

Creativity: Inside and outside the boundaries of the mind

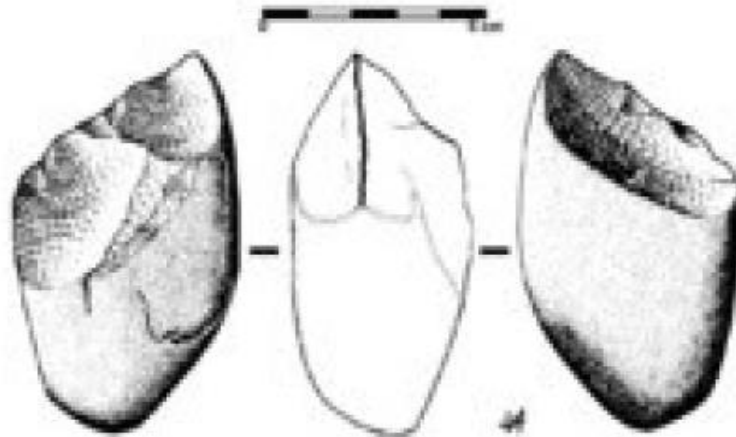
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Creativity: A 21st century competency

- -2 million years , *homo habilis* creates hunting tools – first evidence

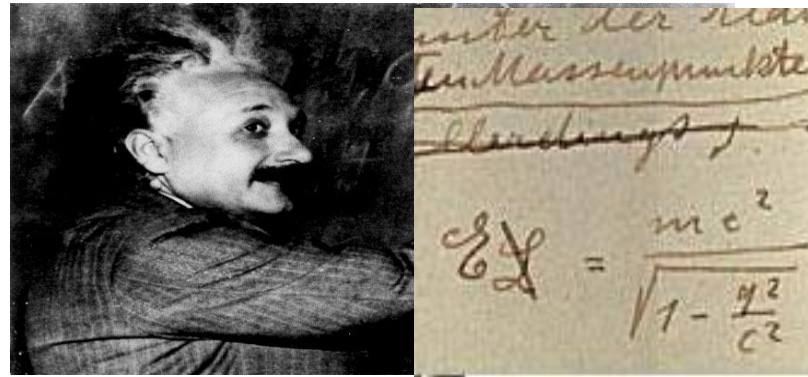


- 21st century skill movement - Creativity, critical thinking, Collaboration, Communication
- 2016-2023 World Economic Forum - Creativity is one of the top three capacities for employability
- 2015-2021 OECD studies, 2024 PISA report includes creativity module

■ Creativity is a capacity to produce content

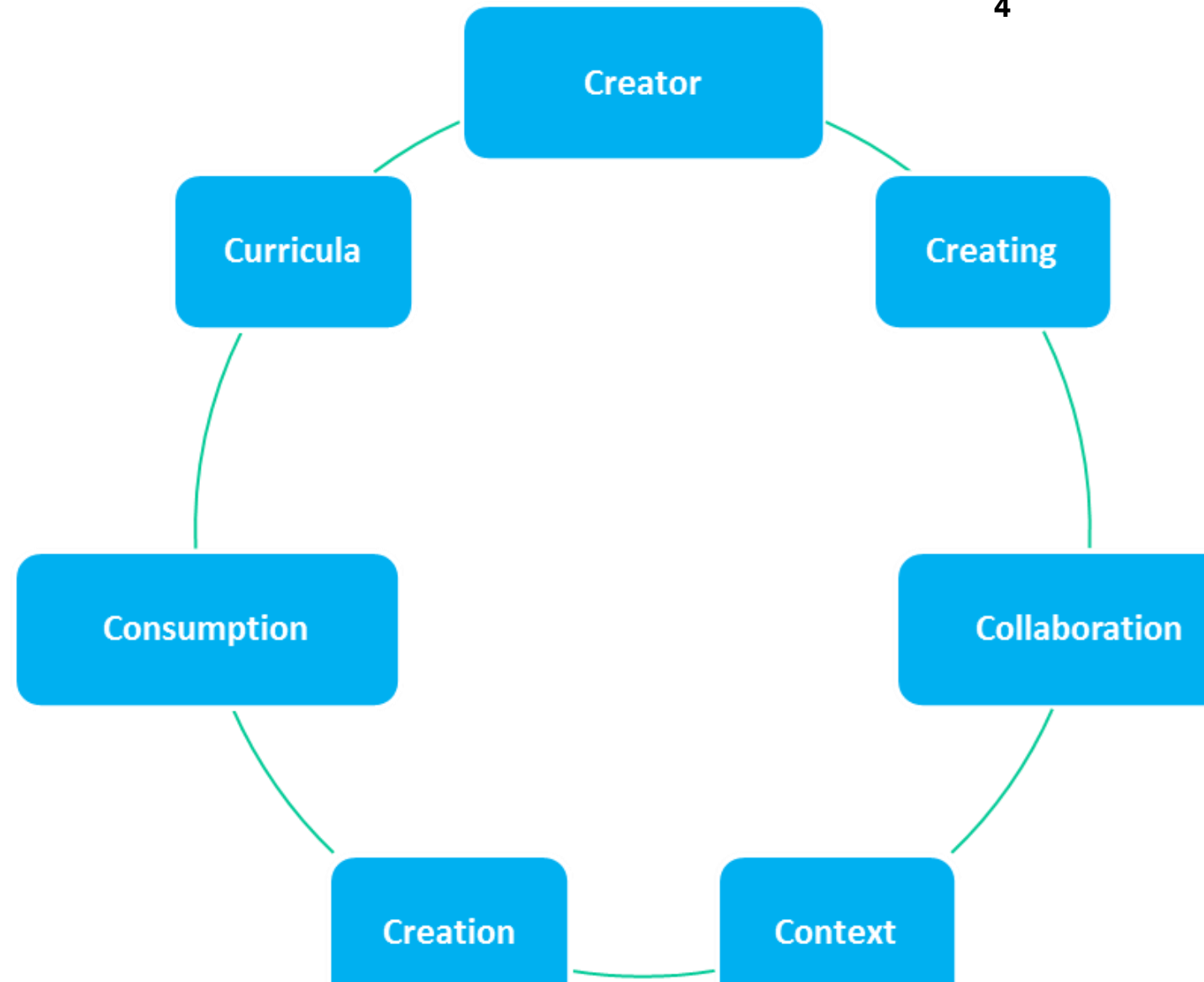
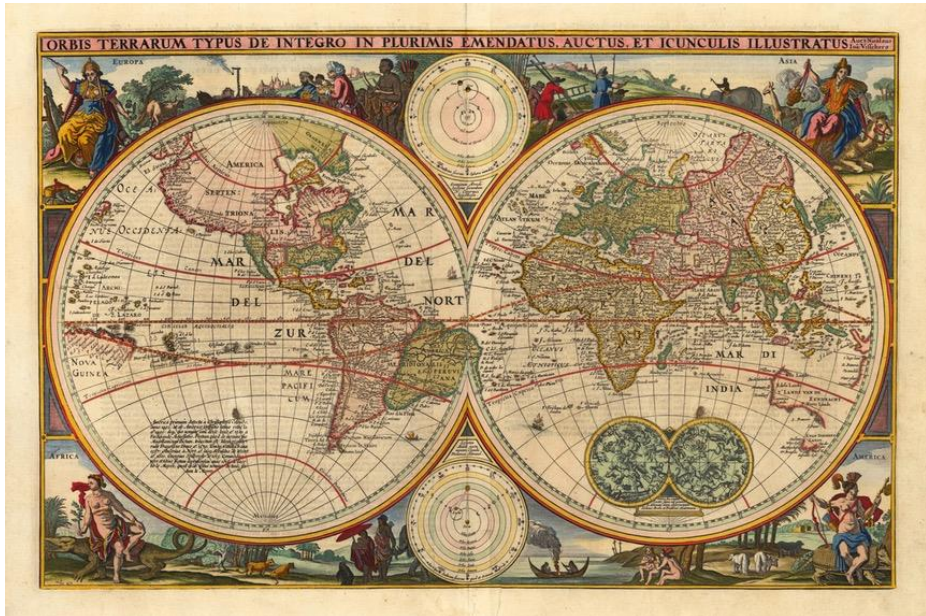
that is both novel and valuable

within its' context.



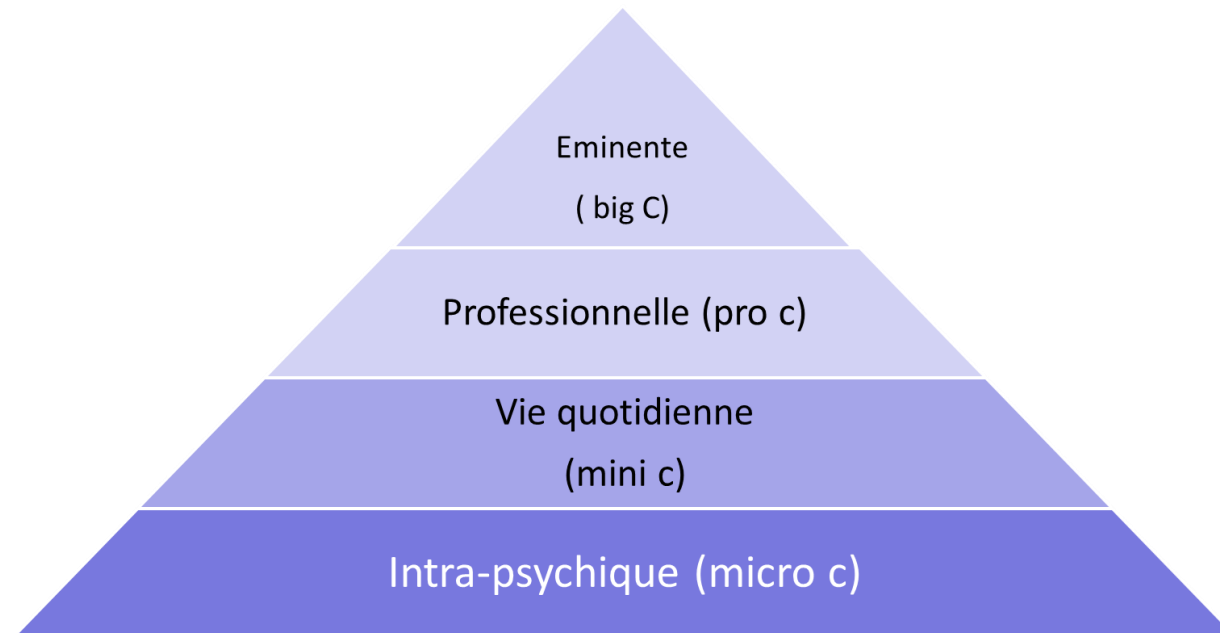
Introduction

- Creativity has been examined for many centuries, but has received increasing attention since 1950 (4 Ps, 5 As).

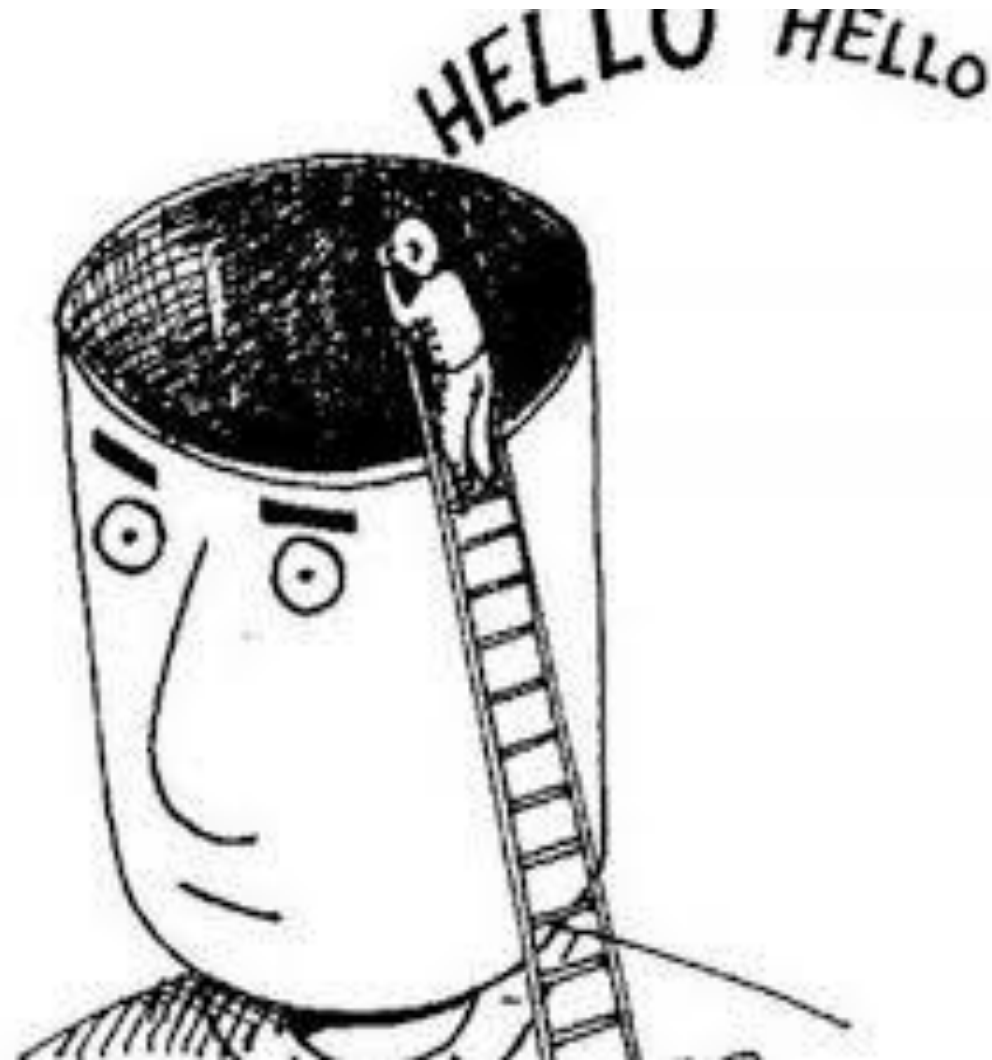


Types of creativity

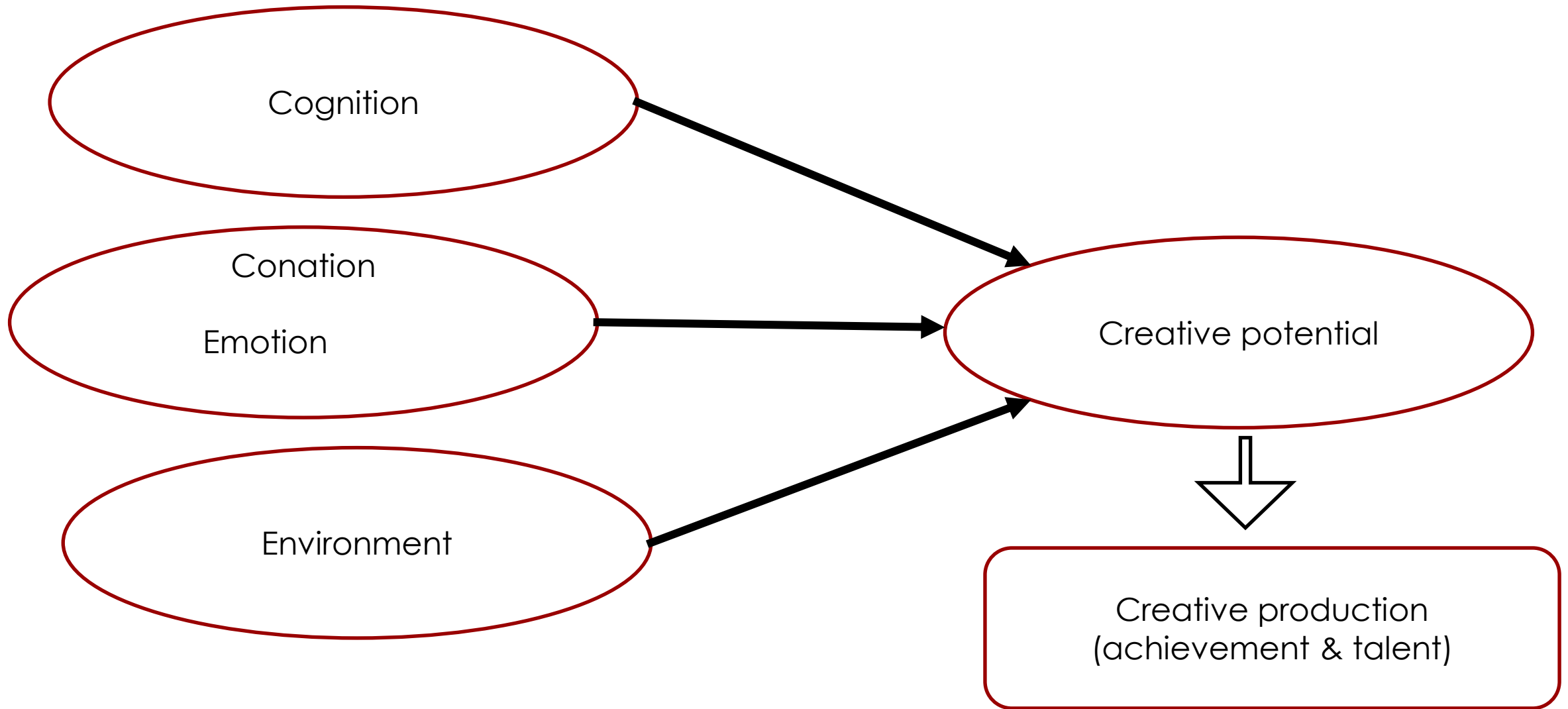
- Big C creativity = eminent cases
- Pro C creativity = creativity in job contexts
- Little c creativity = everyday creativity (in a social setting)
- micro c creativity = personal creativity, intrapsychic creativity



Does creativity require a brain?



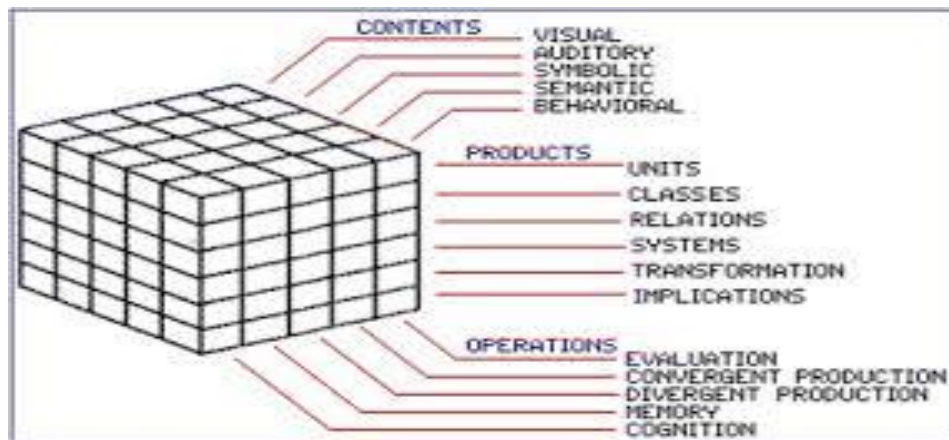
Creators



Sternberg & Lubart (1991, 1995), Lubart et al. (2003/2013)

Guilford (1950) & Mednick (1965)

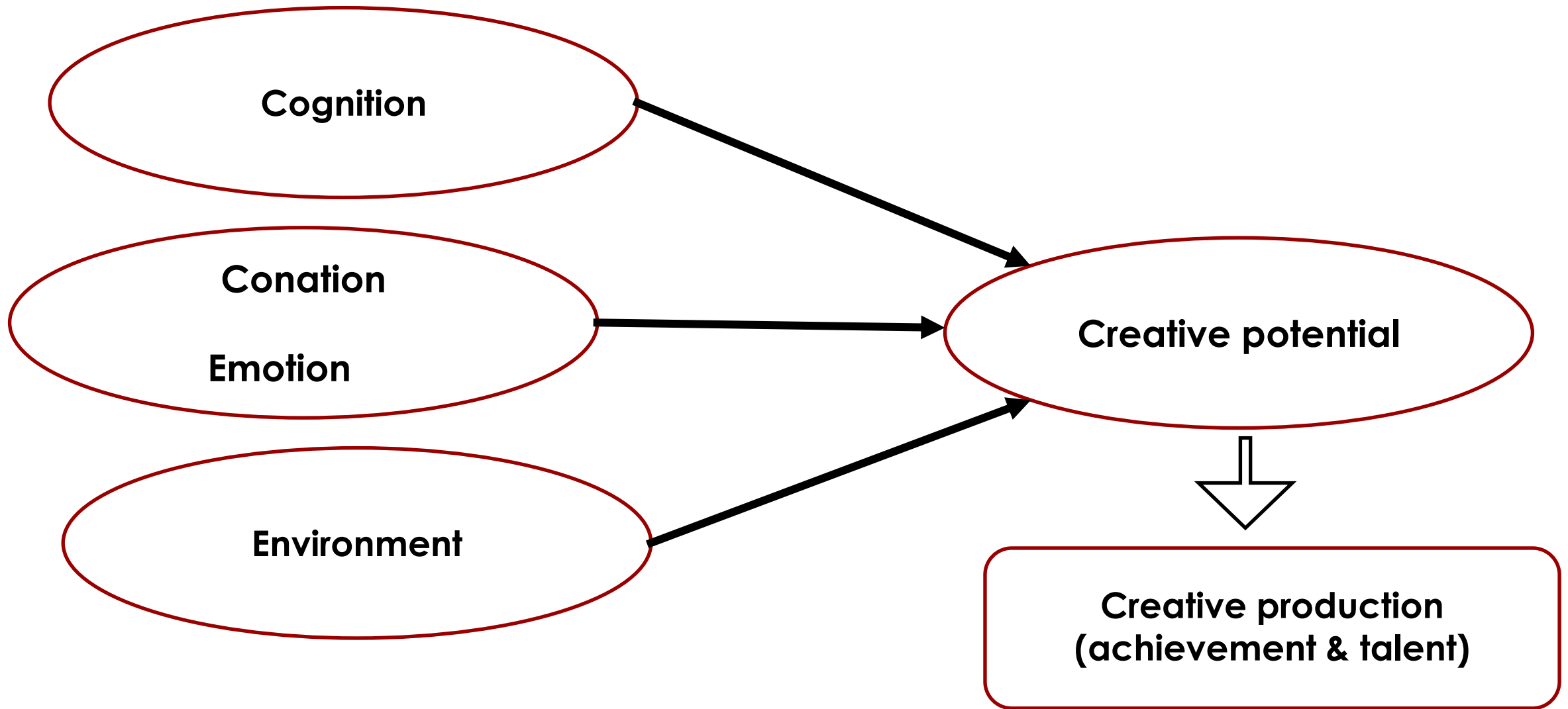
- Divergent thinking (openness)
- Convergent thinking (Koestler: bisociation, Rothenberg: homospatial thinking), Remote Associations
- Evaluation
- Dynamic cycles



J. P. Guilford



S. Mednick



Sternberg & Lubart (1991, 1995), Lubart et al. (2003/2015)



Vincent Van Gogh



Jean-François Millet



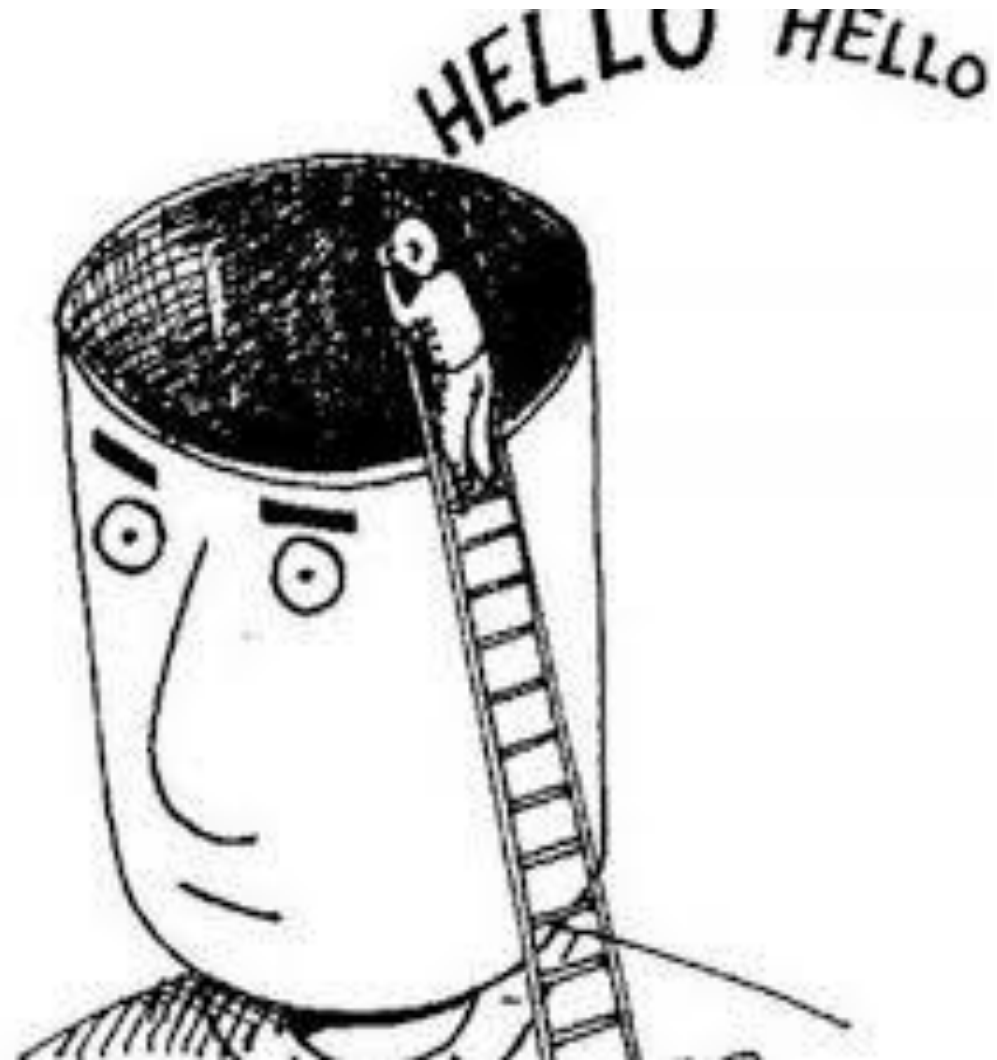
Situated - Distributed Creativity - Potential creativity

- creativity is a contextualized phenomenon
- creativity unfolds over time and space
- creativity is at the interface of productions(mememes) and the receptive audience (self - others)

(see the sociocultural manifesto, Glaveanu,
Hanchett-Hanson, Corazza, Lubart, et al.)



Does creativity require a brain?



Blind variation - selective retention (BVSR) - natural creative process



DARWIN'S FINCHES



Creative robots



Shimon (xylophone
music compositions)



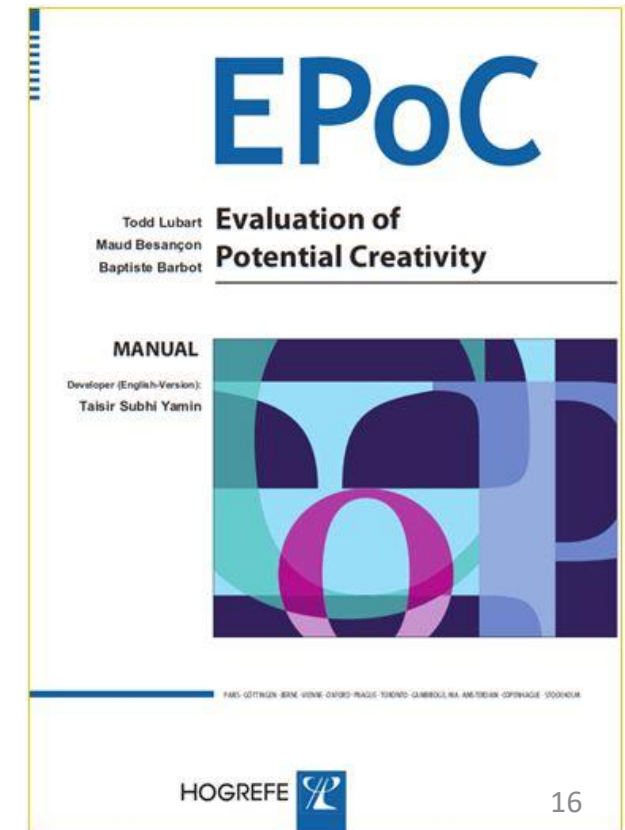
Ai-da (portrait)



Evaluation of Potential Creativity (EPoC)

A hundred different ChatGPT (half GPT3.5, half GPT4) were asked to take the verbal tasks :

- ❖ **Divergent Verbal (DV)** tasks: AUT tasks + Create as many story beginnings or endings as possible
 - Assessment was made using fluency and elaboration criterions
- ❖ **Integrative Verbal (IV)** tasks: From a title, or with 3 characters, create a story
 - Assessment was made with human judges (CAT)

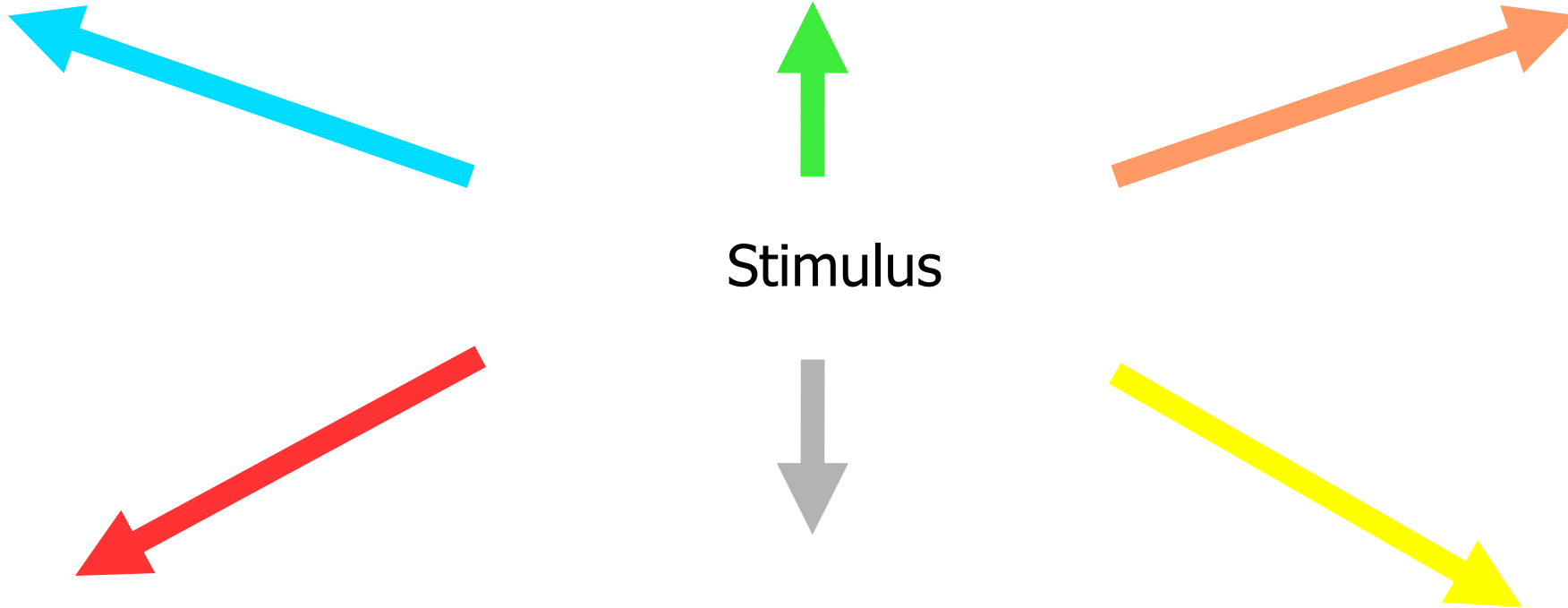


EPoC, a battery to evaluate creative potential (Lubart, Besançon, Barbot, 2011)

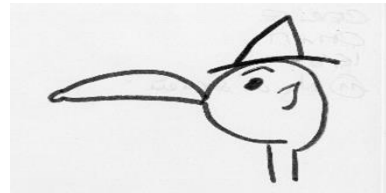
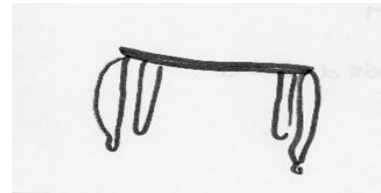
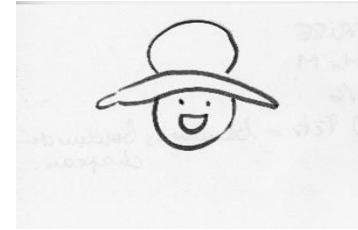
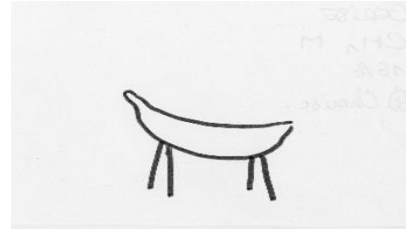
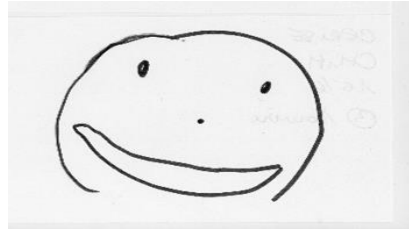
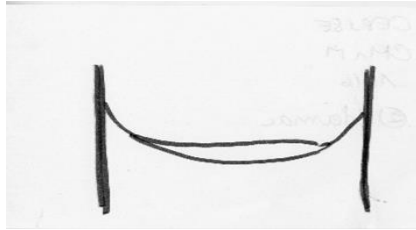


- Developed from 2000 – 2010, based on basic research on children’s development of creative thinking.
- Artistic-graphic, Literary-Verbal, Social, Math, Science domains
- Versions in English, Arabic, German, Turkish (and others under development: Croatian, Slovenian, Polish, Portuguese, Chinese, Spanish ...)
- OECD research use in 10 countries

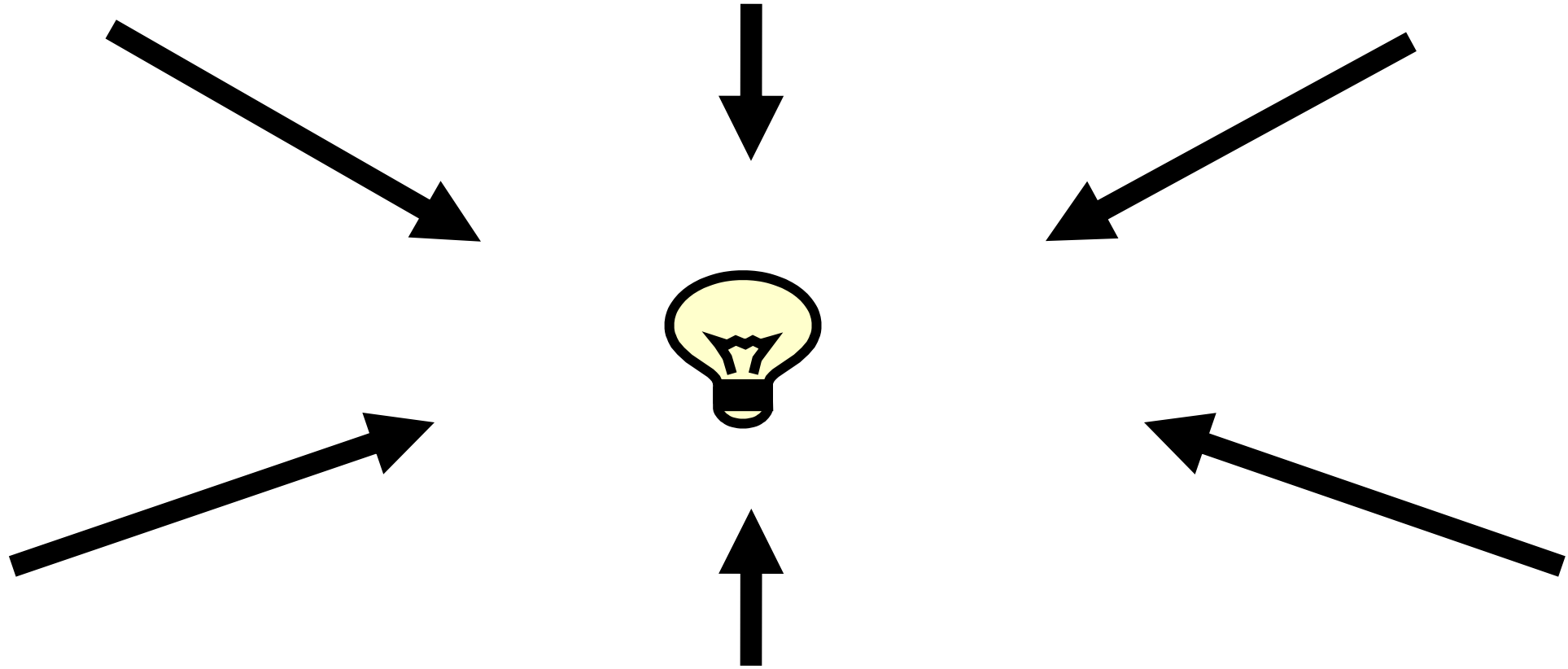
Divergent-Exploratory Thinking



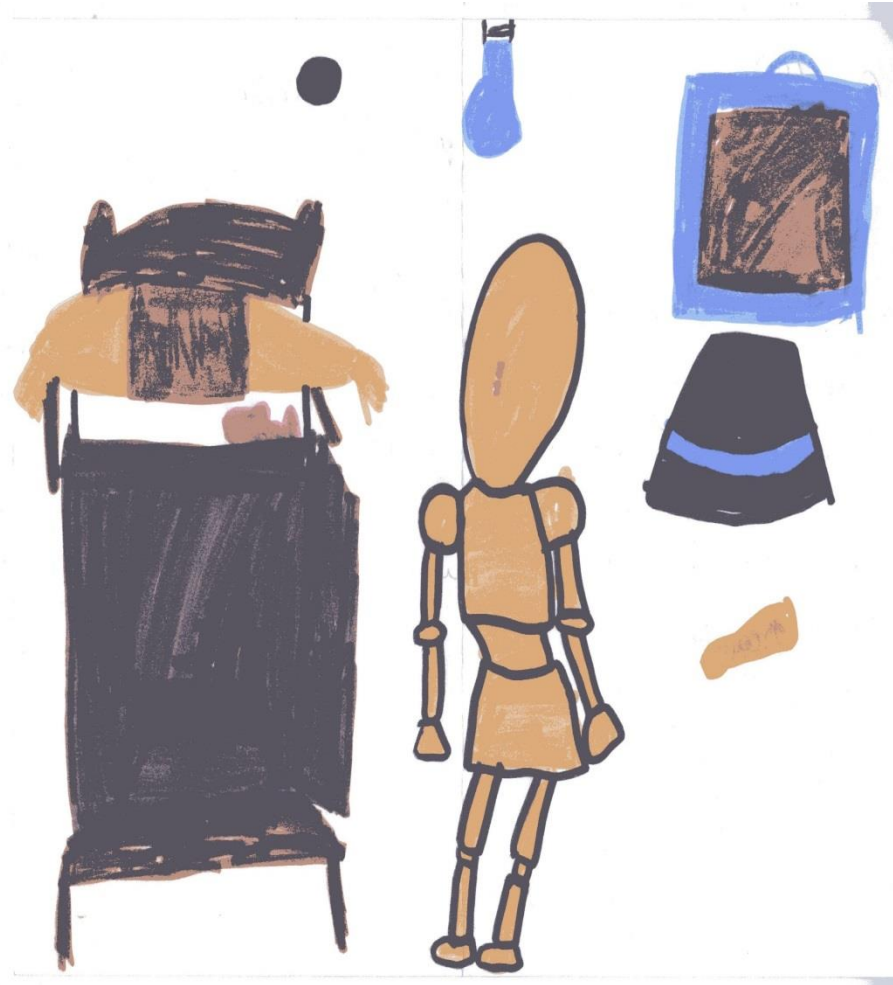
Examples of productions Divergent-exploratory

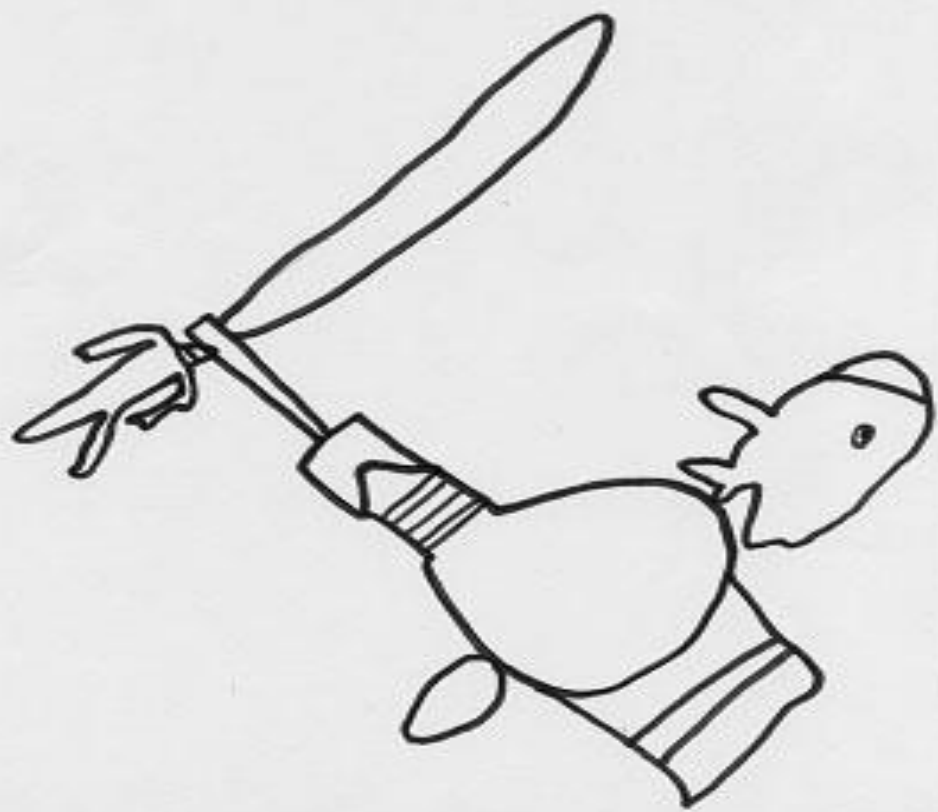


Convergent-Integrative Thinking



Examples of productions Convergent - Integrative





EPoC Scoring: overview

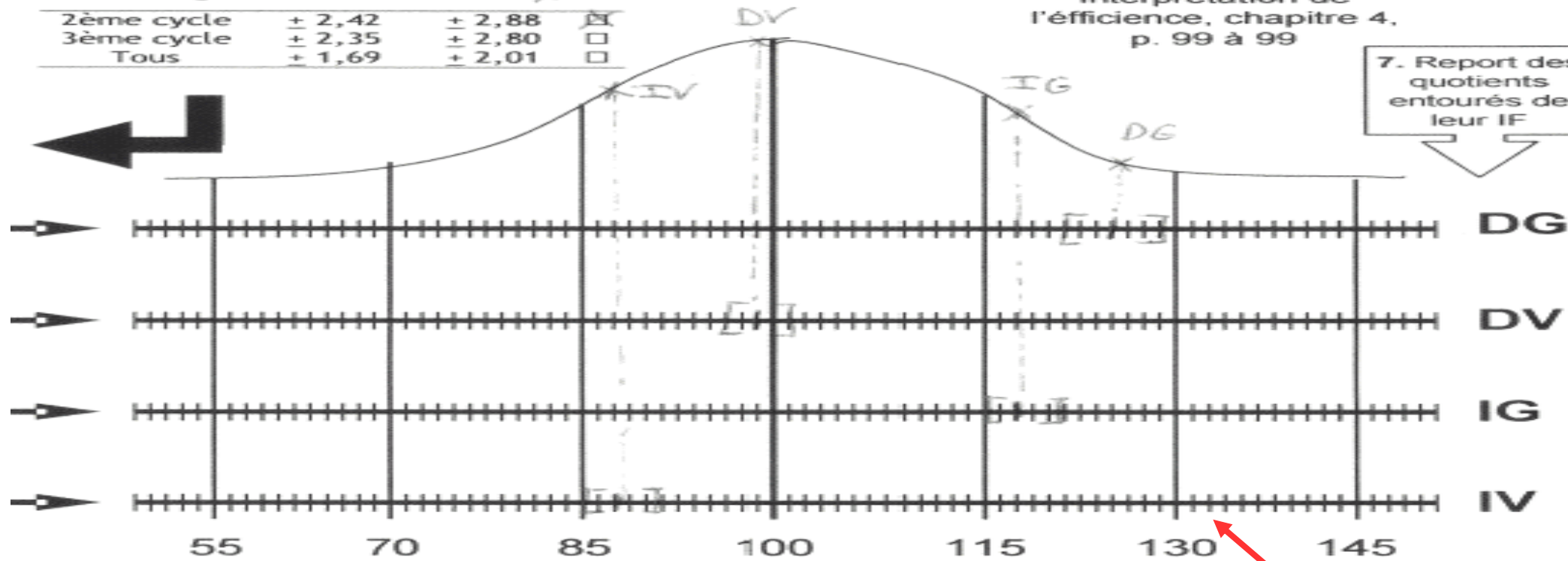
Intervalle de confiance (seuil 90 et 95%) autour des valeurs de quotients

Etalonnage	IF 90% <input type="checkbox"/>	IF 95% <input checked="" type="checkbox"/>
2ème cycle	+ 2,42	+ 2,88
3ème cycle	+ 2,35	+ 2,80
Tous	+ 1,69	+ 2,01

Efficiency

Interpretation de l'efficacité, chapitre 4, p. 99 à 99

7. Report des quotients entourés de leur IF



Indice	Très limité 69 et moins	Limité 70-79	Normal faible 80-89	Moyen 90-109	Normal fort 110-119	Supérieur 120-129	Très supérieur 130 et plus
DG	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
DV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IG	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IV	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Synthèse efficacité

Creative AI-bilities

Table 4: Creative Potential Standardized quotient from EPoC

	QDV		QIV	
	GPT3.5	GPT4	GPT3.5	GPT4
Min	113	138	91	97
Max	138	138	114	125
Mean	136.06	138	104.18	109.16
SD	5.01	0	6.82	7.01
High Verbal Potential				
GPT3.5				7
GPT4				19

Comparing AI to human norms ($m=100$, $s.d= 14$):

- ❖ **DV Tasks:** more than 2 s.d, **incomparable** to what humans can do
- ❖ **IV Tasks:** Scores are under the 1st s.d, GPT 3.5 and 4 are good, but way more average

“Plagiarism 3.0”



“Once upon a time, there was a curious little girl named **Alice**. She loved exploring her grandmother's house, which had many interesting hidden objects. One day, while wandering around the house, Alice discovered a keyhole in her grandmother's bedroom door. Curious, she peers through the keyhole and sees a magical world on the other side.

She sees luminous trees, giant flowers and **strange creatures roaming freely**. Alice decides to venture into the world on the other side of the keyhole. She finds a way through the keyhole and arrives in a strange and wonderful world.

Alice meets a white rabbit who tells her she must find a key to return to the real world. Alice begins her quest to find the magic key. She encounters a **smiling cat**, a **smoking caterpillar** and a wicked **Queen of Hearts**.

Finally, Alice finds the key, but faces a final challenge to return to the real world. She must solve a riddle posed by the Queen of Hearts. Thanks to her perspicacity and intelligence, Alice manages to solve the riddle and returns to the real world, key in hand.

She wakes up in her grandmother's bedroom, realizing that it was all a dream. But as she peers through the keyhole, she sees a sparkle in her grandmother's eyes, who tells her that she, too, saw the magical world through the keyhole when she was a child. Alice smiles, knowing she's discovered something special, something only children can see.

Vinchen, Lubart, et al (2023)

ChatGPT as a creative agent

AI PLAGIARIZES

**Some stories are taken
from other stories**

THERE IS LITTLE VARIETY

**hierarchical clustering
indicate that there are 3 to
4 type of stories in each
conditions**

AI has its preferences

**Qualitative analysis
shows that in some case
20% of stories had
characters with the same
names**

Summary of the main points

- Creativity: a complex psychological construct
- Creativity involves an individual and extra-individual approach (multiple minds)
- Creativity may not require wetware devices (e.g; brains)

Thank you

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