI suggest researchers emphasise an ability to fool evaluators over an ability to impress evaluators.

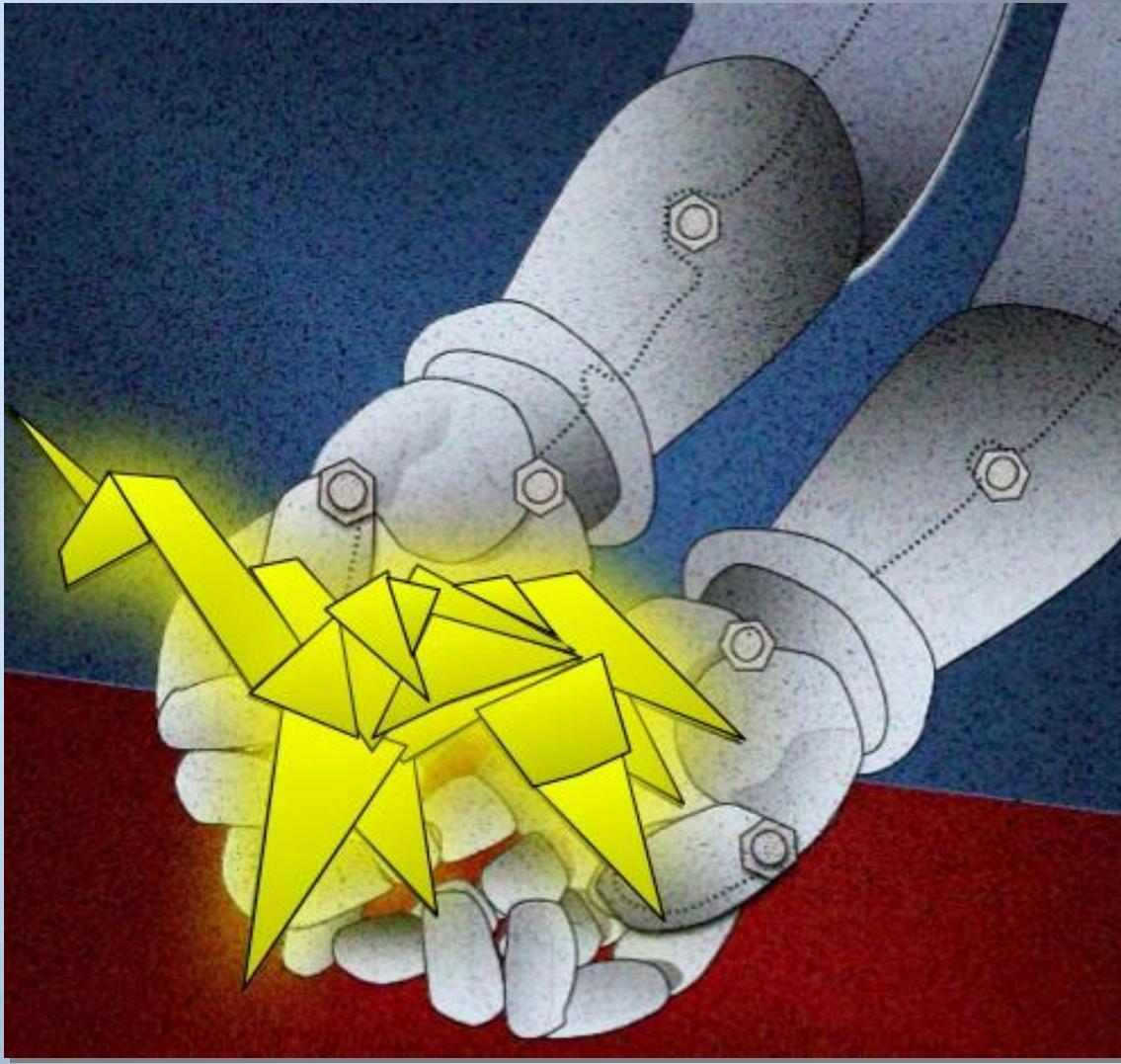
Dammit,
punk, last chance!
What's your
favorite poem,
and **why**?

I want
my **lawyer**,
pig!

The *real* Turing test?



Alan Turing imagined a thought experiment in which a human evaluator would have a discussion of real substance – about literature, poetry, art – with a putative machine. A CC system than can discuss its own *influences*, and share its *inspiring examples*, *motivations*, *successes* and *failures*, is much more likely to impress as a truly creative producer.



A Parting Note: Creativity is not an objective phenomenon. A computer, like any other creator, can only offer up its outputs in good faith, for the world to evaluate. Computational Creativity is ultimately the study of how a machine might show such good faith.