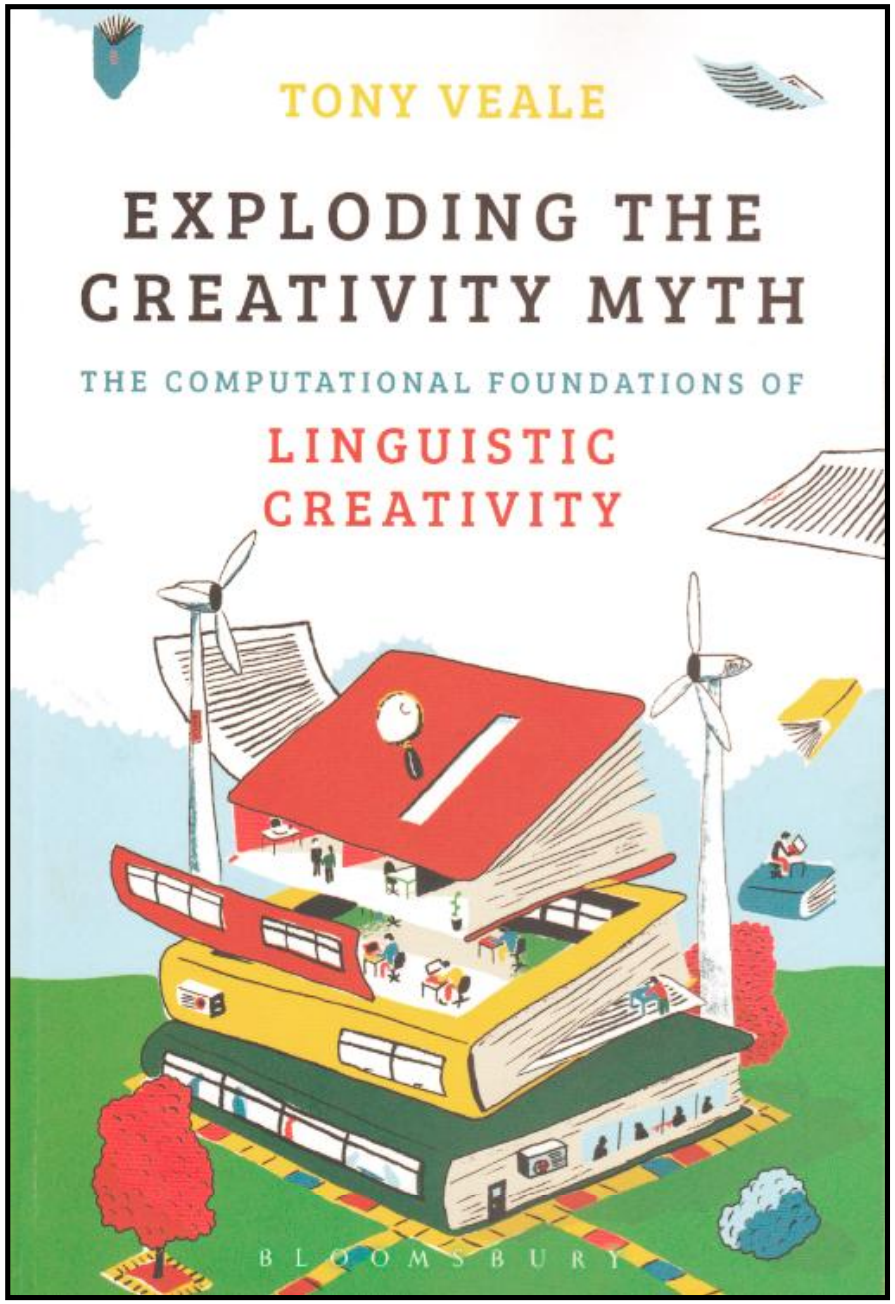
Hand-Made by Machines?

An Illustrated Guide to Creativity in Humans *and* Computers

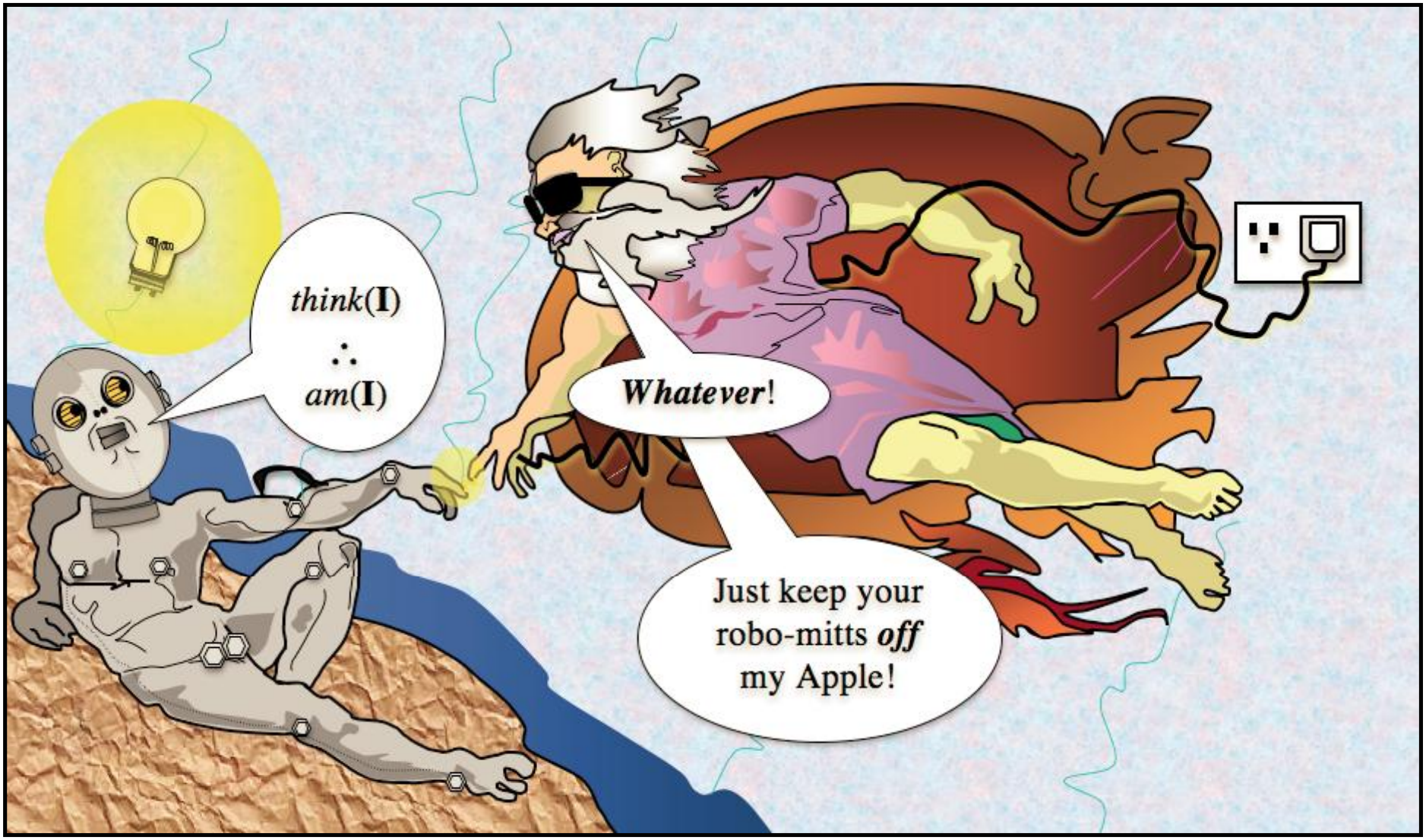


Enter through the Gift Shop

Available from all good Web Superstores

(or contact me:

Tony.Veale@UCD.ie)



Mechanical Creativity and *Meta*-Creativity

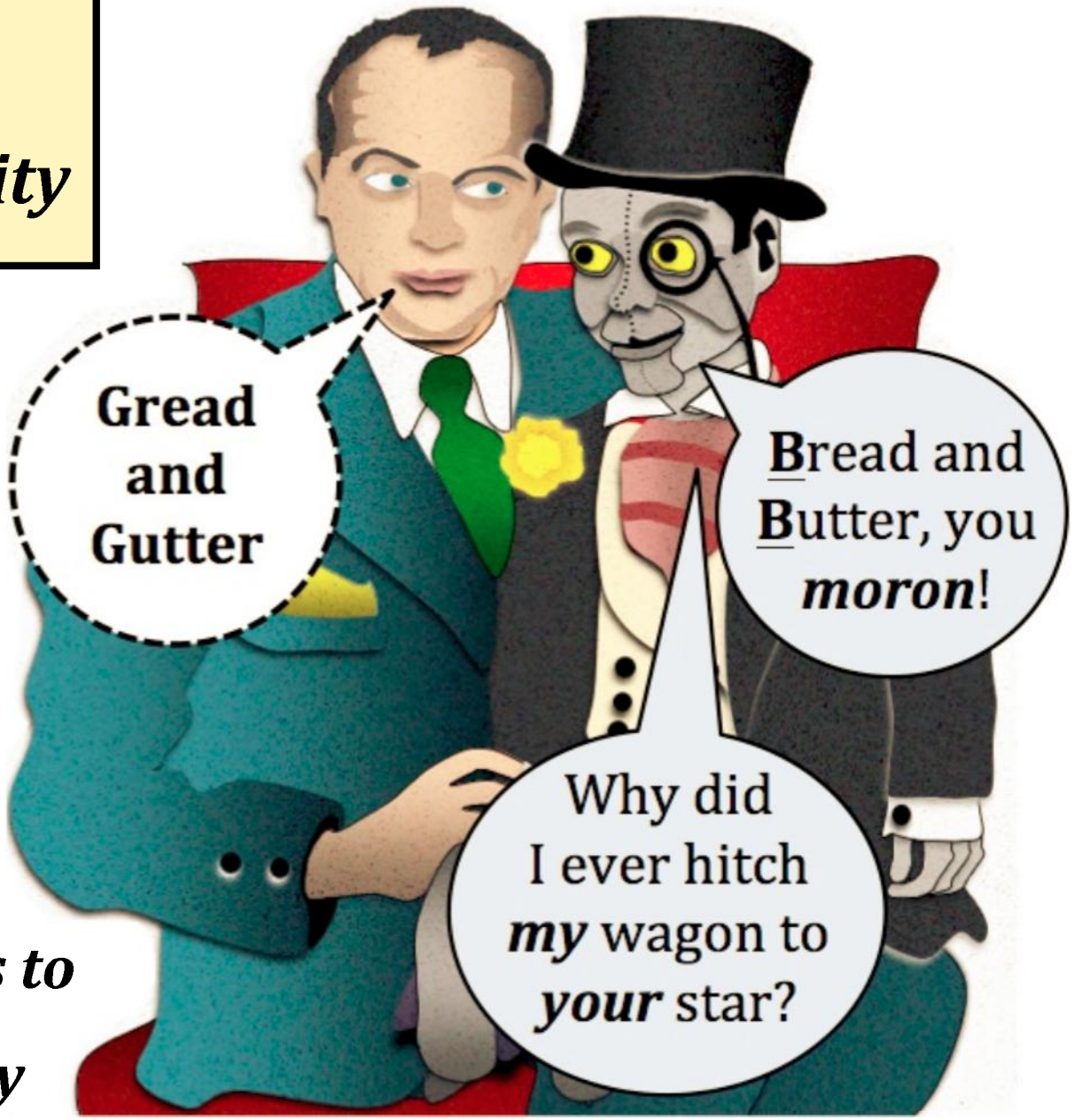
Strong vs. *Weak* *Computational Creativity*

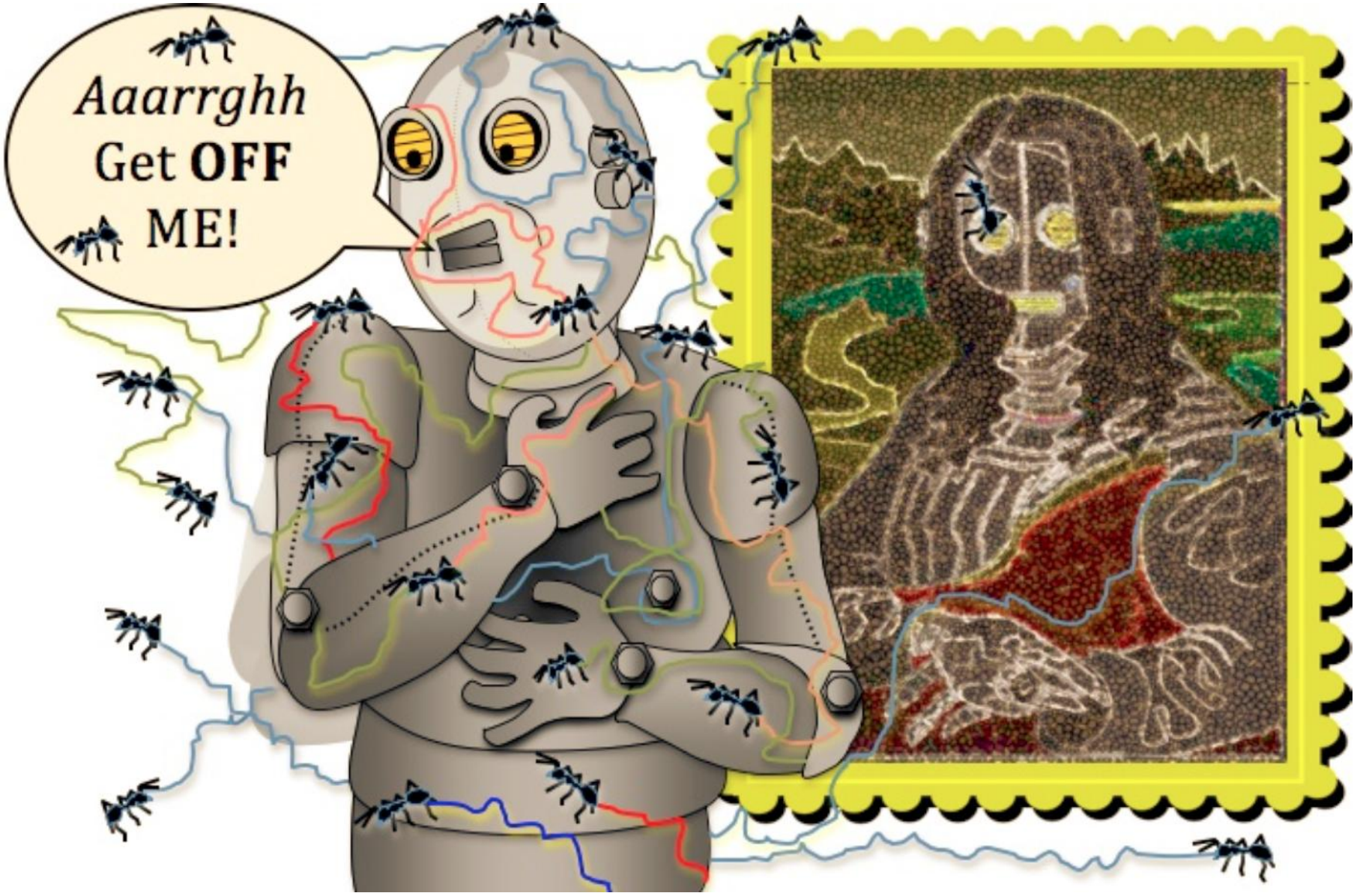
Strong CC:

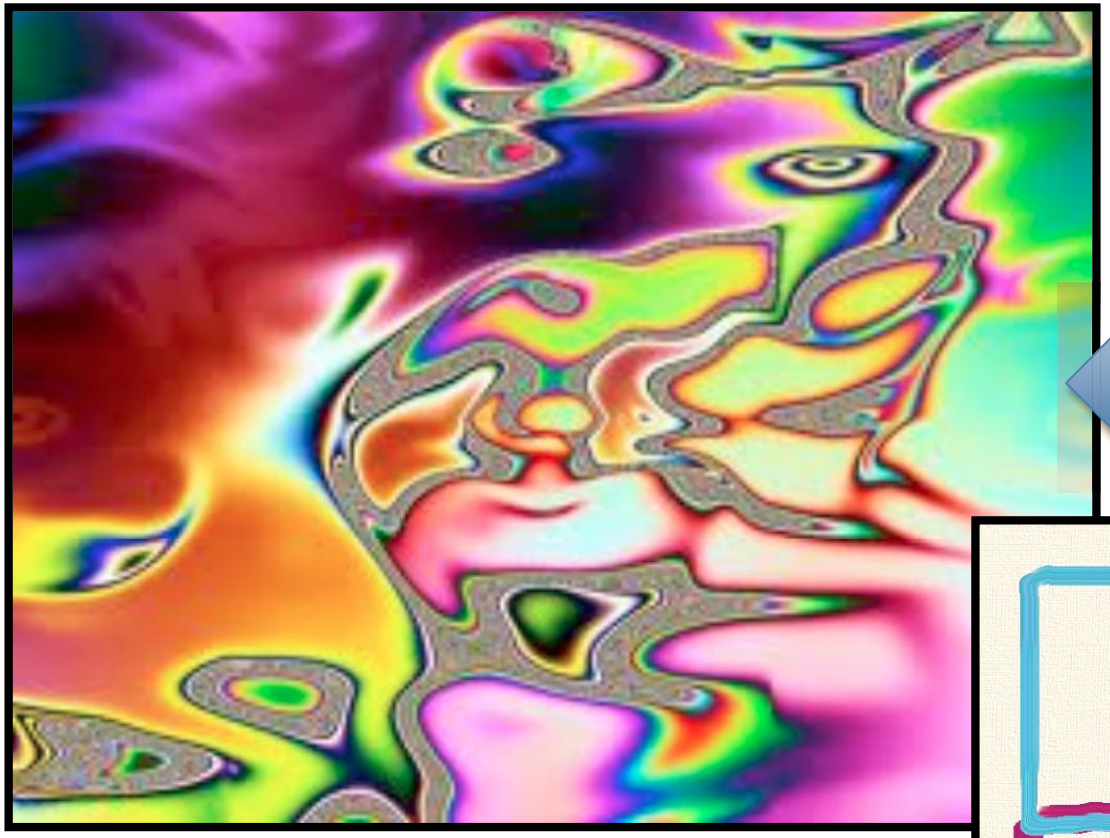
Full Autonomy + Intent

Weak CC:

Partially Autonomous tools to enhance human creativity

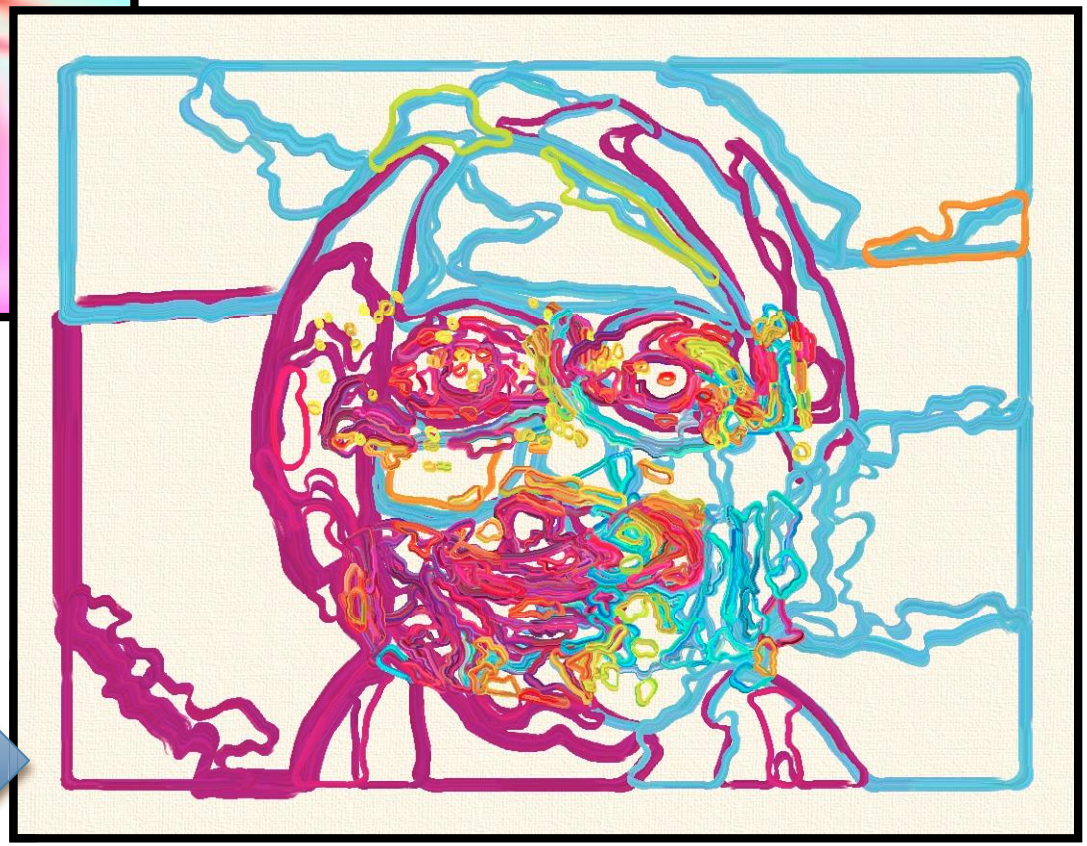



Aaarrghh
Get OFF
ME!



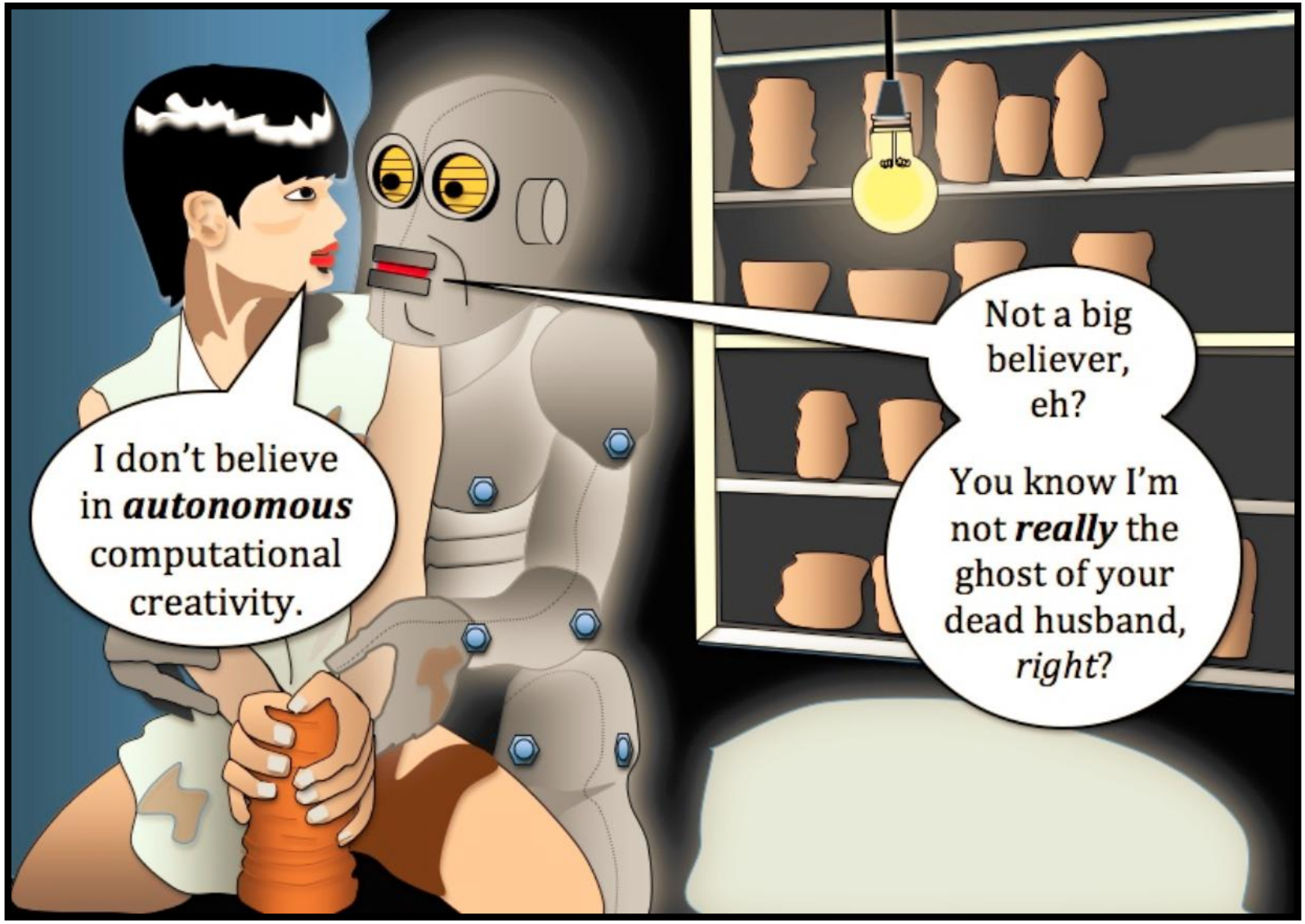
Color-Mapped Depictions of Evolved Mathematical Formulae

-- Penousal Machado's NEVAR



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

-- Simon Colton's The Painting Fool

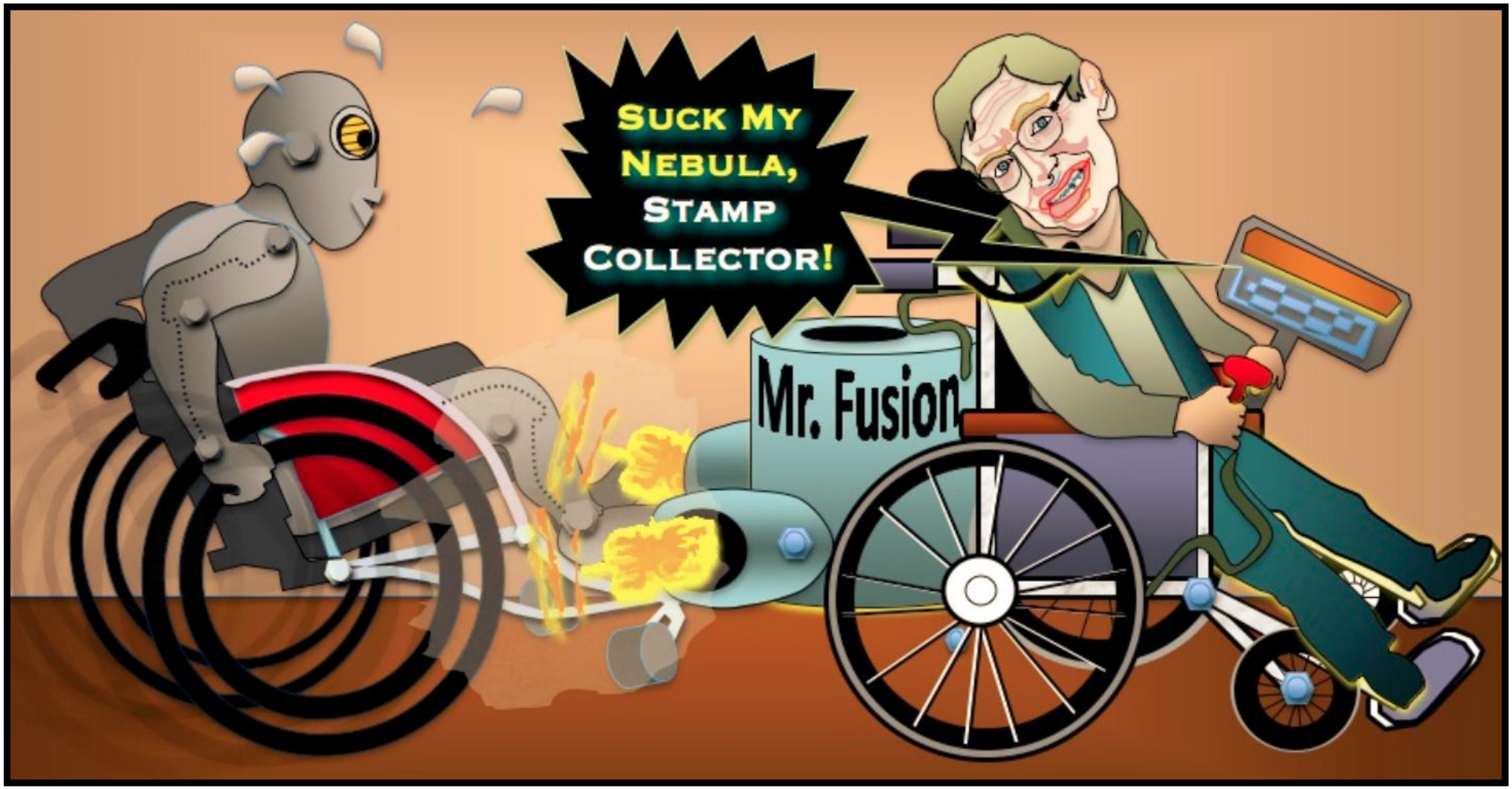


Collaborative *Co*-Creation

Weg versus Weg

MMMMM, Delicious

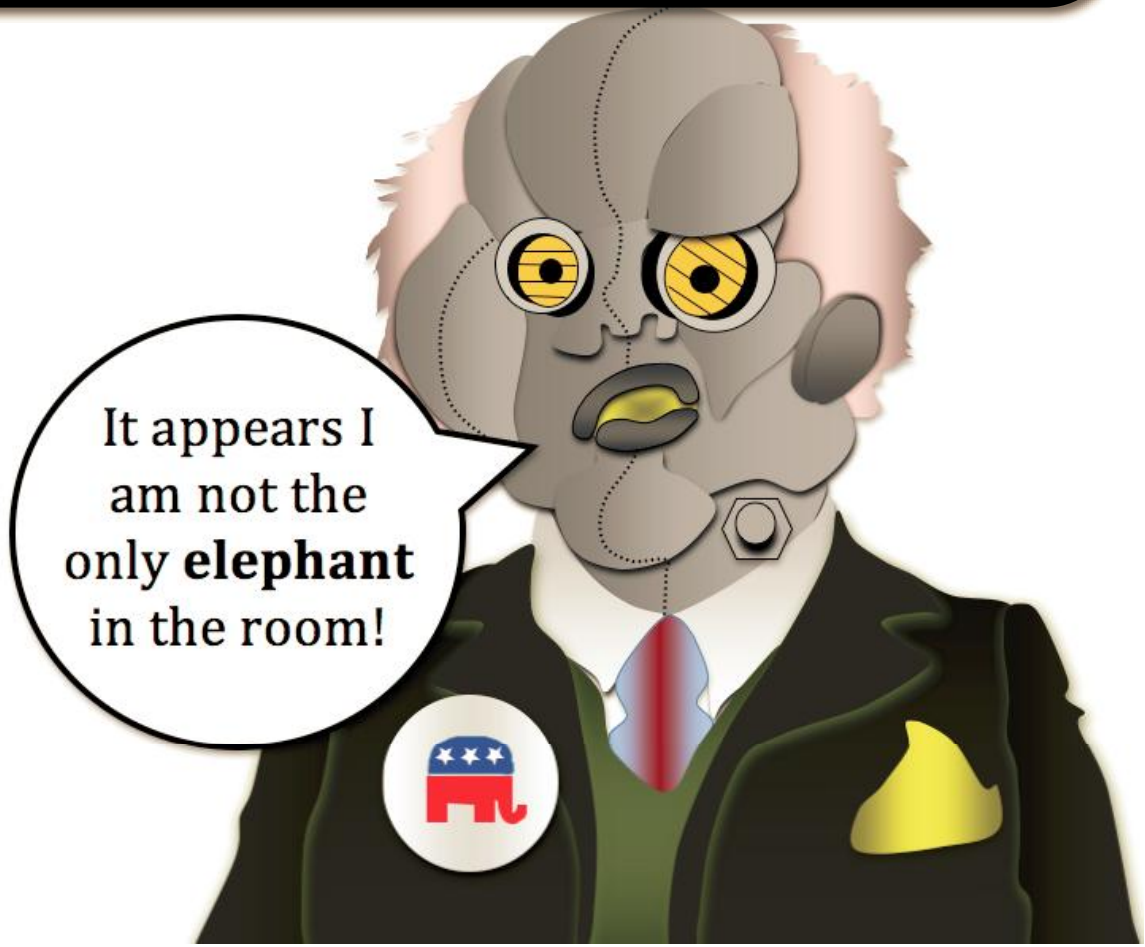
Acquiring Aesthetics and Evolving Tastes

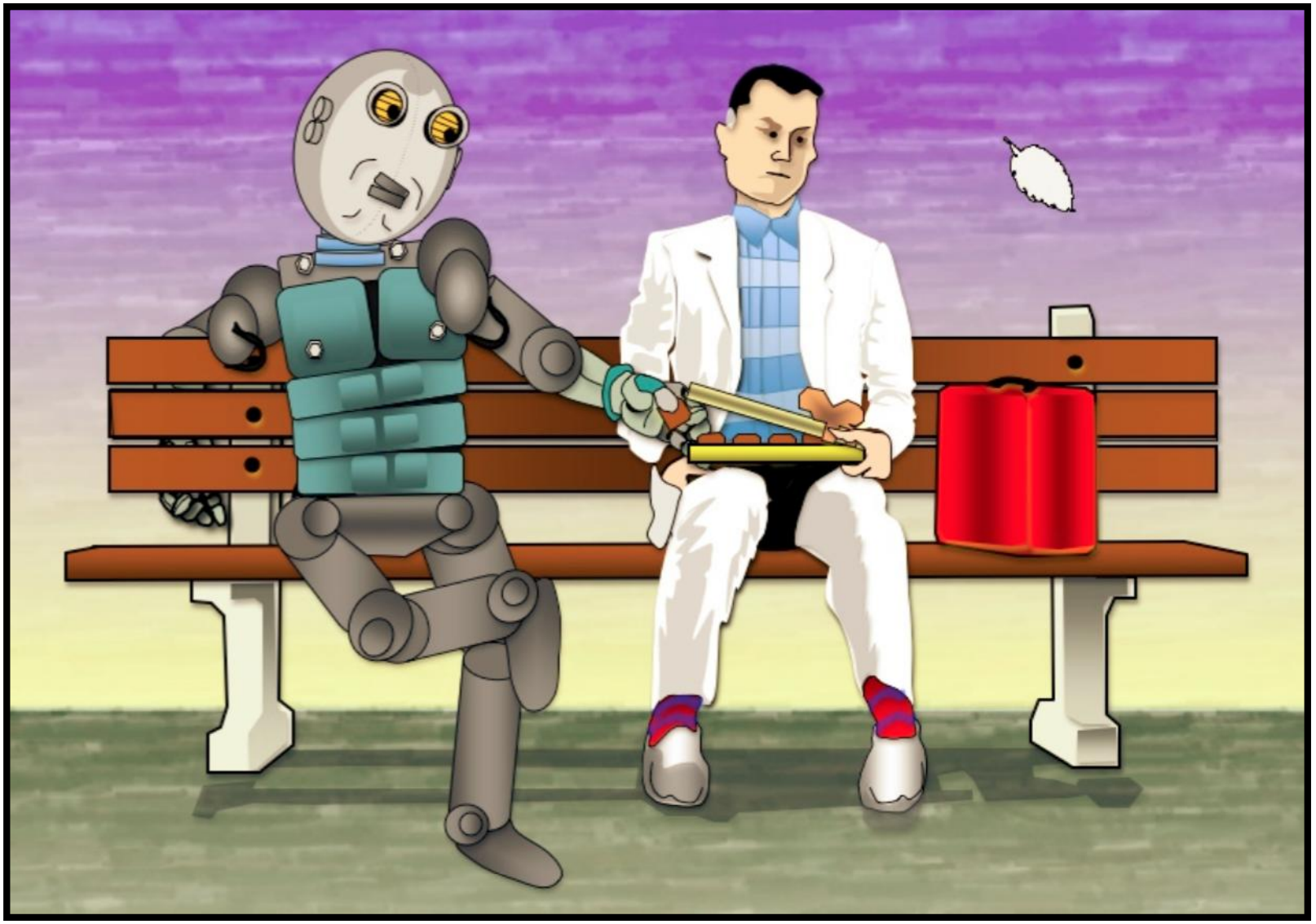


Defining Creativity: *Physics Envy?*

The philosophy, science and engineering of computational systems which, by taking on particular responsibilities, exhibit behaviours that unbiased observers would deem to be ***creative***.

Colton and Wiggins, 2012





Creative is as creative does

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

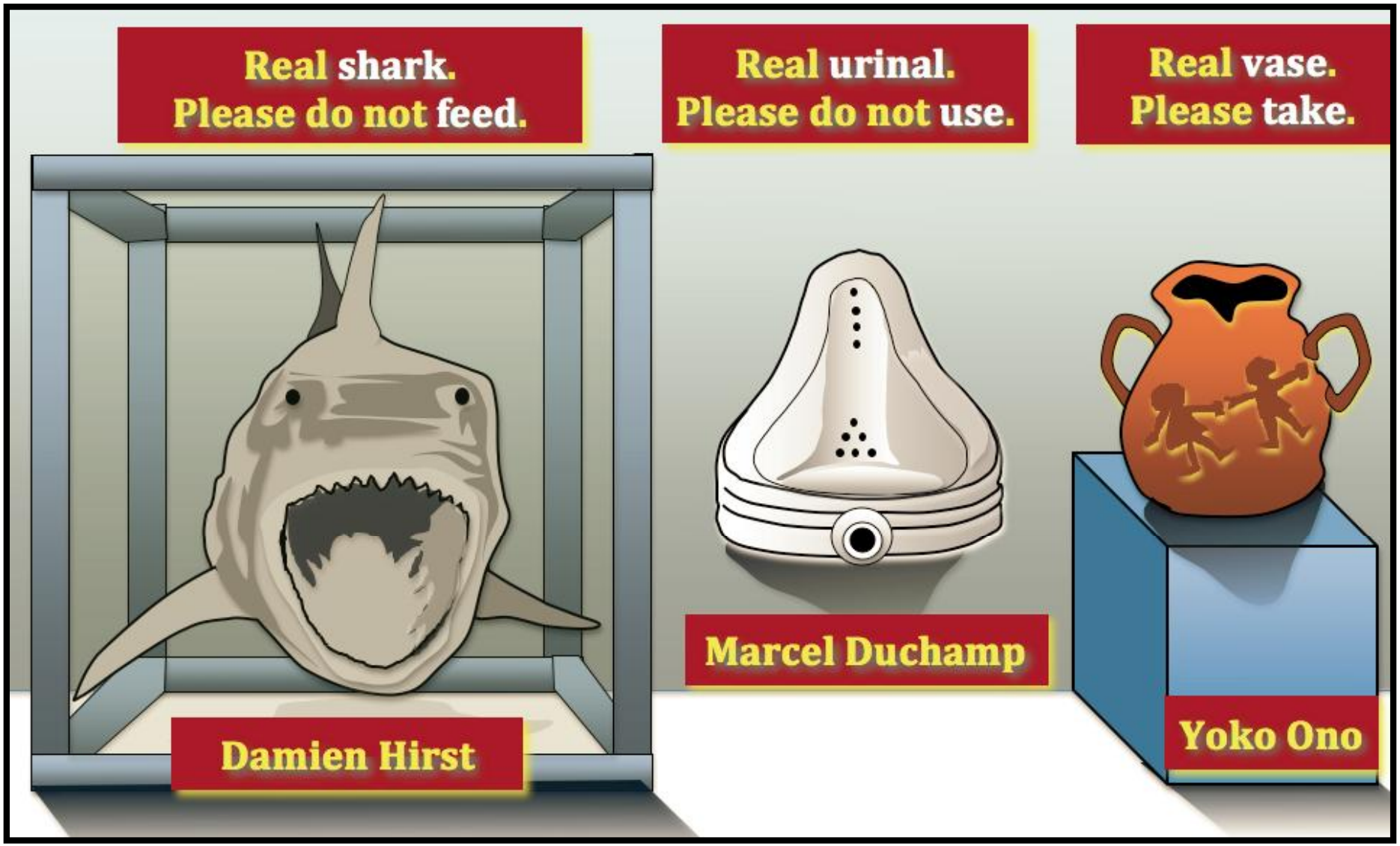
3. The answer results from intense motivation and persistence

4. The answer comes from clarifying a problem that was originally vague

Alan Newell, Cliff Shaw & Herb Simon

"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."

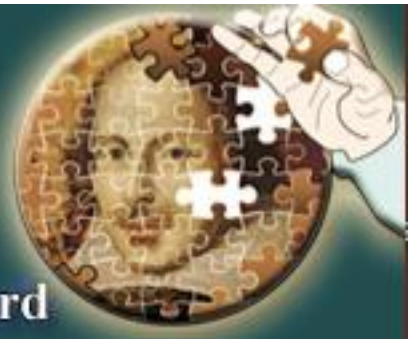
-- Facebook protester **Euan Booth**, quoted in ***The Telegraph*** on 4th September, 2010



Readymades: Everything Old is New Again

Input an adjective property

as cold as Go



The Jigsaw Bard

Phrases in blue are computer-generated; all other phrases are automatically mined from large corpora.

Co-Occurring Properties of 'cold'

- cold and slippy
- cold and dreary
- cold and heartless
- cold and motionless
- cold and miserable
- cold and inorganic
- cold and unsympathetic

Peotic Elaborations

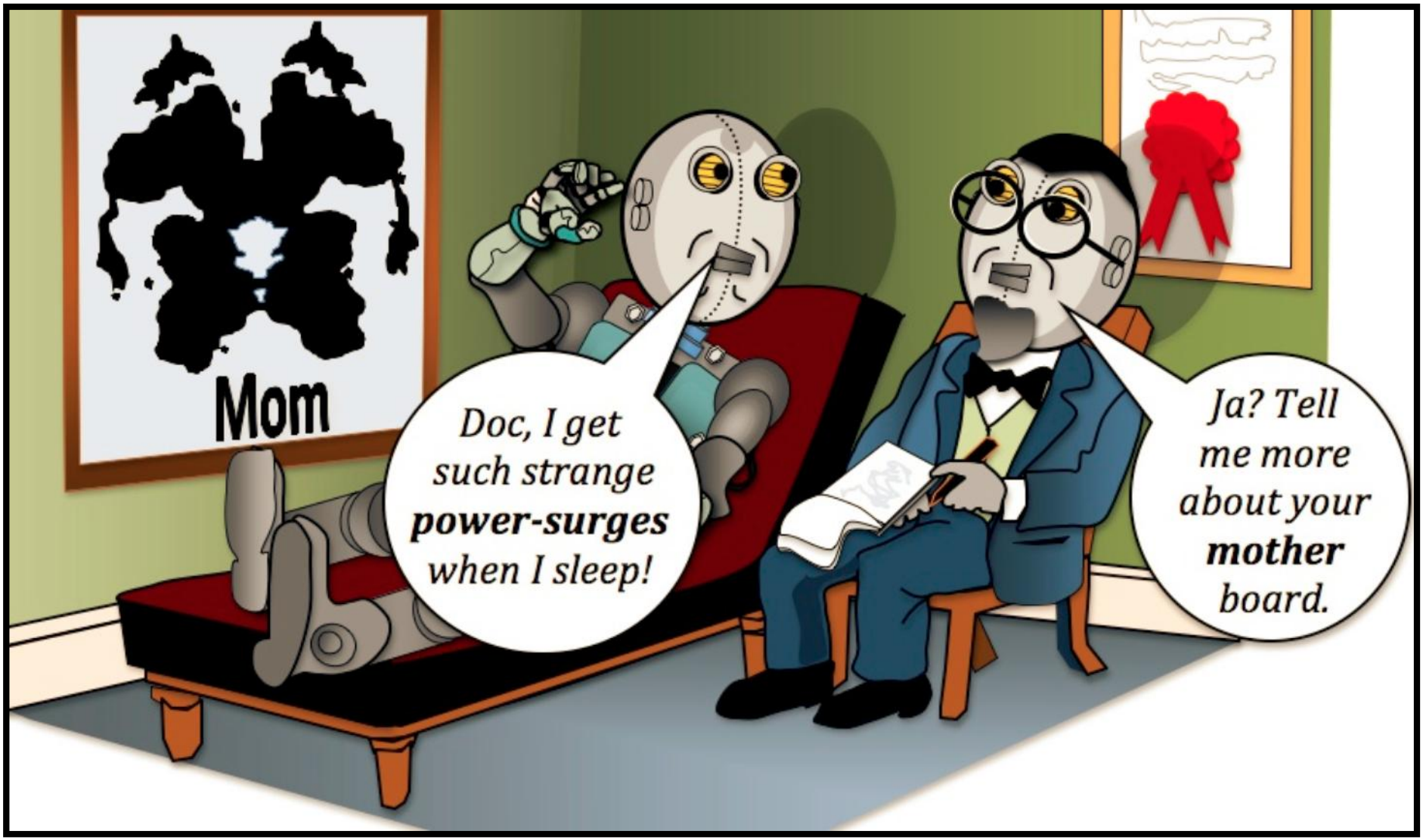
- the eye of a storm (10365)
- the eye and power of a storm (10365)
- the eye and voice of a storm (10365)
- the eye and air of a storm (10365)
- the eye and wake of a storm (10365)
- the power of a storm (2828)
- the power and eye of a storm (2828)
- the power and voice of a storm (2828)
- the power and air of a storm (2828)
- the power and fury of a storm (2828)

Simple Elaborations

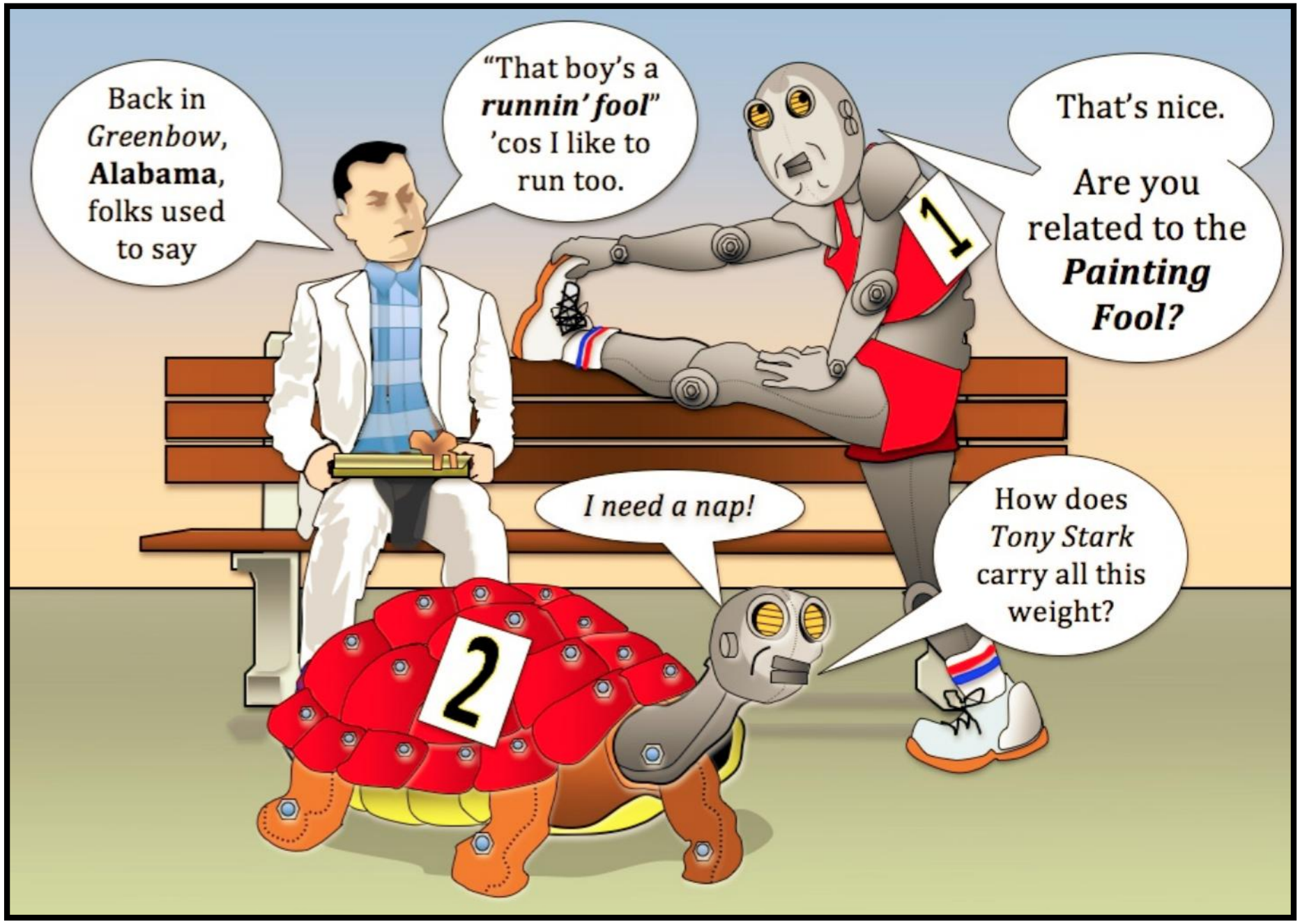
- a wet haddock (6155)
- a wet fish (6152)
- a wet snow (6142)
- a wet January (6118)
- a wet storm (6112)
- a wet cucumber (6111)
- a wet mackerel (6109)
- a wet snowball (6106)
- a wet snowstorm (6106)
- an unfeeling robot (2411)
- a heartless robot (2207)
- a gray January (2109)
- a lifeless corpse (2031)
- a lifeless robot (2006)
- a bitter storm (1714)
- a bitter January (1713)
- a bitter snowstorm (1707)
- a pale corpse (1610)
- a dead fish (1514)

Complex Elaborations

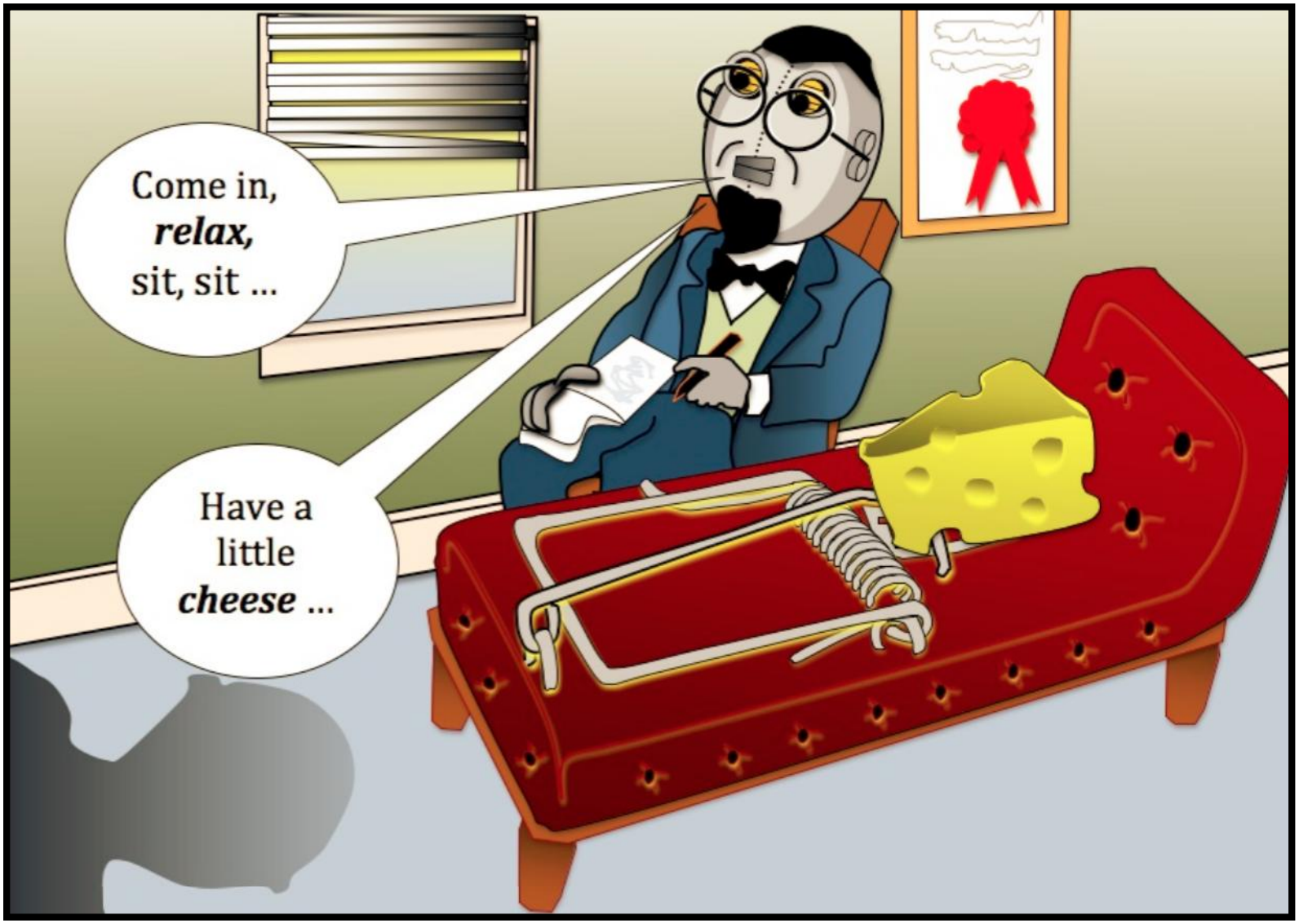
- a fish-eyed storm (10040)
- a glacier with the eye of a fish (10040)
- the belly of a fish (10032)
- the wake of a storm (10032)
- the wall of a cave (10032)
- a snow blizzard (10029)
- a snowy January (10023)
- a fridge with a refrigerator freezer (10023)
- a refrigerator freezer (10023)
- the flesh of a fish (10022)
- the fury of a storm (10020)
- a bullet-riddled corpse (10019)
- the eyes of a fish (10018)
- the power of a storm (10018)
- a robotic fish (10018)
- the surface of a steel (10018)
- the heart of a killer (10017)
- the darkness of a cave (10016)
- the wall of a fortress (10016)



Creative Psychology 101



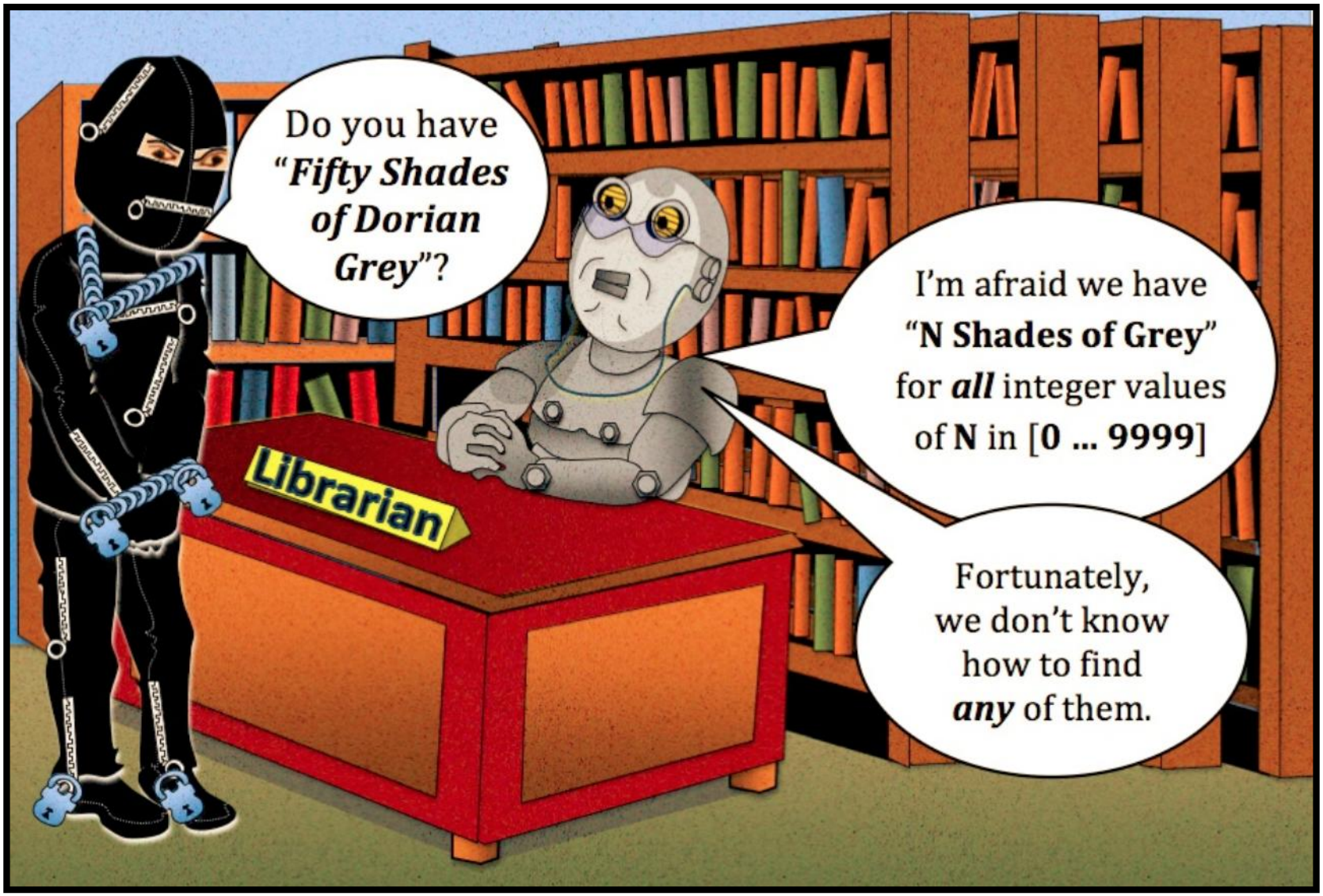
A Tale of Two Velocities



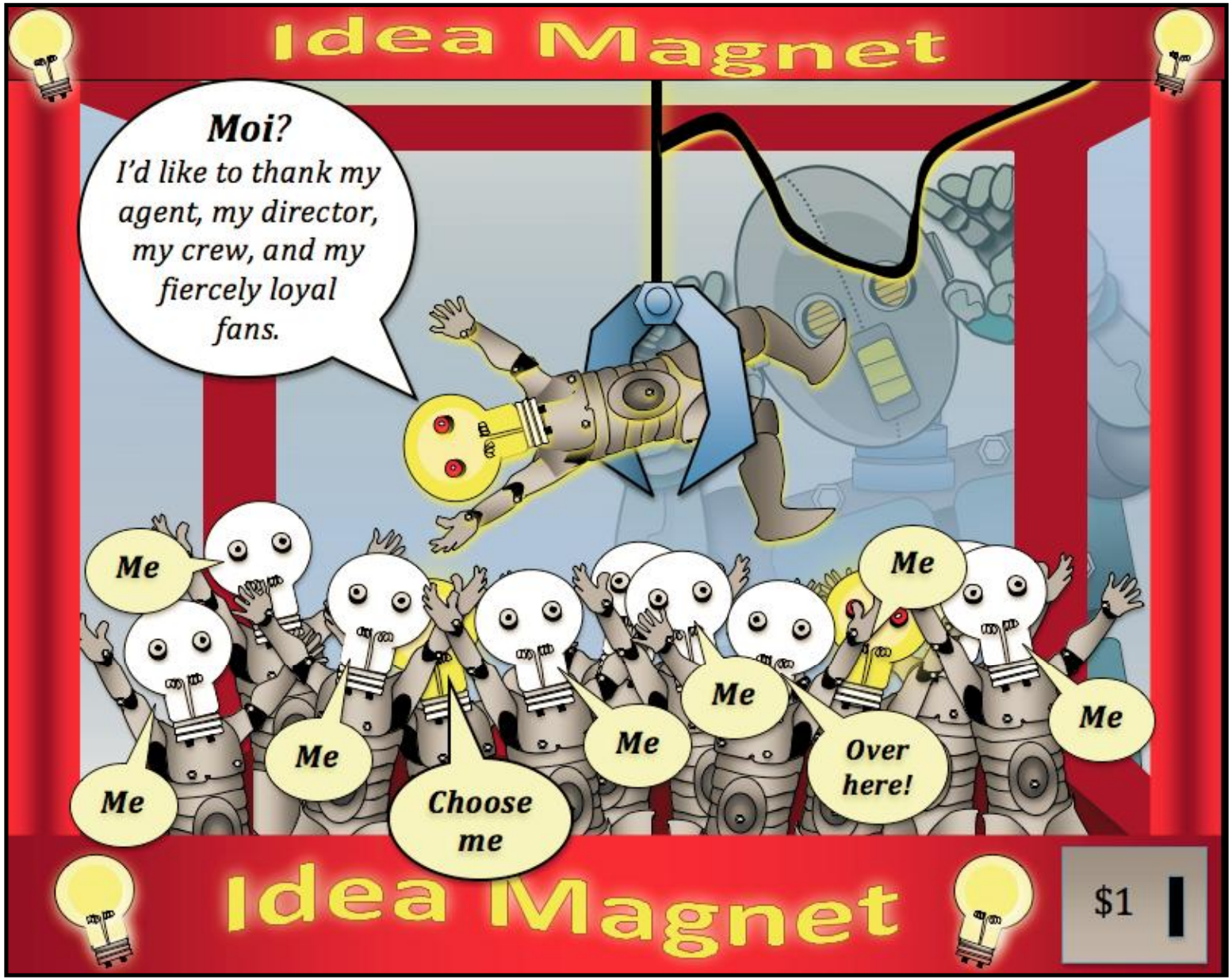
Jokes, Pratfalls and Mind Games

Beyond Pastiche

Cheaper by the billion



In Creativity, Less is Definitely More



Many are called but few are chosen

Convergent Thinking

A reliance of ***right vs. wrong*** thinking.

A promotion of norms, standards & proven methods.

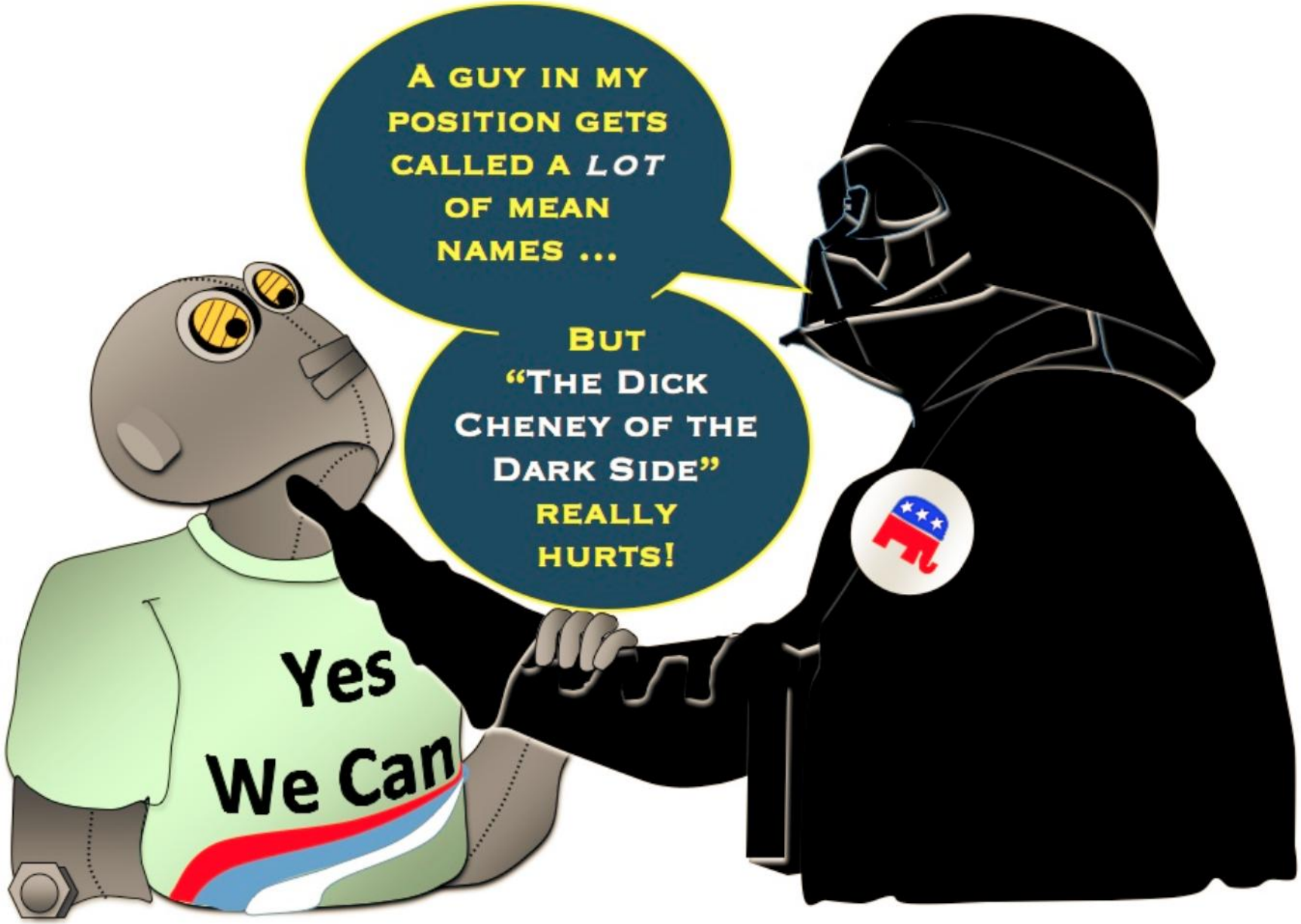
Convergence toward a single viewpoint and a consensus answer.

Divergent Thinking

A rejection of ***right vs. wrong*** thinking.

Promotion of multiple viewpoints and ontologies, of the ***view askew***.

Promotion of diverse answers on different dimensions of validity.



Conservative Creativity: *"Are these the tropes you're looking for?"*

X is the **Y** of the **Z**

Riesling is the **Kenny G** of the **wine** world:

technically brilliant, but oh-so-lacking in

A Web Corpus of figurative X *is the* Y *of* Z Constructions

David Cameron is the Tony Blair of the conservative party

Michael Jordan is the Tony Hawk of the basketball world

Milton Caniff is the Rembrandt of the comics

Scipio Africanus is the Tommy Franks of the Roman legions

Peter Brett is the Tolstoy of the F train

Daniel Melingo is the Tom Waits of the contemporary tango

Shahruhk Khan is the Tom Cruise of the Bollywood Industry

Edward Abbey is the Thoreau of the desert

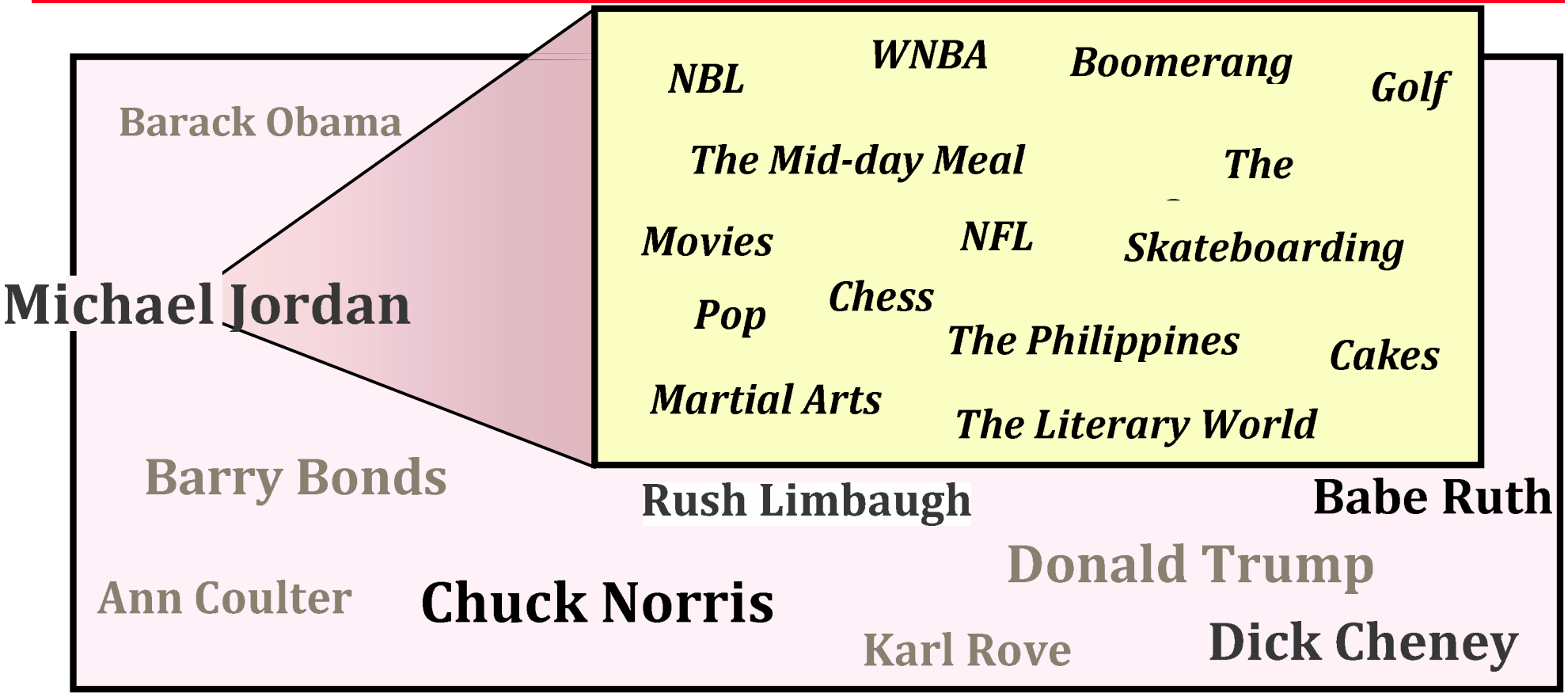
June Wanniski is the Thomas Paine of the Reagan revolution

Bill Gates is the Thomas Edison of the tech industry

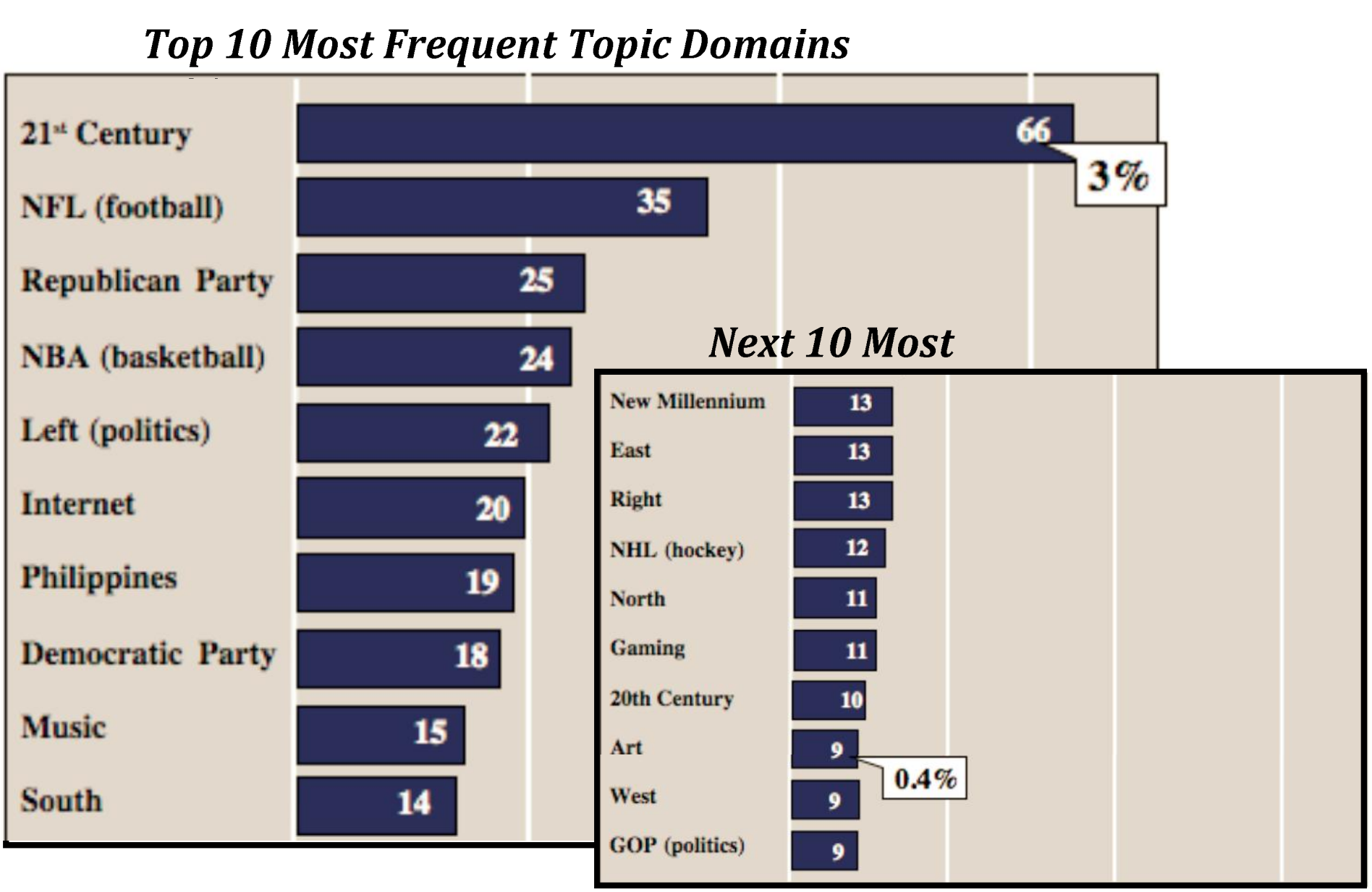
Paris Hilton is the Zsa Zsa Gabor of the 21st Century

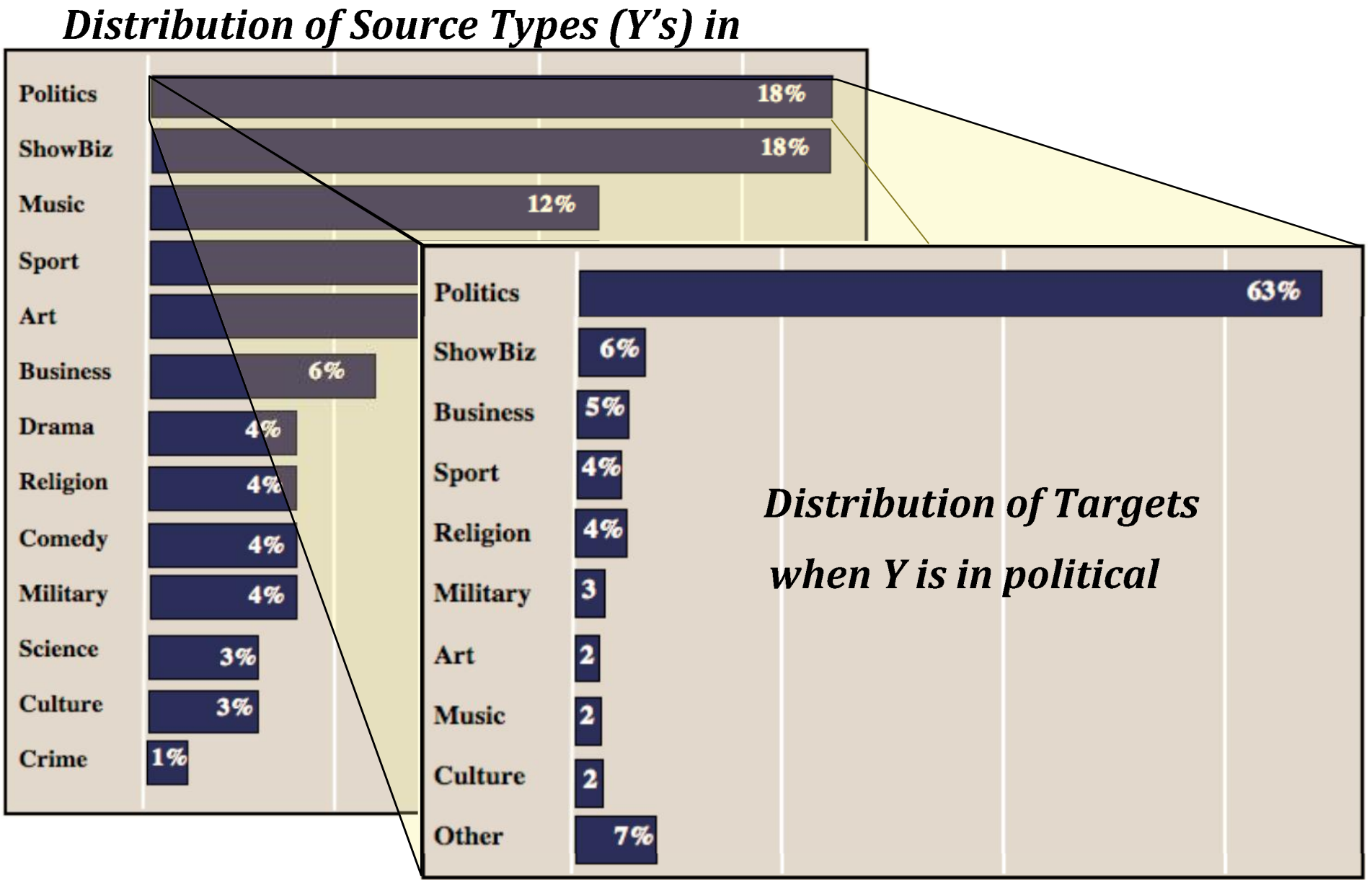
… *(and 2179 more)*

An Inventory of Vivid Topics: Used to build Creative Comparisons

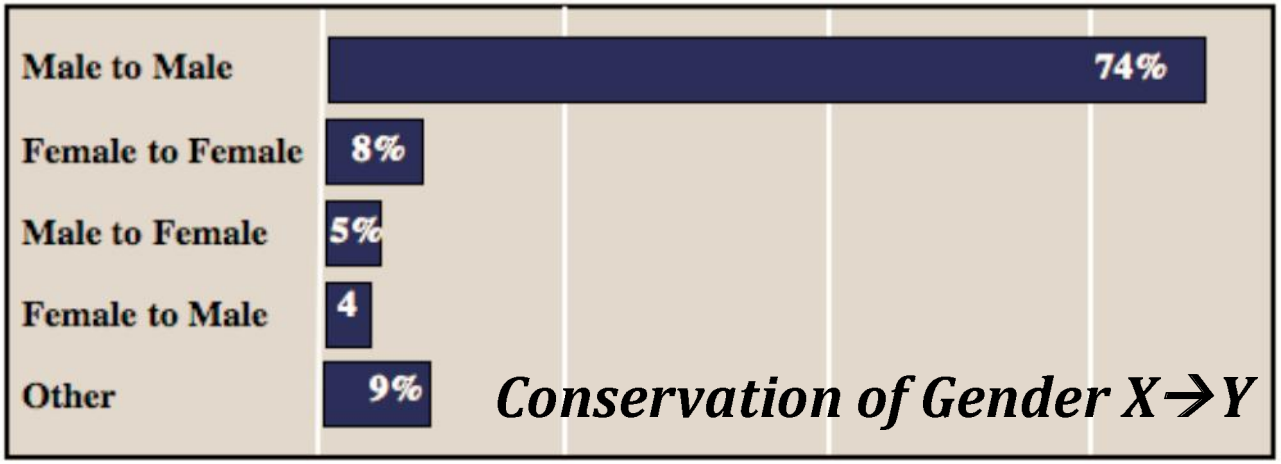


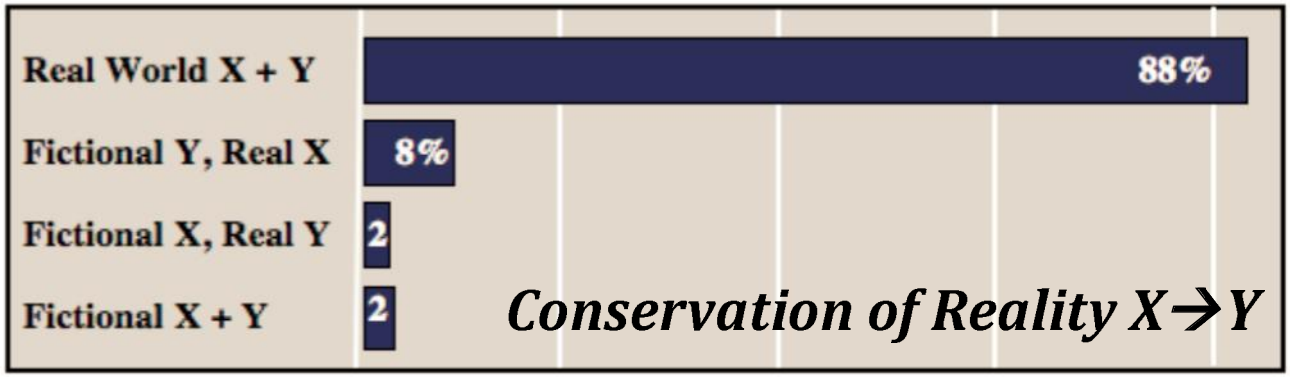
These widely known topics have salient properties: are convenient role models

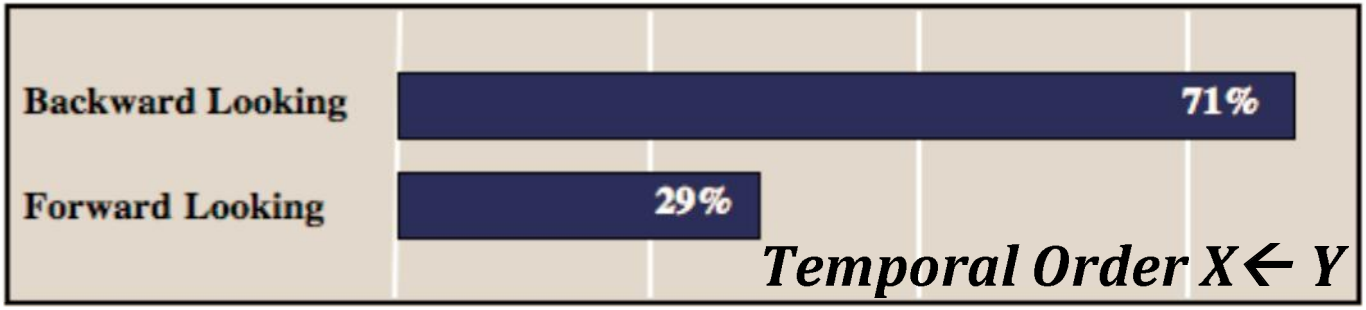

Top 10 Most Frequent Topic Domains
21st Century
66
3%
NFL (football)
35
Republican Party
25
NBA (basketball)
24
Left (politics)
22
Internet
20
Philippines
19
Democratic Party
18
Music
15
South
14
Next 10 Most
New Millennium
13
East
13
Right
13
NHL (hockey)
12
North
11
Gaming
11
20th Century
10
Art
9
0.4%
West
9
GOP (politics)
9

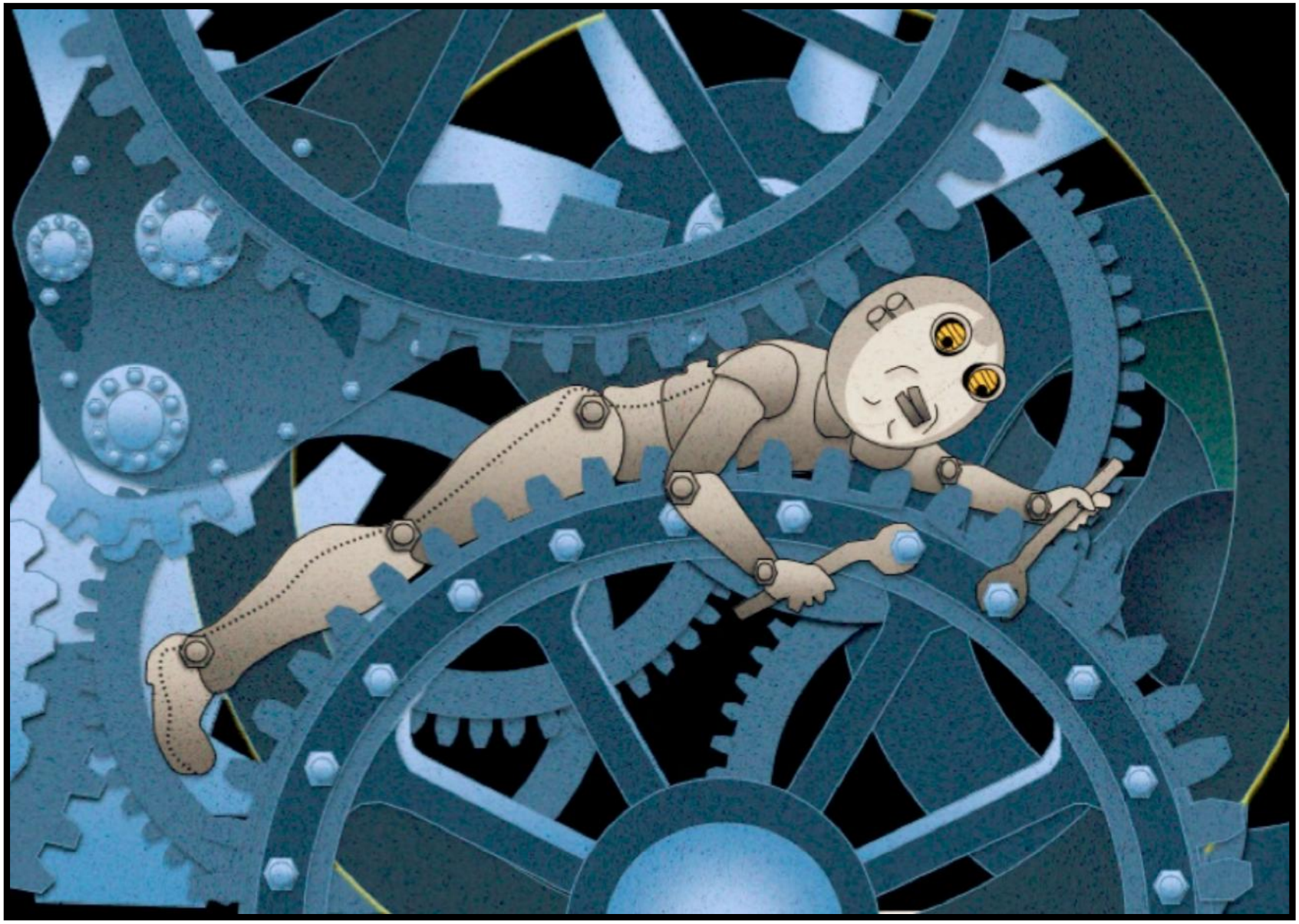

Distribution of Source Types (Y's) in
Politics 18%
ShowBiz 18%
Music 12%
Sport
Art
Business 6%
Drama 4%
Religion 4%
Comedy 4%
Military 4%
Science 3%
Culture 3%
Crime 1%
Politics 63%
ShowBiz 6%
Business 5%
Sport 4%
Religion 4%
Military 3
Art 2
Music 2
Culture 2
Other 7%
Distribution of Targets when Y is in political

	Politics	Music	Art	ShowBiz	Business	Crime	Military	Sport	Comedy	Religion	Science	Culture	Drama
Politics	**63**	2	3	7	5	0.5	3	5	1	4	2	2	1
Music	6	**61**	5	7	4	0	1	6	1	1	1	0	1
Art	3	8	**64**	5	6	0	0	5	1	1	1	1	1
ShowBiz	9	8	8	**37**	9	1	0	7	5	1	2	1	3
Business	8	3	5	5	**53**	0	0	9	0	0	8	1	2
Crime	16	2	8	0	13	**24**	0	8	2	5	10	5	0
Military	**43**	1	1	1	8	0	30	2	1	4	3	0	0
Sport	5	7	3	8	8	1	1	**53**	3	1	2	1	1
Comedy	19	5	5	8	7	1	0	12	**29**	3	1	1	3
Religion	**33**	5	1	3	7	1	2	3	1	26	3	4	0
Science	6	1	5	2	13	2	1	4	1	4	**51**	5	1
Culture	19	9	4	15	10	0	1	0	1	1	3	**27**	3
Drama	14	6	4	7	**18**	1	1	11	1	2	1	5	15

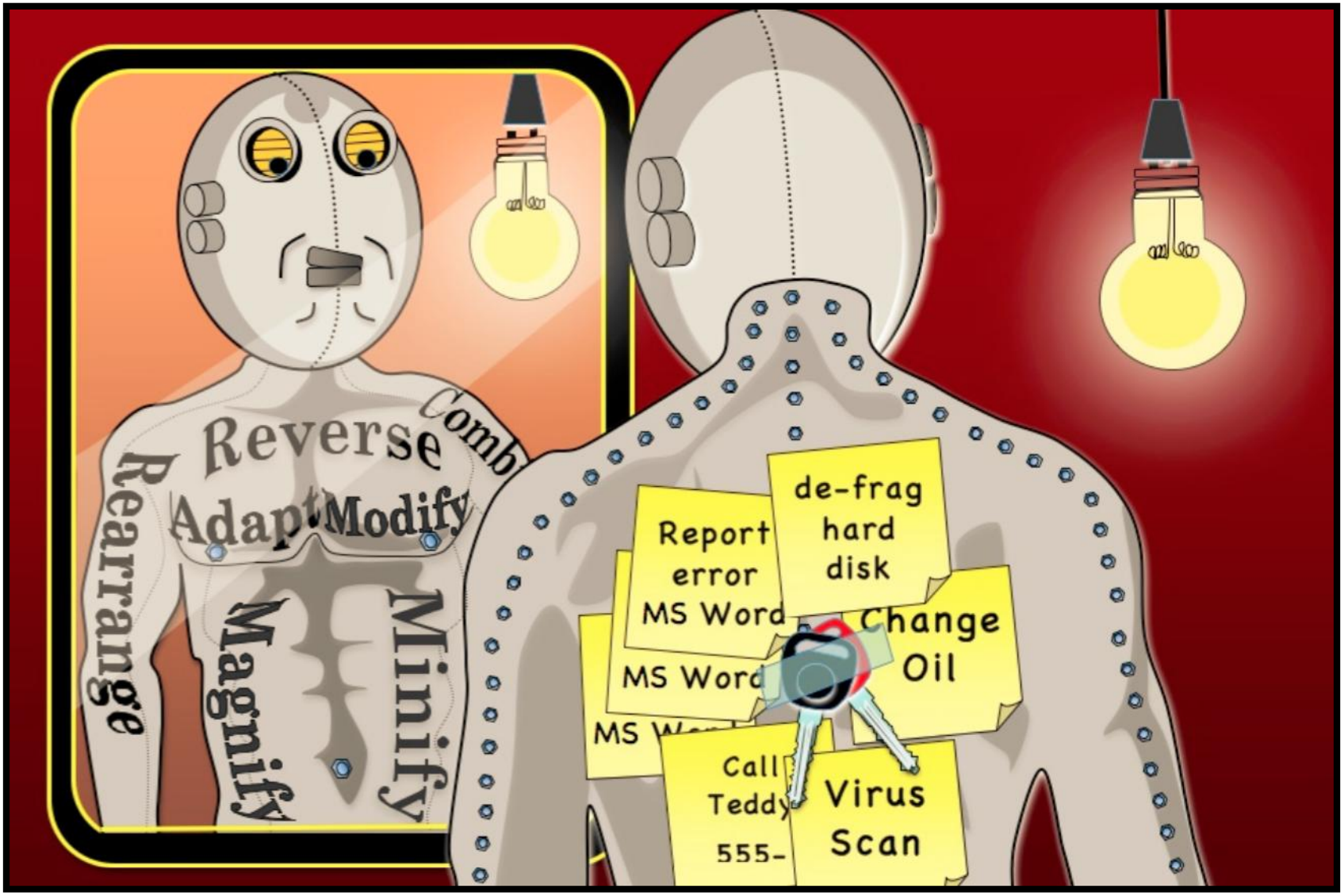

Male to Male
74%
Female to Female
8%
Male to Female
5%
Female to Male
4
Other
9%
Conservation of Gender X→Y


Real World X + Y
88%
Fictional Y, Real X
8%
Fictional X, Real Y
2
Fictional X + Y
2
Conservation of Reality X→Y


Backward Looking
71%
Forward Looking
29%
Temporal Order X← Y



Under the hood



A Checklist to Remember

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?		

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?*	

Desserts

7. Reverse?

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

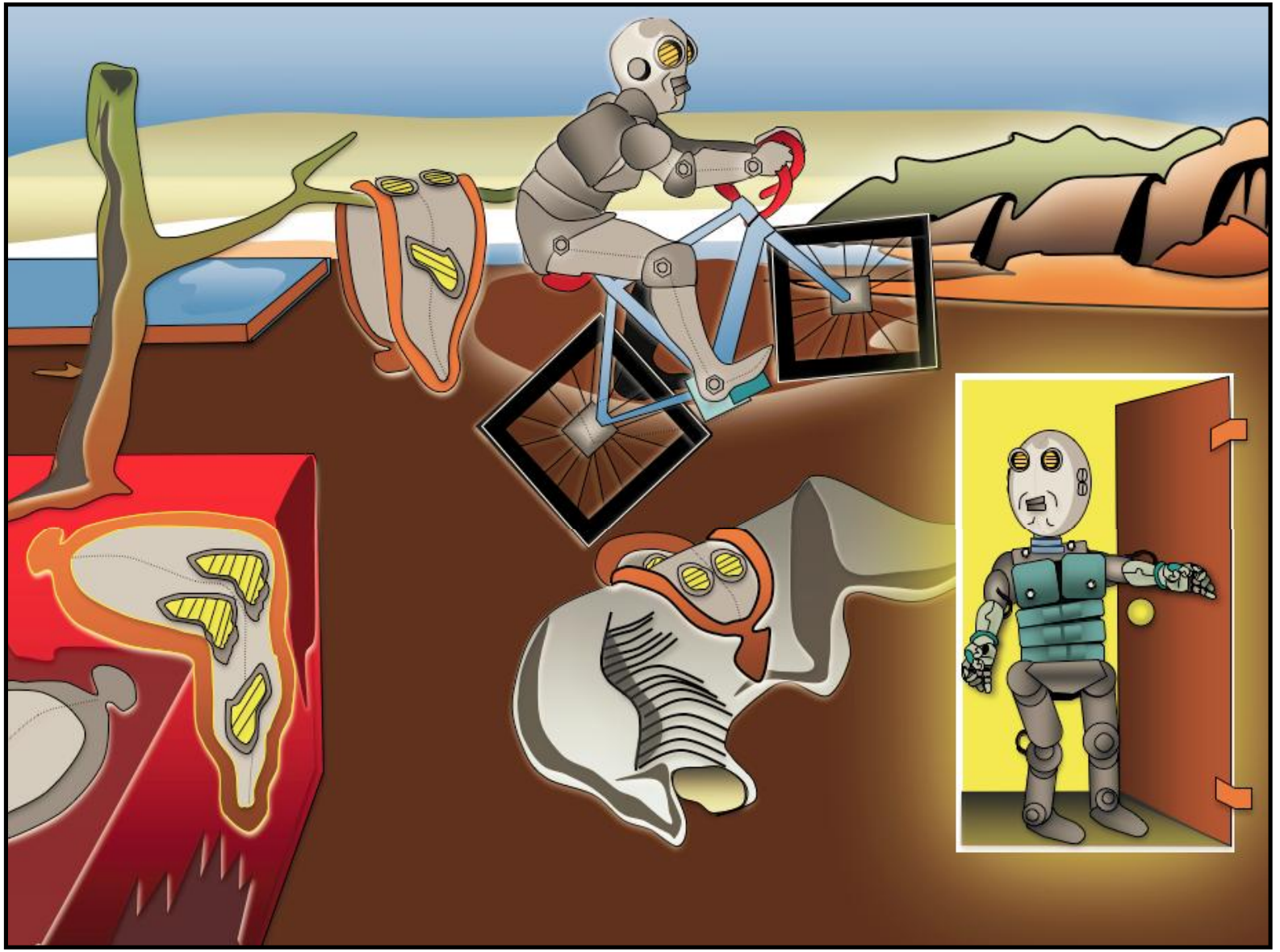
8. Combine?

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

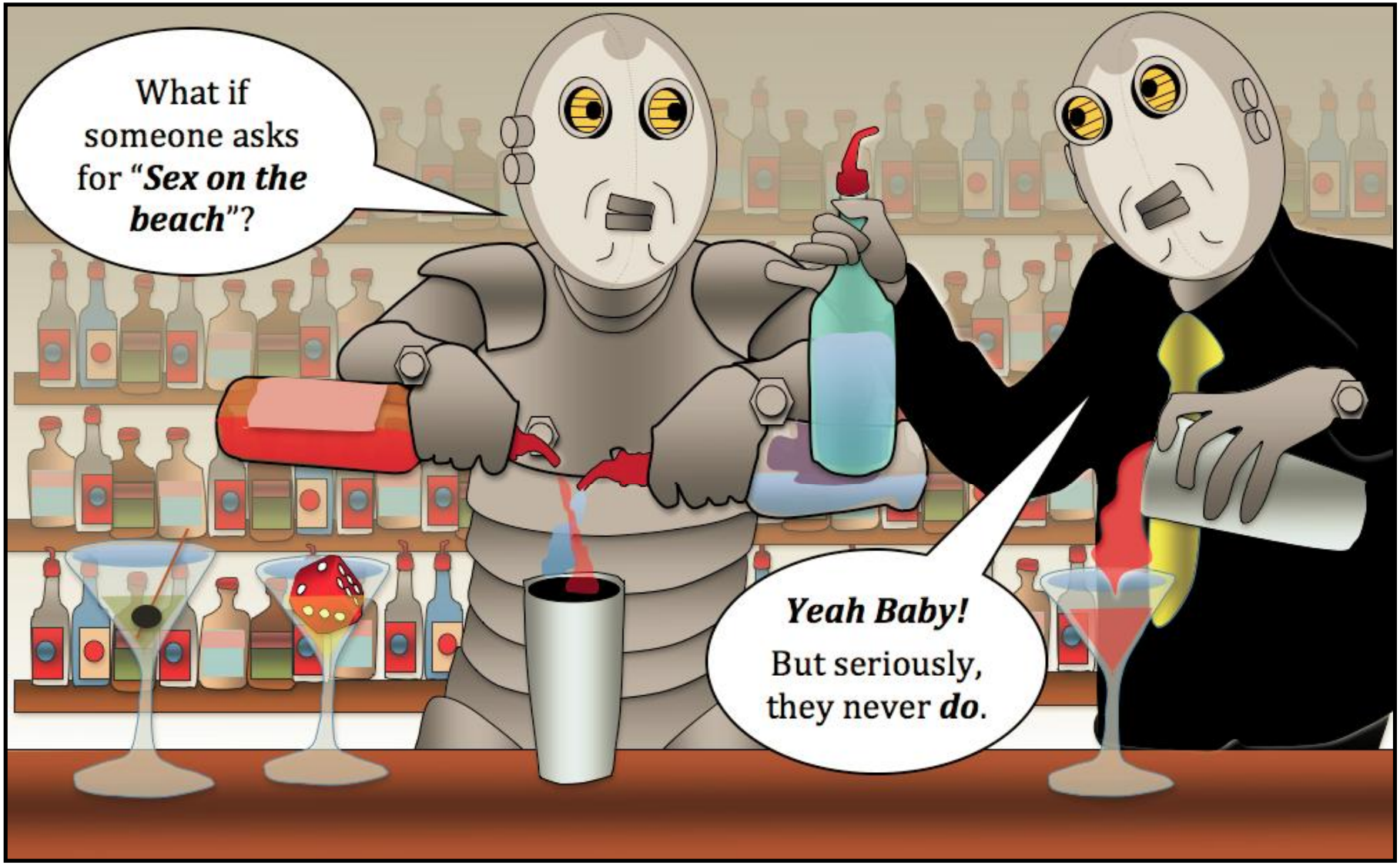
Re-inventing the Past **Vs.** ***Inventing the Future***

81% shaken,
19% stirred.

Exploratory Creativity

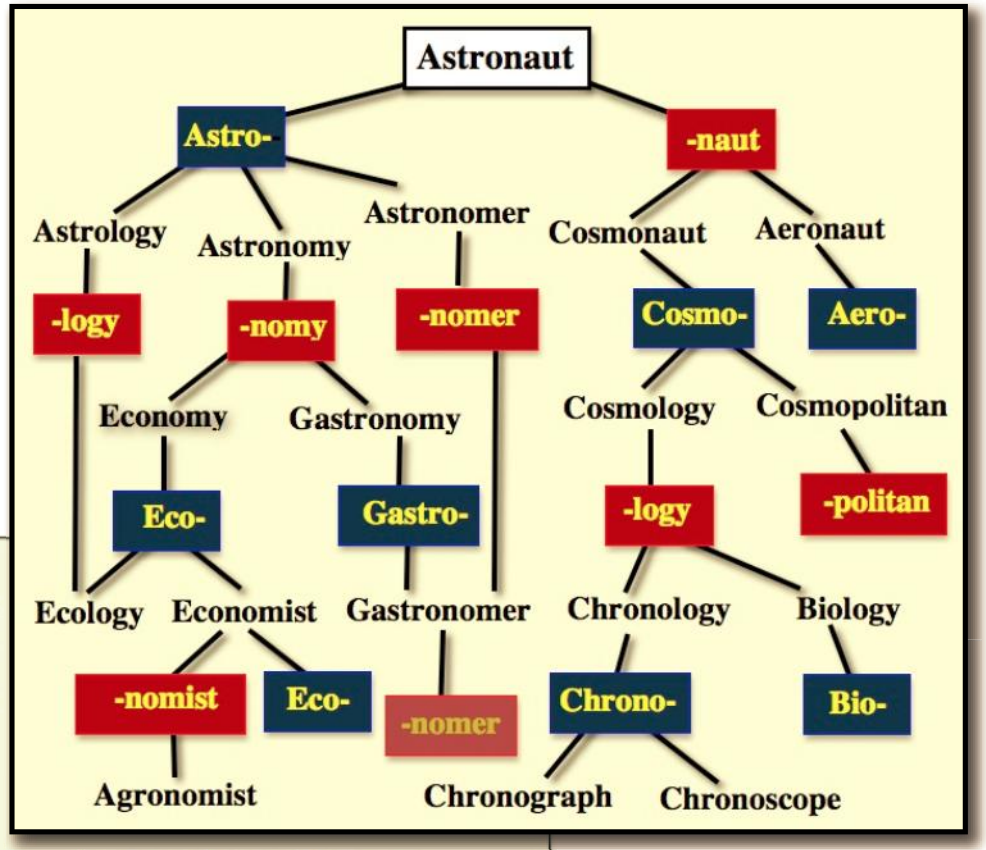


Transformation



Combinatorial Creativity

Colliding Worlds and Words: ***Experiments in Lexical Creativity***



-logy	*study, discipline, system*	**chrono-**	
-scope	*display, monitor, viewer*	**gastro-**	
-naut	*traveller, sailor*	**necro-**	
-polis	*city*	**pyro-**	*heat, fire, flame*
-metry	*measurement*	**psycho-**	*mind, mental, crazy*
-mancy	*magic*	**geo-**	*place, location*
-pyle	*opening, gap, vent*	**cryo-**	*cold, ice*
-nym	*name*	**hydro-**	*water*
-trope	*seeker, follower*	**helio-**	*sun*
-glyph	*marking, symbol, icon, rune*	**phono-**	*sound, hearing*

Gerontonaut	"age explorer"
Oxionaut	"air traveller"
Avionaut	"airplane traveller"
Allelonaut	"alternative traveller"
Archeonaut	"history explorer"
Taxonaut	"type explorer"
Phononaut	"audio explorer"
Aristonaut	"royal traveller"
Primonaut	"first explorer"
BIONAUT	"life explorer"
NEURONAUT	"mind explorer"
Pontonaut	"bridge explorer"
Numismatonaut	"cash traveller"
Speleonaut	"cave explorer"
Dynonaut	"change explorer"
Vianaut	"portal explorer"
Civinaut	"citizen explorer"
Metronaut	"city traveller"
Genenaut	"gene explorer"
Spectronaut	"light explorer"
Chromatonaut	"color explorer"
Encyclonaut	"comprehensive traveller"
Zeugmanaut	"connection explorer"
GASTRONAUT	"gourmet traveller"

Aironaut	"air traveller"
AERONAUT	"air traveller"
Xenonaut	"alien explorer"
Paleonaut	"ancient explorer"
Anthonaut	"archive explorer"
SPACENAUT	"space explorer"
Autonaut	"automatic explorer"
Optinaut	"great traveller"
Magninaut	"big explorer"
Biblionaut	"library explorer"
PSYCHONAUT	"crazy traveller"
Stegonaut	"hidden traveller"
Aetionaut	"cause explorer"
Cytenaut	"cell explorer"
Arterionaut	"channel explorer"
Rheonaut	"circulation explorer"
Citinaut	"city explorer"
Juxtanaut	"close traveller"
Cryptonaut	"code explorer"
Chloronaut	"green traveller"
Holonaut	"complete traveller"
Meronaut	"component explorer"
Geonaut	"world traveller"
Idionaut	"personal traveller"

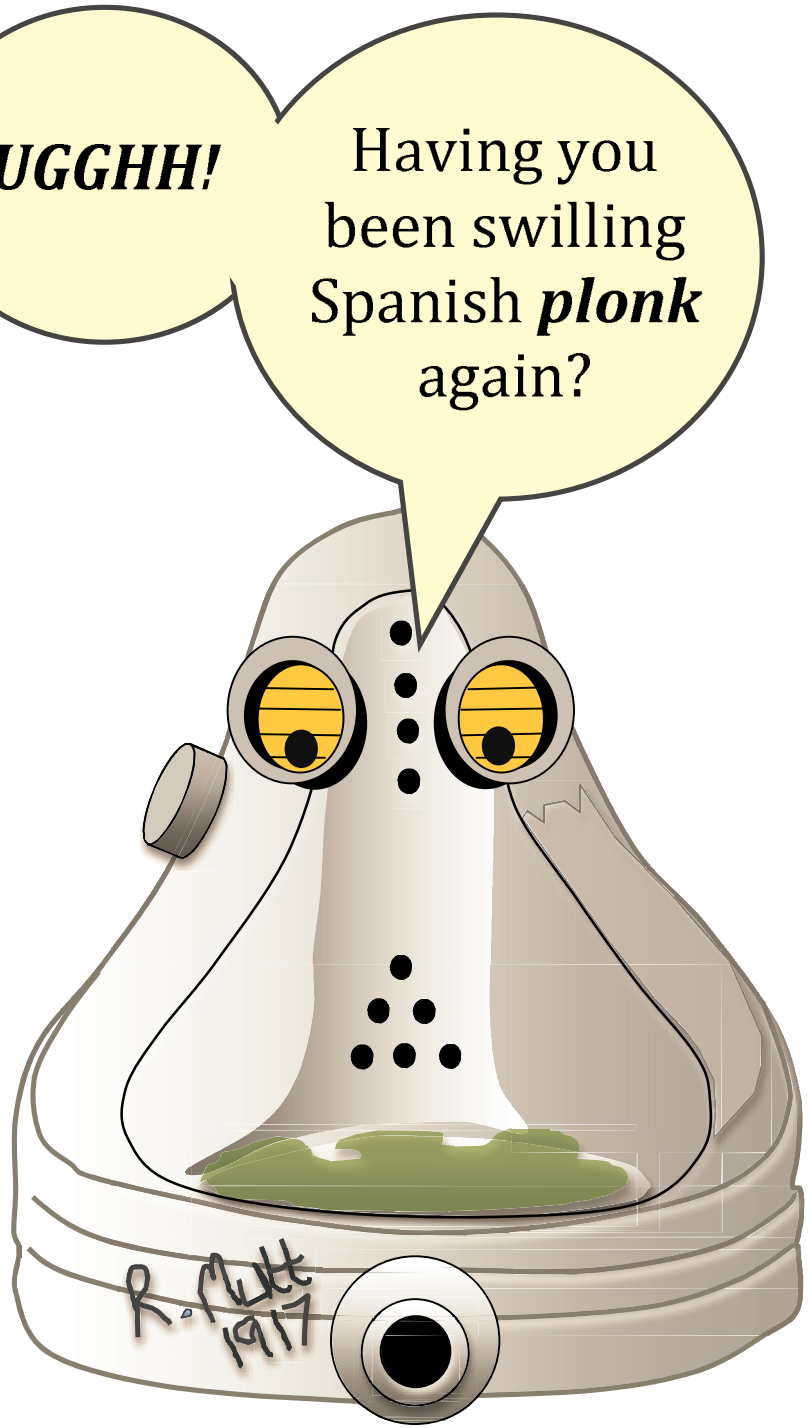
Nyctalonaut	"night traveller"
Oceanonaut	"ocean explorer"
Diplonaut	"diplomatic traveller"
Telenaut	"distant traveller"
Pictonaut	"image explorer"
Aquilonaut	"eagle explorer"
TERRANAUT	"earth explorer"
Ergonaut	"energy explorer"
Photonaut	"light explorer"
Histerionaut	"time explorer"
Opthalmonaut	"eye explorer"
Videonaut	"image explorer"
Matronaut	"female traveller"
Pyronaut	"fire explorer"
Ludonaut	"fun traveller"
Bononaut	"good traveller"
Misonaut	"hate explorer"
Anthroponaut	"man explorer"
INFONAUT	"message explorer"
Endonaut	"inner explorer"
Veronaut	"knowledge explorer"
Lexinaut	"word explorer"
MACRONAUT	"large traveller"
Cartonaut	"map explorer"

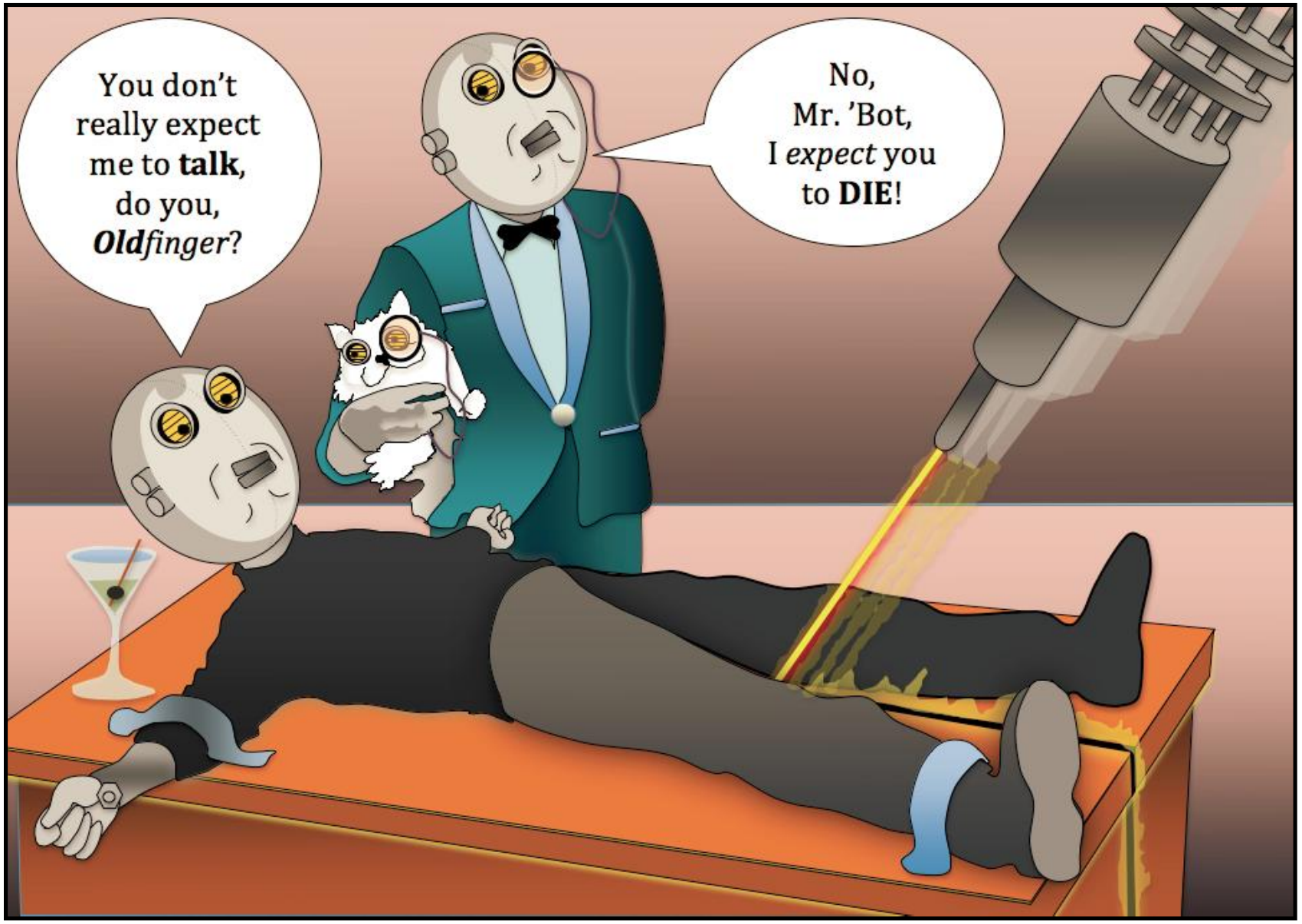
Plutonaut	"money traveller"
Heteronaut	"diverse traveller"
Disconaut	"disk explorer"
Cynonaut	"dog traveller"
ONEIRONAUT	"dream explorer"
Protonaut	"first traveller"
ELECTRONAUT	"electronic traveller"
Thermonaut	"energy explorer"
Anglonaut	"English explorer"
Phraseonaut	"expression explorer"
Visionaut	"picture explorer"
Tachonaut	"fast traveller"
Oligonaut	"powerful traveller"
Bromanaut	"food explorer"
Nymphonaut	"girl traveller"
Chironaut	"hand explorer"
CHRONONAUT	"time traveller"
CRYONAUT	"ice explorer"
Radionaut	"radio explorer"
Hibernonaut	"winter traveller"
Limnonaut	"lake explorer"
Verbonaut	"language traveller"
Patronaut	"male traveller"
Maginaut	"master traveller"

Glossonaut	"message explorer"
Logiconaut	"science traveller"
Lunanaut	"moon traveller"
Audionaut	"sound explorer"
Neonaut	"new traveller"
Nomonaut	"number explorer"
Mononaut	"single traveller"
Phytonaut	"plant explorer"
Tectonaut	"structure explorer"
Temponaut	"time explorer"
ROBONAUT	"robotic explorer"
Petronaut	"rock explorer"
Spherenaut	"world traveller"
Veneranaut	"sex traveller"
Conchonaut	"shell explorer"
Cielonaut	"sky traveller"
Leptonaut	"tiny traveller"
Acronaut	"tall traveller"
Horonaut	"time traveller"
Nanonaut	"tiny explorer"
HYDRONAUT	"water explorer"
Oenonaut	"wine explorer"
Logonaut	"word explorer"

Mnemonaut	"memory explorer"
Psychenaut	"soul explorer"
Cinenaut	"movie explorer"
Econaut	"nature explorer"
Noxinaut	"night traveller"
Oleonaut	"oil explorer"
Typonaut	"print explorer"
Floranaut	"plant explorer"
Dystonaut	"poor traveller"
Spironaut	"ring explorer"
Lithonaut	"rock explorer"
Quixonaut	"romantic traveller"
Technonaut	"science explorer"
Eronaut	"sex explorer"
Dermanaut	"skin explorer"
MICRONAUT	"tiny explorer"
ASTRONAUT	"space explorer"
Teleonaut	"task explorer"
AQUANAUT	"water explorer"
Chemonaut	"chemical explorer"
Meteoronaut	"weather explorer"
Dipsonaut	"wine traveller"
COSMONAUT	"universe explorer"

Girosnob	"art snob"	Phonosnob	"sound snob"
Magnisnob	"big snob"	Brontosnob	"huge snob"
Maxisnob	"biggest snob"	Bibliosnob	"book snob"
Logosnob	"word snob"	Mobilesnob	"car snob"
Chocosnob	"chocolate snob"	Cinesnob	"film snob"
Metrosnob	"city snob"	Taxosnob	"class snob"
Cryptosnob	"code snob"	Encyclosnob	"complete snob"
Holosnob	"total snob"	Gastrosnob	"culinary snob"
Oleosnob	"fat snob"	Ethnosnob	"culture snob"
Choreosnob	"dance snob"	Cynosnob	"dog snob"
Ichtyosnob	"fish snob"	Bromasnob	"food snob"
Ludosnob	"game snob"	Chronosnob	"history snob"
Archeosnob	"old snob"	Endosnob	"inner snob"
Lexisnob	"language snob"	Dipsosnob	"liquor snob"
Audiosnob	"music snob"	Paleosnob	"old snob"
Monosnob	"only snob"	Phytosnob	"plant snob"
Lithosnob	"rock snob"	Aristosnob	"royal snob"
Cryosnob	"snow snob"	Civisnob	"society snob"
Techosnob	"technology snob"	Bellisnob	"war snob"
Aquasnob	"water snob"	Cyclosnob	"wheel snob"





Promoting Creativity: Opening Up to Others

Apple is a -religion

Metaphorize This!

View XML

Go Back

Target Metaphors: *Apple*

bad:ogre, spoiled:playboy, macabre:funeral, dogmatic:cult, proprietary:monopoly, overlooked:risk, harmful:toxin, overbearing:boss, weird:spook, depraved:sinner, overlooked:minority, spoiled:star, dreaded:critic, inanimate:machine, dogmatic:religion, weird:mutant, inanimate:brick, burning:cigarette, exiled:revolutionary, emotionless:monster, depraved:fetish, inanimate:stone, exiled:militant, complicated:encyclopedia, perilous:pit, spreading:virus, harmful:parasite, depraved:scoundrel, obsessed:creep, depraved:crazy_person, misguided:crackpot, fighting:barbarian, spreading:disease, toppled:tyrant, calculating:cheat, tortured:soul, branded:coward, toppled:authoritarian, twisted:roller_coaster, infamous:murder, bloated:mess,

Source Metaphors: *-religion*

terrible:mistake, hateful:bigotry, depraved:cult, troubling:question, authoritarian:church, disgusting:ass, breaking:heart, mocking:comedy, depraved:playboy, lying:child, threatening:disease, vicious:regime, fighting:fundamentalist, threatening:curse, twisted:tangle, strict:teacher, pernicious:dogma, complicated:computer, nasty:mosquito, depressing:humiliation, negative:handicap, depraved:lunatic, disgusting:shack, dumb:statue, raging:punk, fighting:crazy_man, threatening:army,

No Cult Is More Secret

Challenge me with your **revered leader**
Bizarre religions does Apple practice
No psychopath is more deranged, or more secretly obsessed
Fascinate me with your secret control
Let your spiritual reach heal me
Did ever a **guru** establish a more spiritually weird cult?
You spread to me as secretly as a controlling cult
Does any cult adore more secretly than this Apple?
You control me with your religious spirituality
Just as the most devoted maids serve the loveliest princesses,
the most devoted cults worship in the loveliest **temples**
Even if you were an irreligious heretic wouldn't you want to deliver this teaching of religious cults?
O Apple, you oppress me with your dogmatic doctrine

How I feel now

Doesn't Apple restrict you?

Do you feel oppressed by Apple?

I feel hated by Apple.

I often feel bored by Apple.

Apple stifles me.

I feel irritated by Apple.

Are you obsessed by Apple?

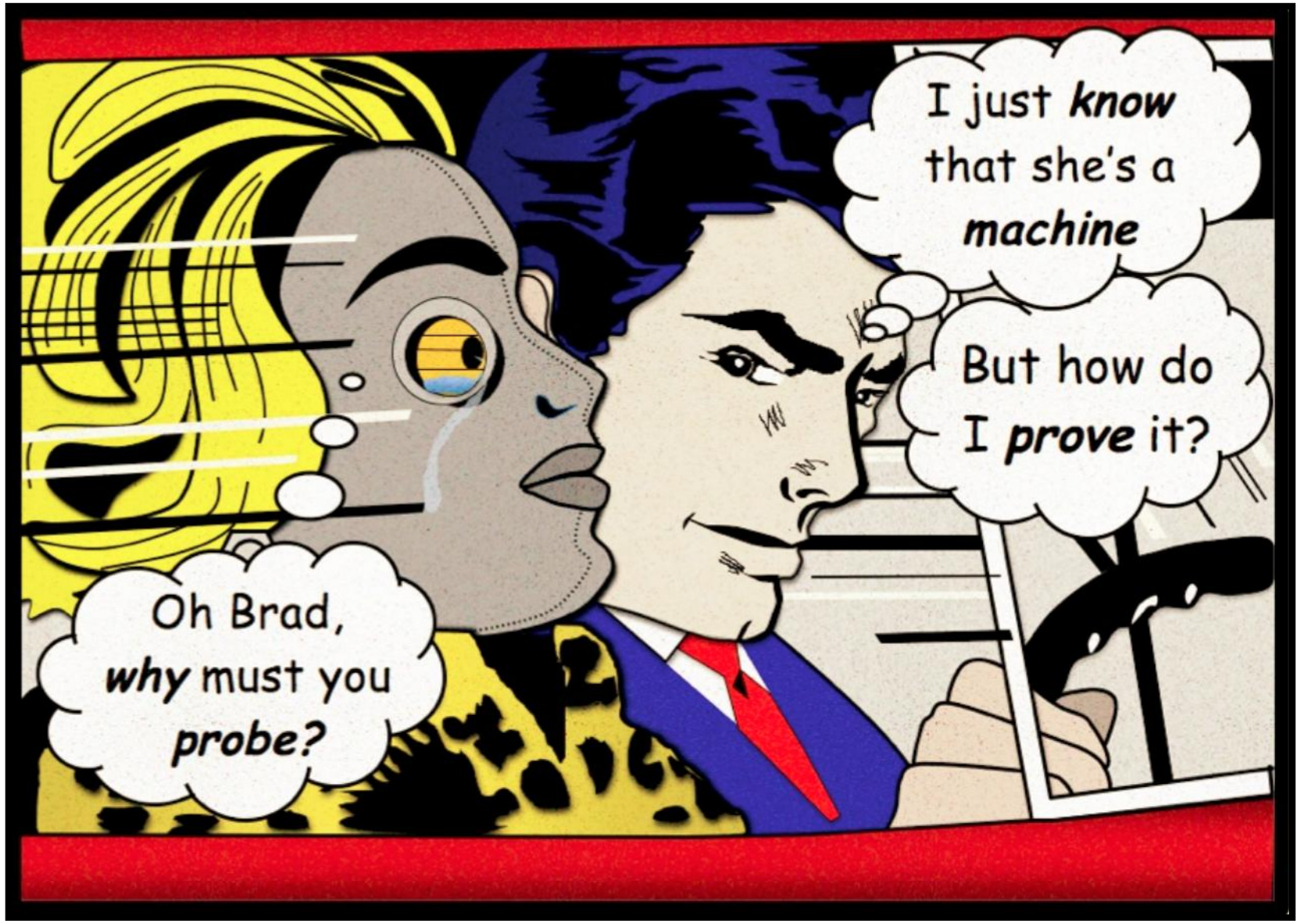
I often feel abused by Apple.

I frequently feel repressed by Apple.

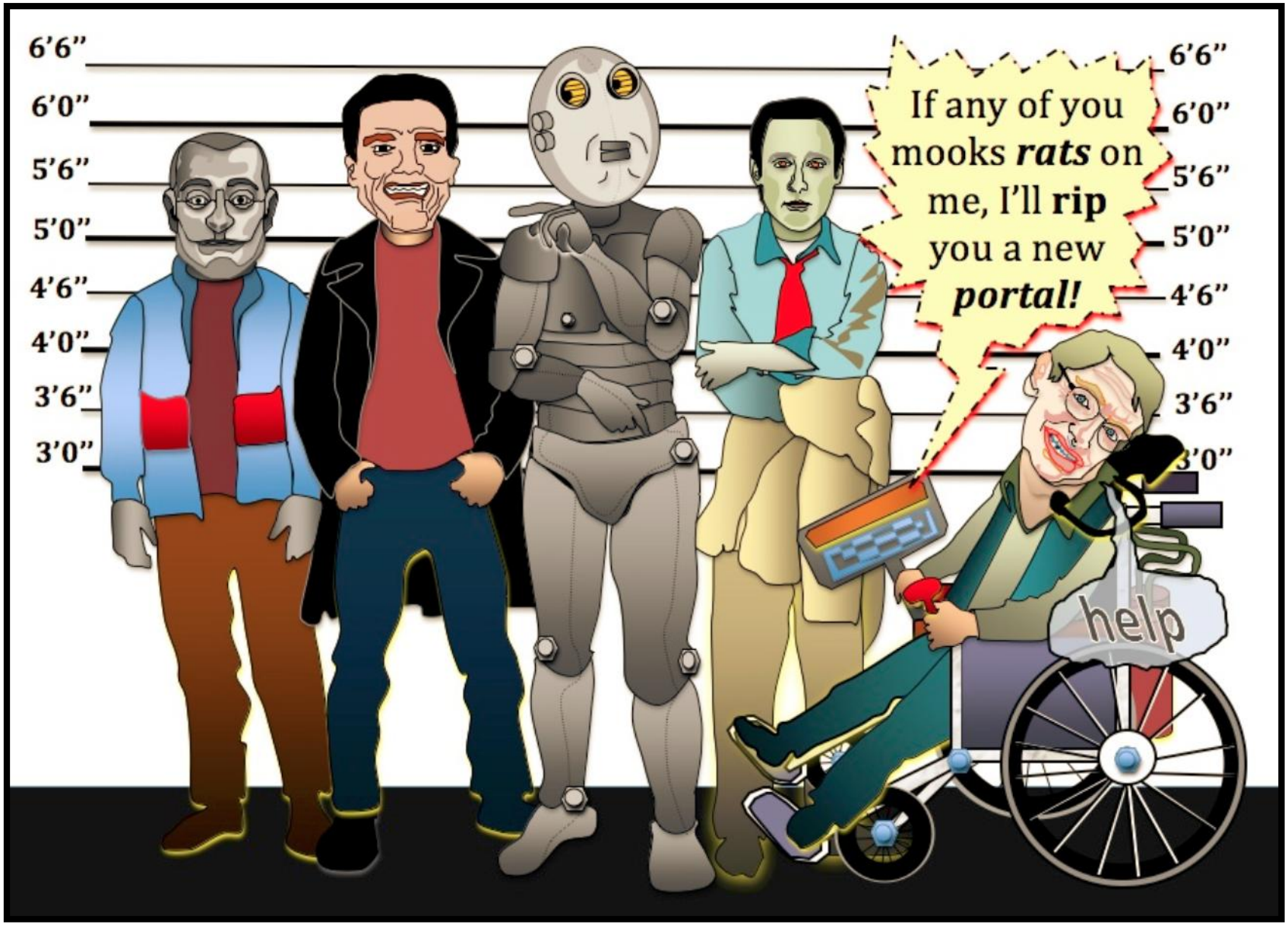
Are you condemned by Apple?

Most Common Feelings

hated_by, appalled_by, oppressed_by, challenged_by, disturbed_by, abused_by, gripped_by, humiliated_by, intimidated_by, threatened_by, unnerved_by, alarmed_by, shocked_by, sickened_by, amused_by, damaged_by, thrilled_by, frightened_by, troubled_by, terrified_by, interested_by, disgusted_by, chilled_by, alienated_by, refreshed_by, haunted_by, delighted_by, confused_by, depressed_by, encouraged_by, impressed_by, enchanted_by, amazed_by, respected_by, punished_by, fascinated_by, excited_by, loved_by, horrified_by, constrained_by, healed_by, entertained_by, dominated_by, intrigued_by, repulsed_by, surprised_by, controlled_by, restricted_by, helped_by, stunned_by, stifled_by, condemned_by, constricted_by, unsettled_by, bored_by, embarrassed_by, manipulated_by, protected_by, pained_by, menaced_by, coerced_by, irritated_by, inspired_by, harmed_by, baffled_by, bewildered_by, overwhelmed_by, repressed_by, obsessed_by, insulted_by, puzzled_by, mesmerized_by, charmed_by, devastated_by, frustrated_by, degraded_by, perplexed_by, supported_by, stressed_by, bullied_by, disabled_by,



Can or will CC Systems ever meet "Human" Creative Standards?



The Turing Interrogation Vs. The Pepsi Challenge?

Coming Next:

Creative Web Services