UNIVERSITÉ PARIS DESCARTES
INSTITUT DE PSYCHOLOGIE

# The measure and mismeasure of creativity

Todd Lubart
University of Paris Descartes

# Creativity: A 21st century competency

- 2010 IBM international study of CEOs (N=1541)
  - Creativity is the top ability sought after for top management
- 2013 Adobe survey, 4000 grade 1--12 teachers and parents, (USA, UK, Germany, Australia)

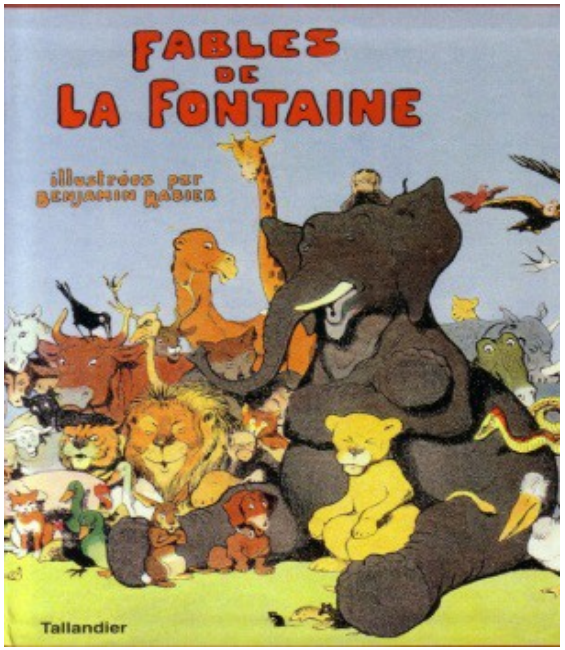
  85 to 90% of parents, 65 to 87 % of teachers :
  « Creativity is essential for the future economy »
- 2015-2016 OECD – International study on educating creativity
- 2016 World Economic Forum "Future of jobs report"- Creativity will be one of the top three capacities for employability in 2020.

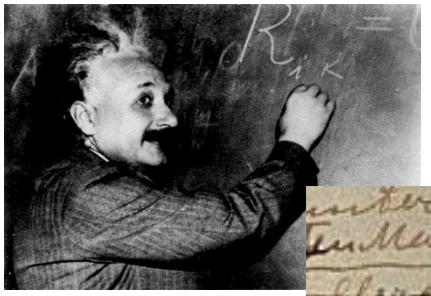
- Creativity is a capacity to produce content

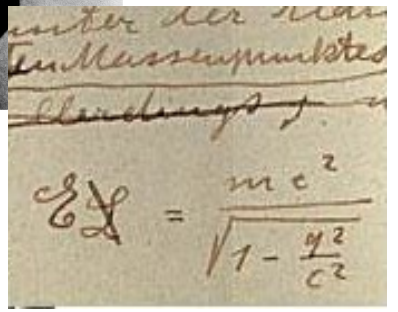
  that is both

  novel and valuable

  within its' context.






# Why should we measure creativity?

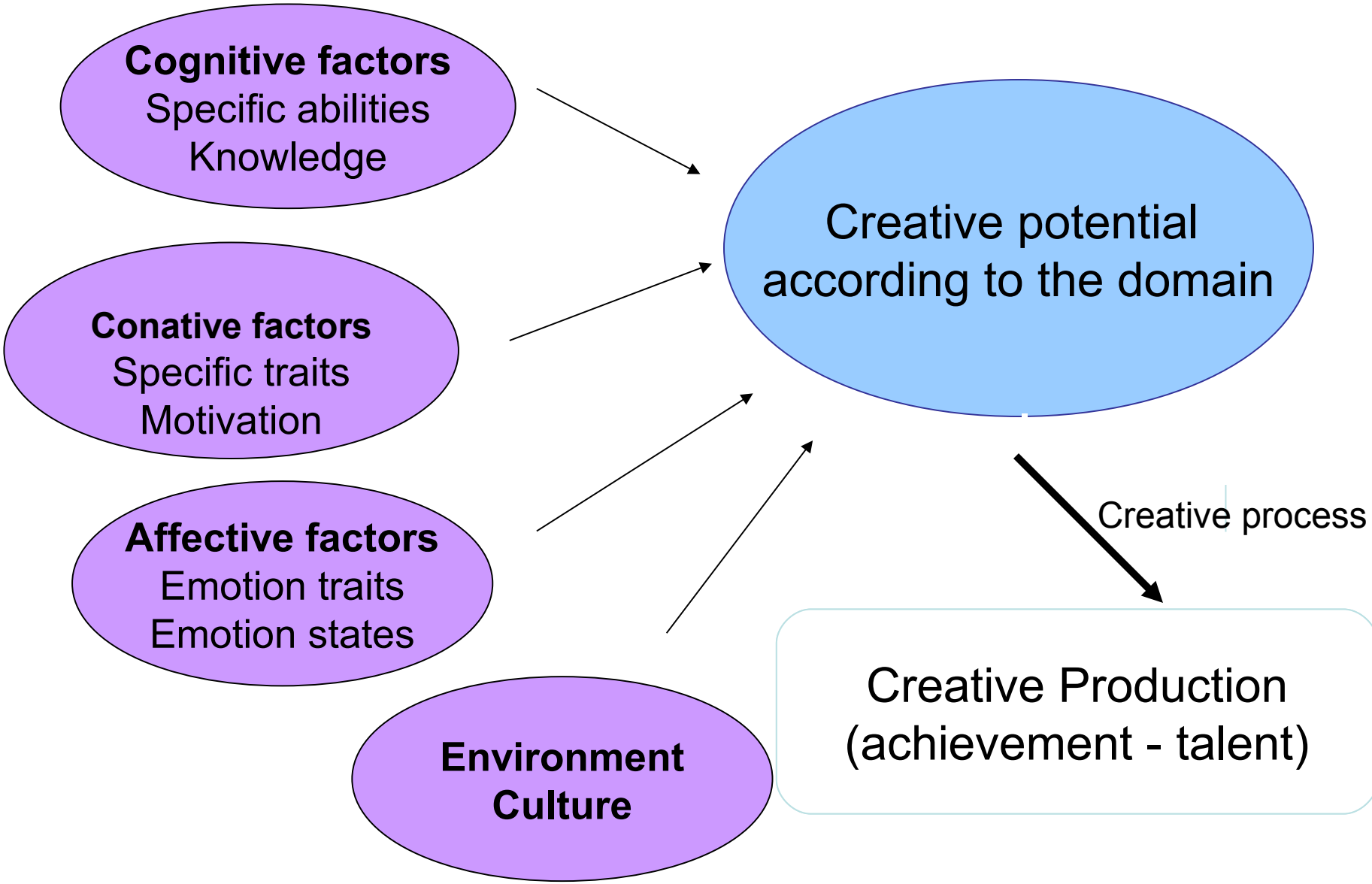
1. Measures operationalize a psychological construct, allowing it to be captured, and discussed.

2. Measures facilitate a capacity being valued in the educational system.

3. Measures contribute to detection (selection, orientation) and capacity development.

# Levels of creative activity

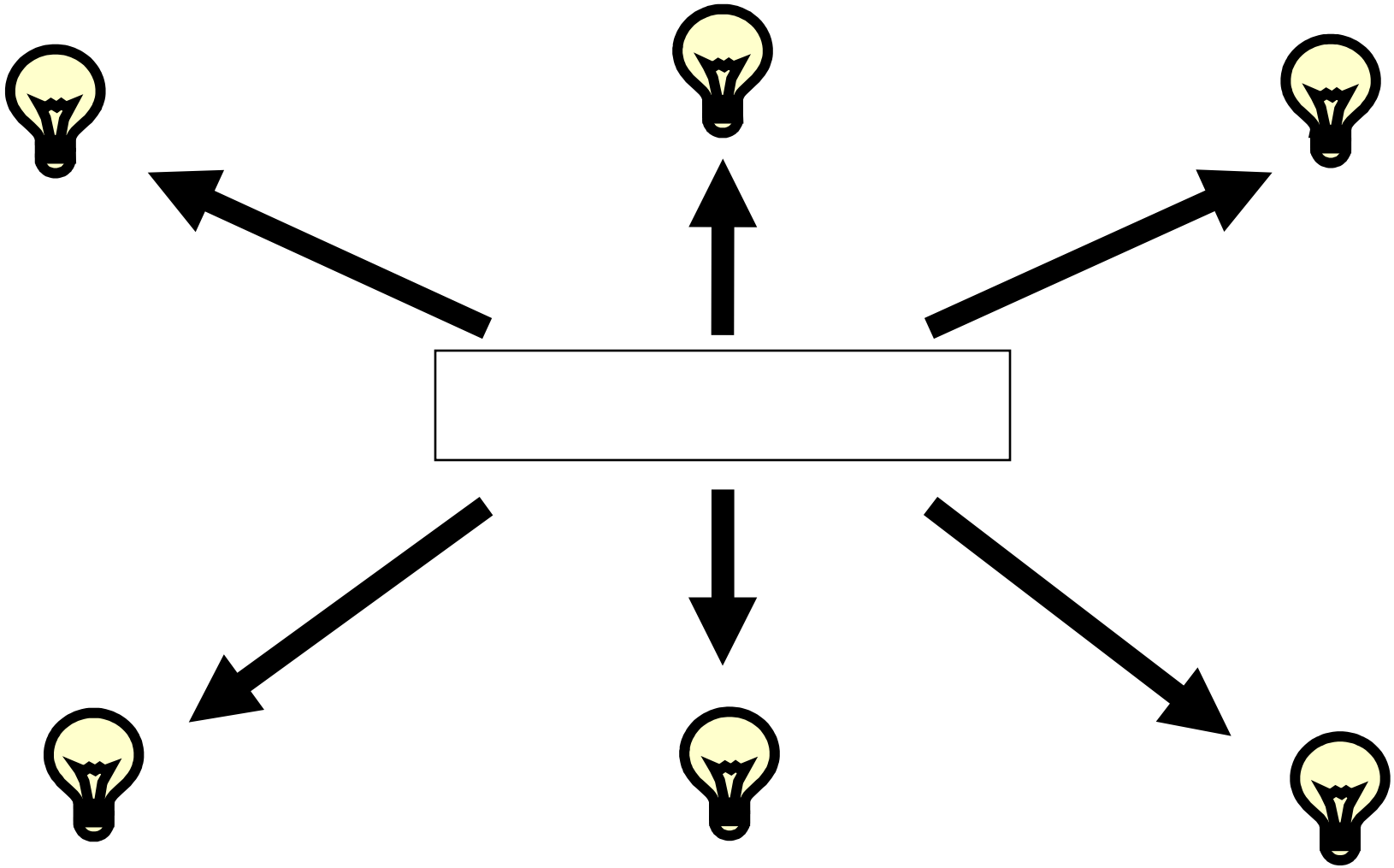
- **Mini c - intra individual**
- **Little c – interpersonal, local context**
- **Pro C – domain context**
- **Big C – global context**


Cognitive factors
Specific abilities
Knowledge
Conative factors
Specific traits
Motivation
Affective factors
Emotion traits
Emotion states
Environment
Culture
Creative potential
according to the domain
Creative process
Creative Production
(achievement - talent)

# Creative Process

- A two mode process is assessed
  - Divergent-exploratory: generate many original ideas
  - Convergent-integrative: generate one elaborated idea that combines several elements in a new way

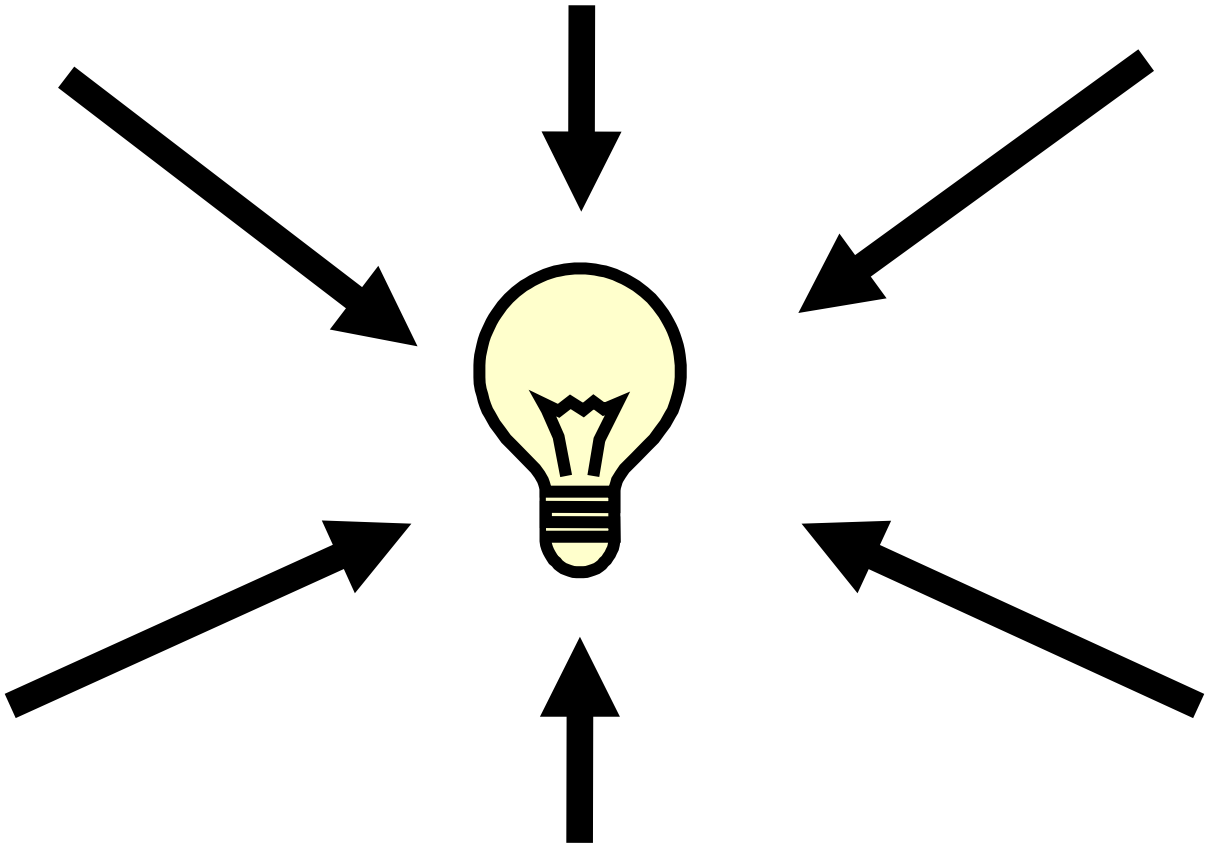
# Divergent thinking



# The Divergent-Exploratory Mode of thinking

- A set of internal factors are relevant:
  - Cognition: Selective encoding, Flexibility, Knowledge,
  - Personality: Perseverance, Openness, Non-conformity
  - Motivation: Novelty-seeking
  - Emotion: Positive emotion

# Convergent thinking



# The Convergent-Integrative Mode of thinking

- A set of internal factors are relevant:
  - Cognition: Selective comparison(analogies, metaphors), selective combination (bisociation, janusian thinking, …), evaluation
  - Personality: Perseverance, Non-conformity, risk taking, Ambiguity tolerance,
  - Motivation: Need for Achievement, Need for Order
  - Emotion: Negative emotion

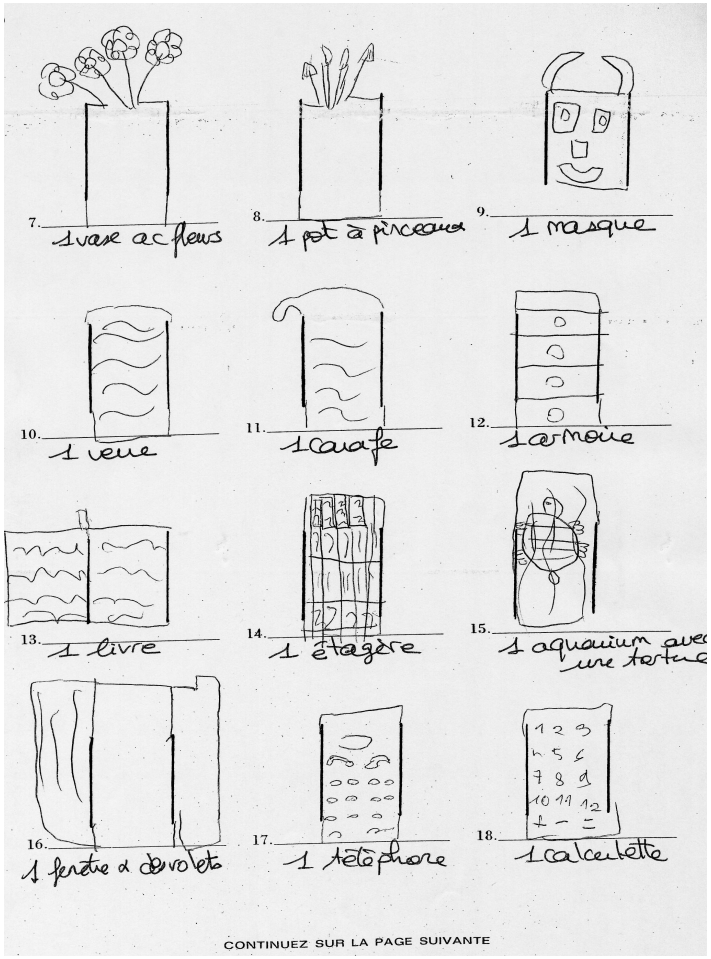
# Assessment Issues

1. Creative Potential *vs*. Creative Achievement (Talent)
2. Domain-specific *vs.* general
3. Measurement approach to potential
   - Simulate real creative work (art, literary composition, ...)
   - --Involve divergent-exploratory, convergent-integrative thinking, involve motivation, personality factors, emotions

# Examples of creativity measures

- TTCT : Divergent, graphic and verbal
- WKCT : Divergent, verbal
- RAT : Convergent, verbal
- TCT-DP : Convergent, Graphic

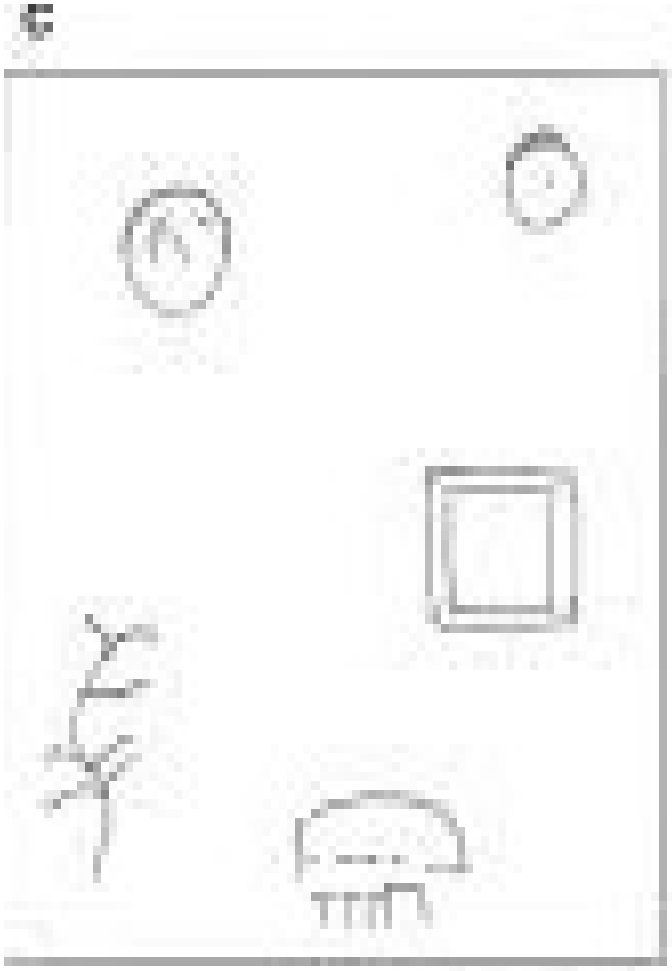
# Examples of Measures




- RAT (Mednick)

  surprise – birthday – line

  (response: party)



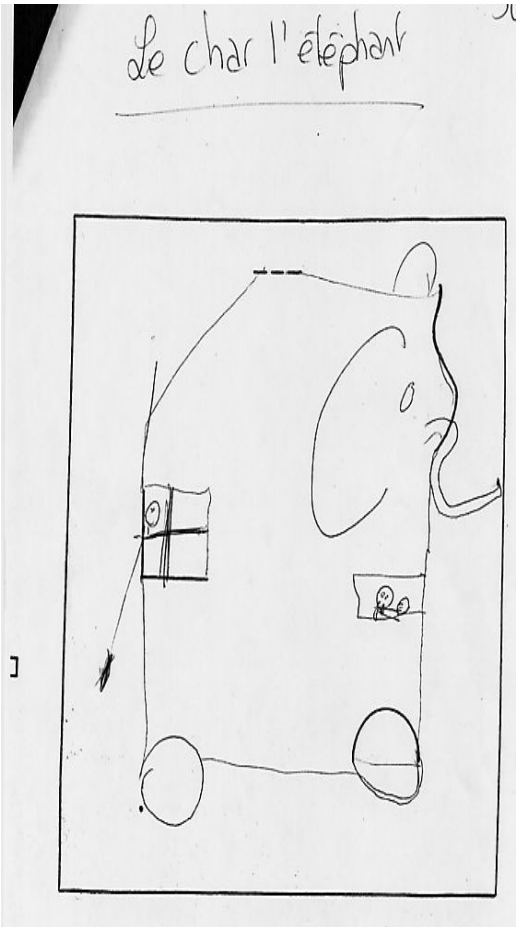

Le char l'éléphant

**Table 1**
Results of factor analyses (factor loadings) of TCT-DP subscores after varimax rotation.

| Variables | Drawing form A | | | Drawing form B | | |
|---|---|---|---|---|---|---|
| | Factor 1 | Factor 2 | $h^2$ | Factor 1 | Factor 2 | $h^2$ |
| Cn | .99 | .05 | .98 | .99 | −.07 | .94 |
| Cm | .65 | .45 | .63 | .56 | .24 | .74 |
| Ne | −.03 | .62 | .38 | −.08 | .76 | .62 |
| Ci | .30 | .65 | .51 | .13 | .62 | .39 |
| Cth | .15 | .93 | .88 | .09 | .83 | .61 |
| Bfd | .77 | −.02 | .59 | .89 | −.02 | .93 |
| Bfi | .47 | .49 | .46 | .33 | .47 | .53 |
| Pe | −.02 | .52 | .27 | −.21 | .52 | .44 |
| Hu | .15 | .76 | .60 | .13 | .69 | .51 |
| Uct | .28 | .55 | .39 | .27 | .49 | .39 |
| Expl. Var. | 2.43 | 3.27 | | 2.35 | 2.91 | |
| Pct. Var. | 24% | 33% | | 24% | 29% | |

Cn = Number of graphic elements used among the initial elements proposed; Cm = Number of graphic elements used in a meaningful way; Ne = Number of new items added to the composition; Ci = Number of contacts established between the initial graphic elements; Cth = Degree to which the elements were connected thematically; Bfd = Use of the element outside the frame; Bfi = Use of added elements outside the frame; Pe = Use of three-dimensional drawing techniques; Hu = Creation of a humoristic or emotional atmosphere; Uct = Use of unconventional, non-stereotyped content or graphic forms. Expl. Var. = Explained variance; Pct. Var. = percentage of explained variance.

# EPoC, a new battery to evaluate creative potential

- Developed from 2000 – 2010, based on prior research on children's development of creative thinking.
- 2011: Artistic-graphic and Literary-Verbal domains normed on a French population.
- 2013: Versions in English, Arabic, German, Turkish (and other languages under development – Polish, Chinese, Portuguese, Slovenian, ...).
- 2015: Extension to Social, Math, Science, Music Domains & OECD research use in 10 countries.

# How does EPoC work?

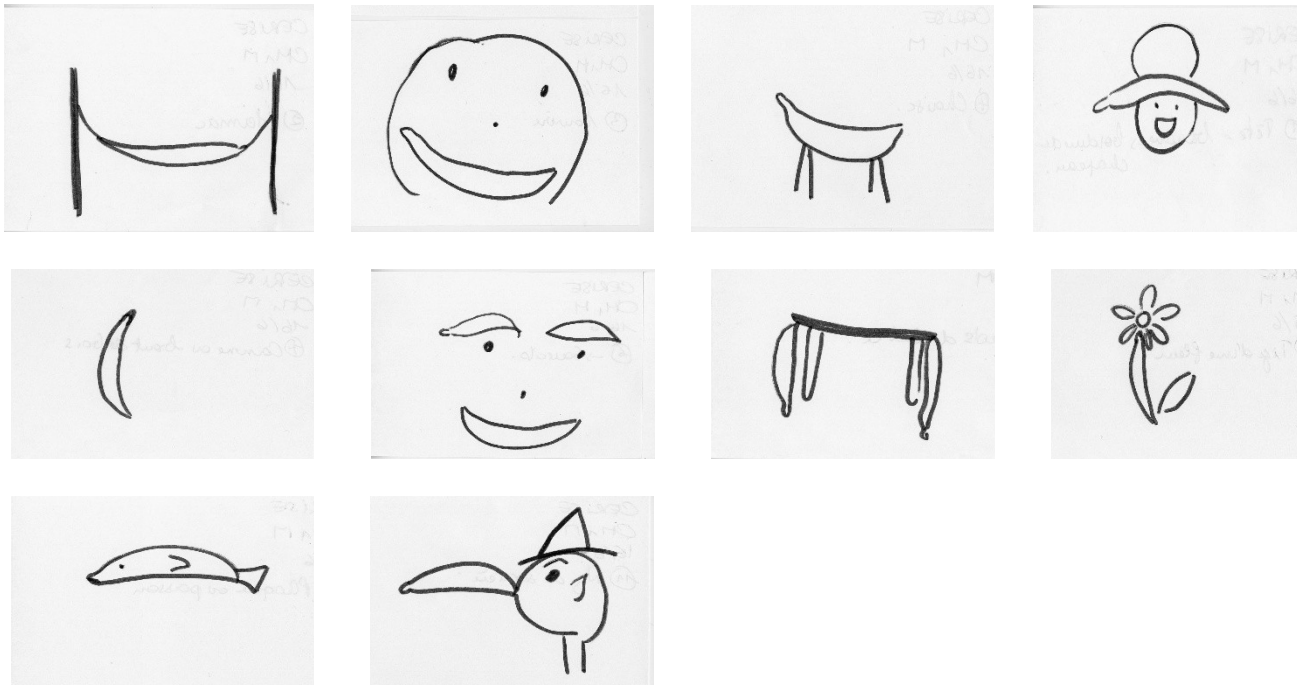
- Have the child show what they can produce when they engage the creative process in a domain-specific, meaningful task.
- Solicit both divergent-exploratory and convergent-integrative thinking, the two main parts of the creative process.
- Measure children's creative thinking on two separate occasions, with two distinct contents from the target domain.

# Test Administration

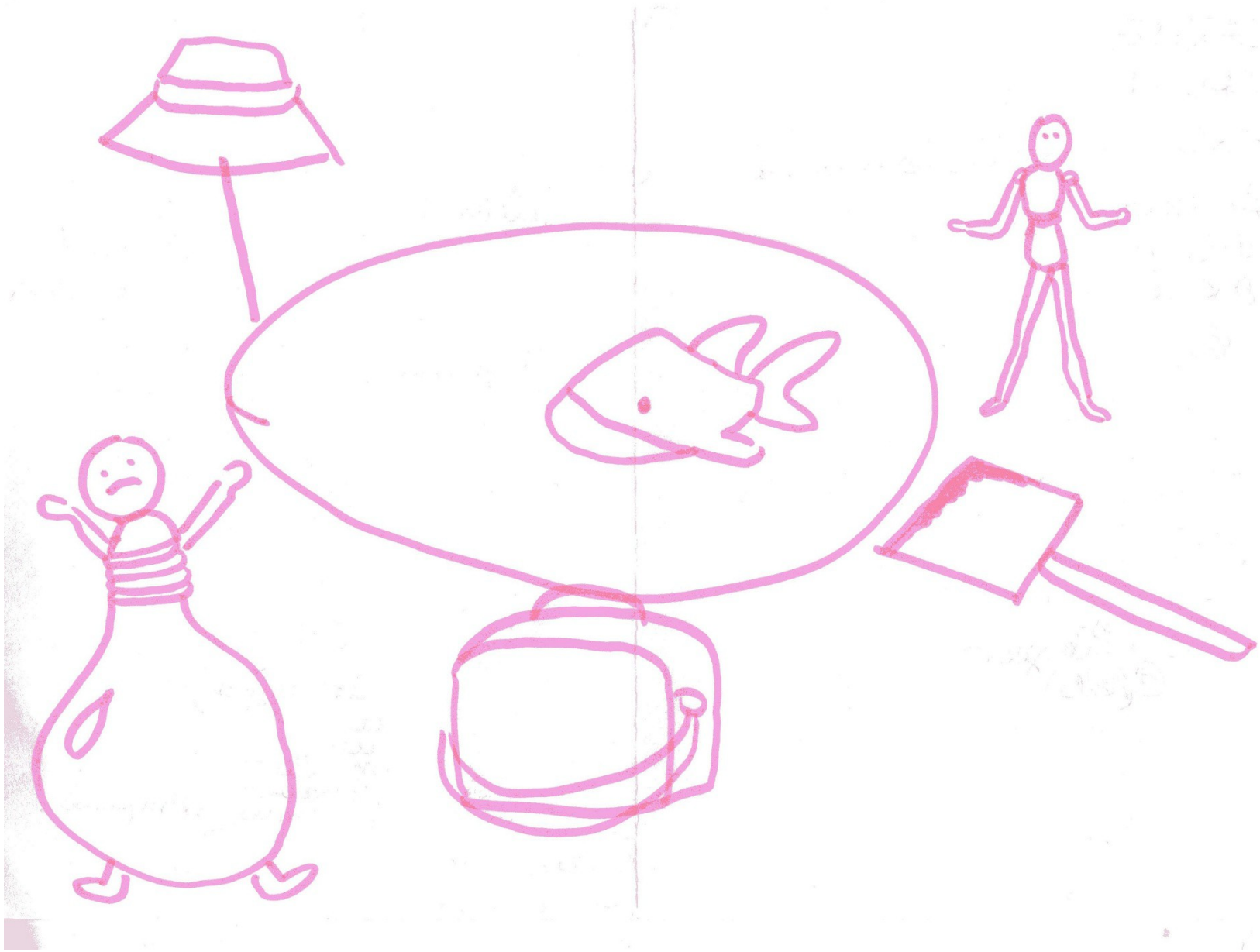
- Individual
- 2 sessions of 20 minutes per domain assessed, several days apart
- Each session, divergent-exploratory and convergent-integrative tasks

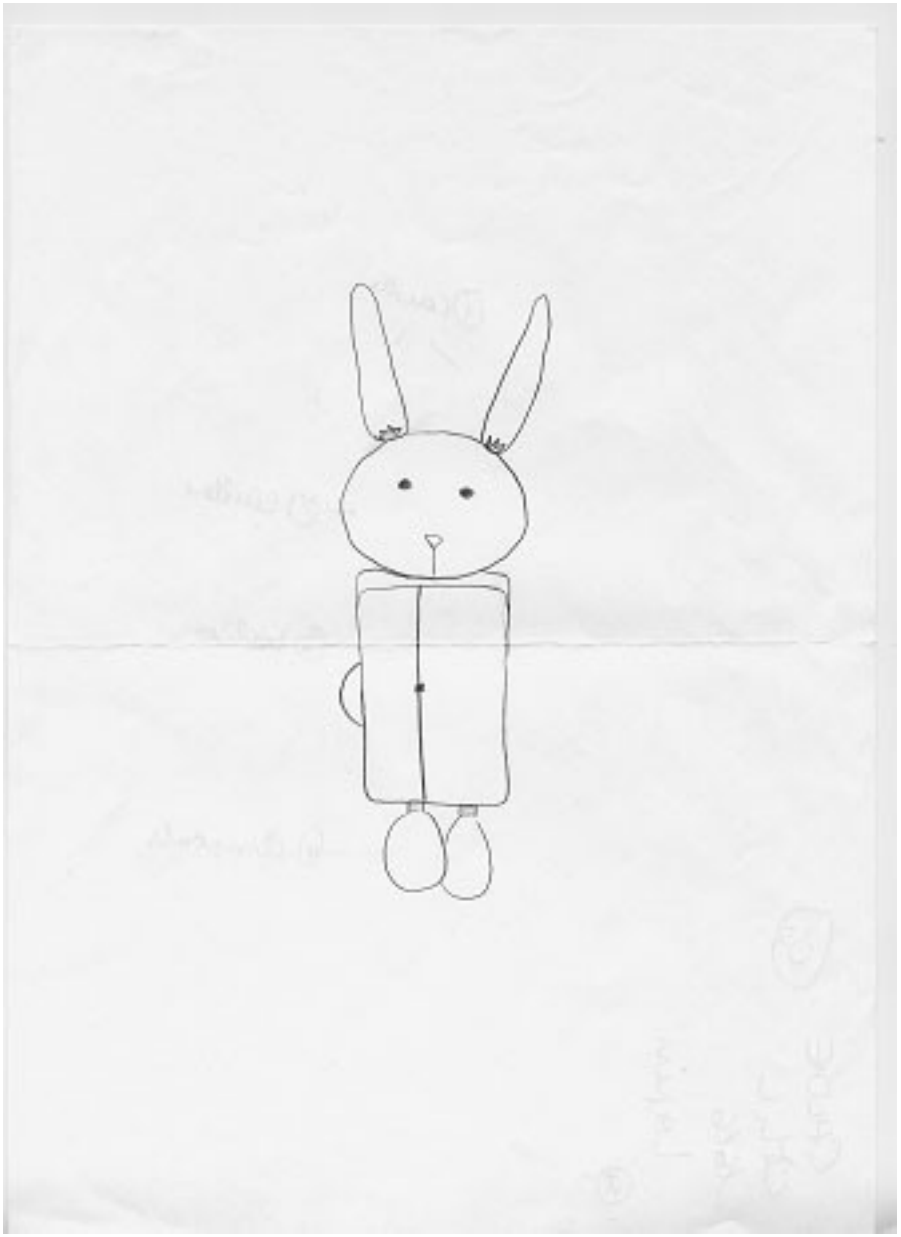
- Scoring =
  - Divergent : Fluency
  - Convergent : judges ratings

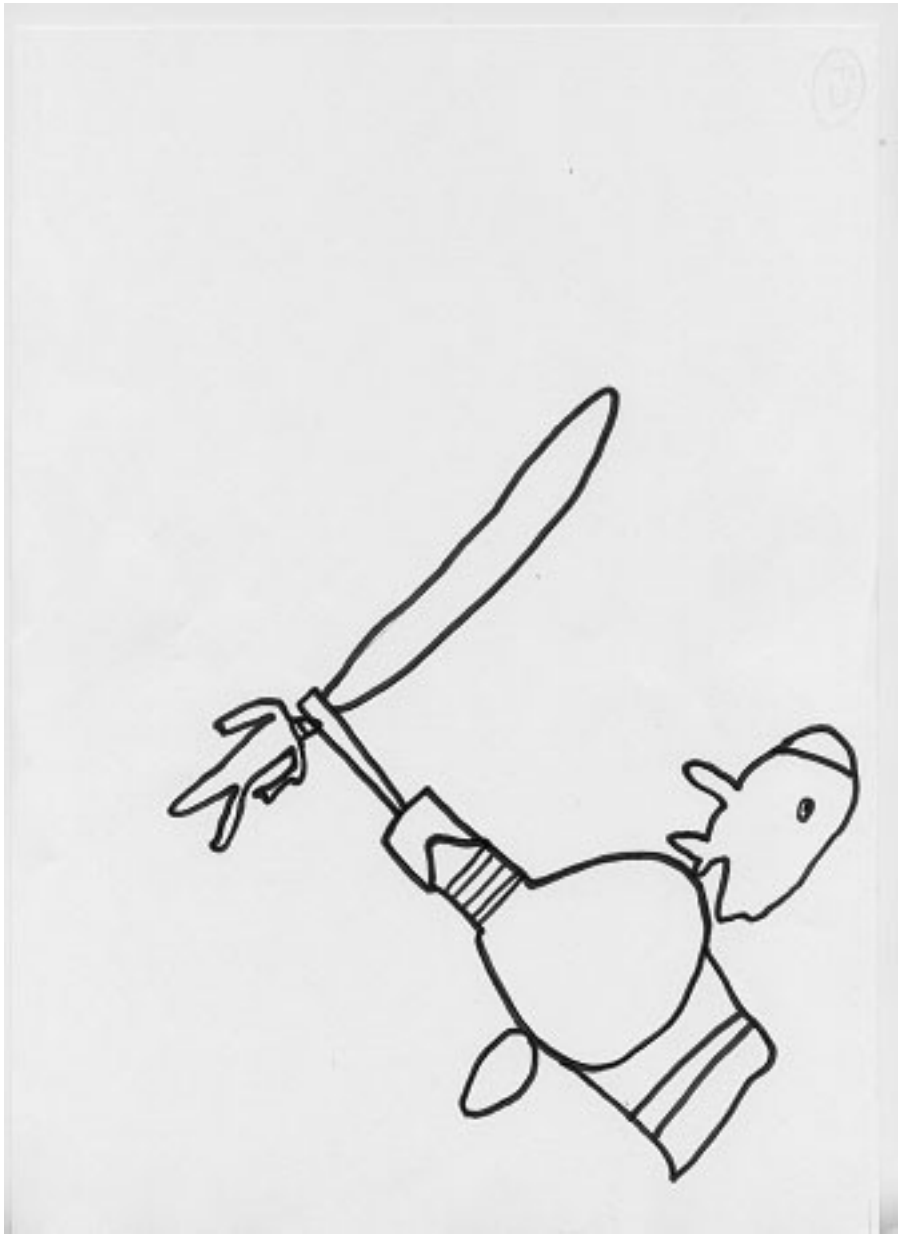
# Examples of productions Divergent-exploratory



# Examples of productions
# Convergent - Integrative







# EPoC Scoring

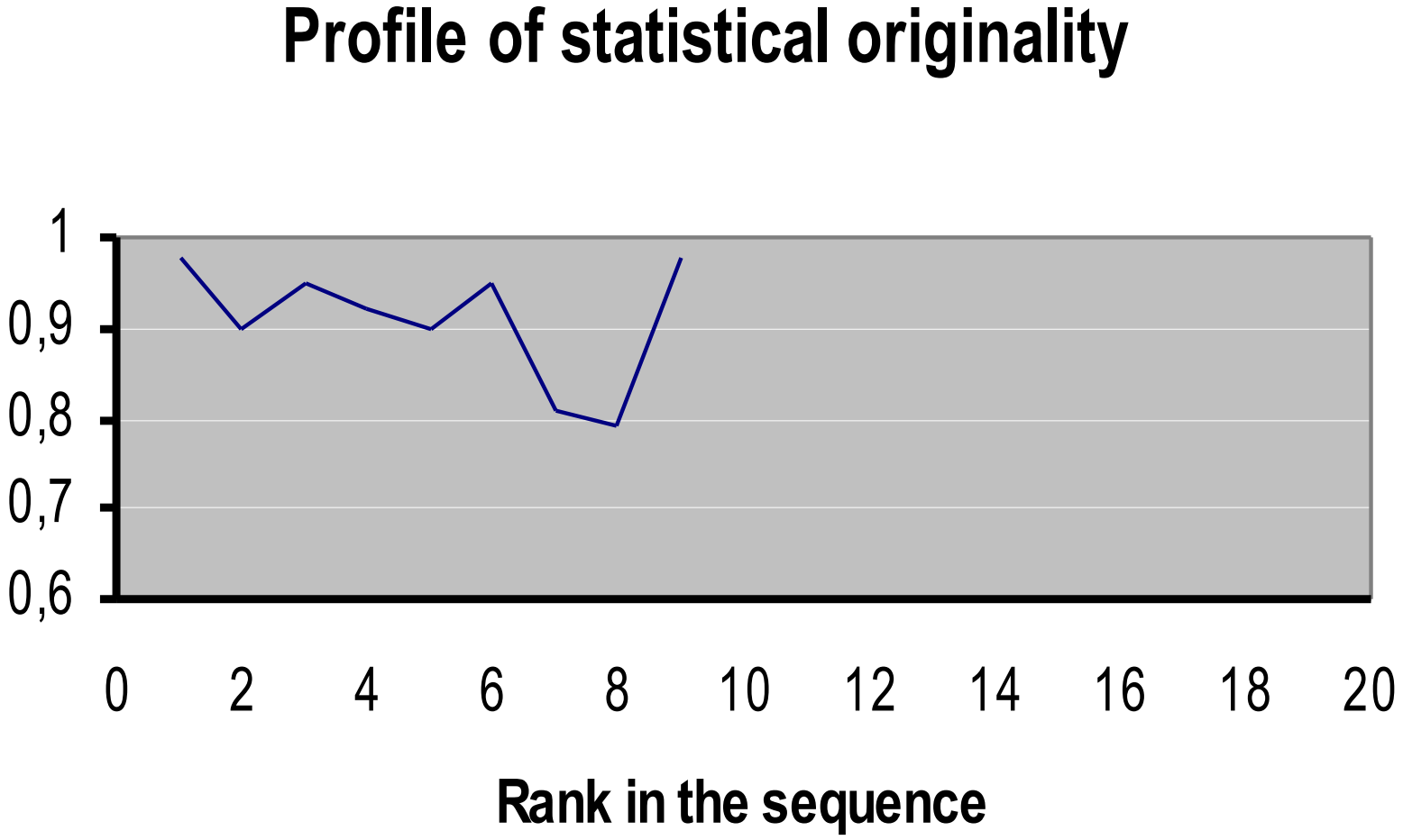
Divergent-exploratory: fluency

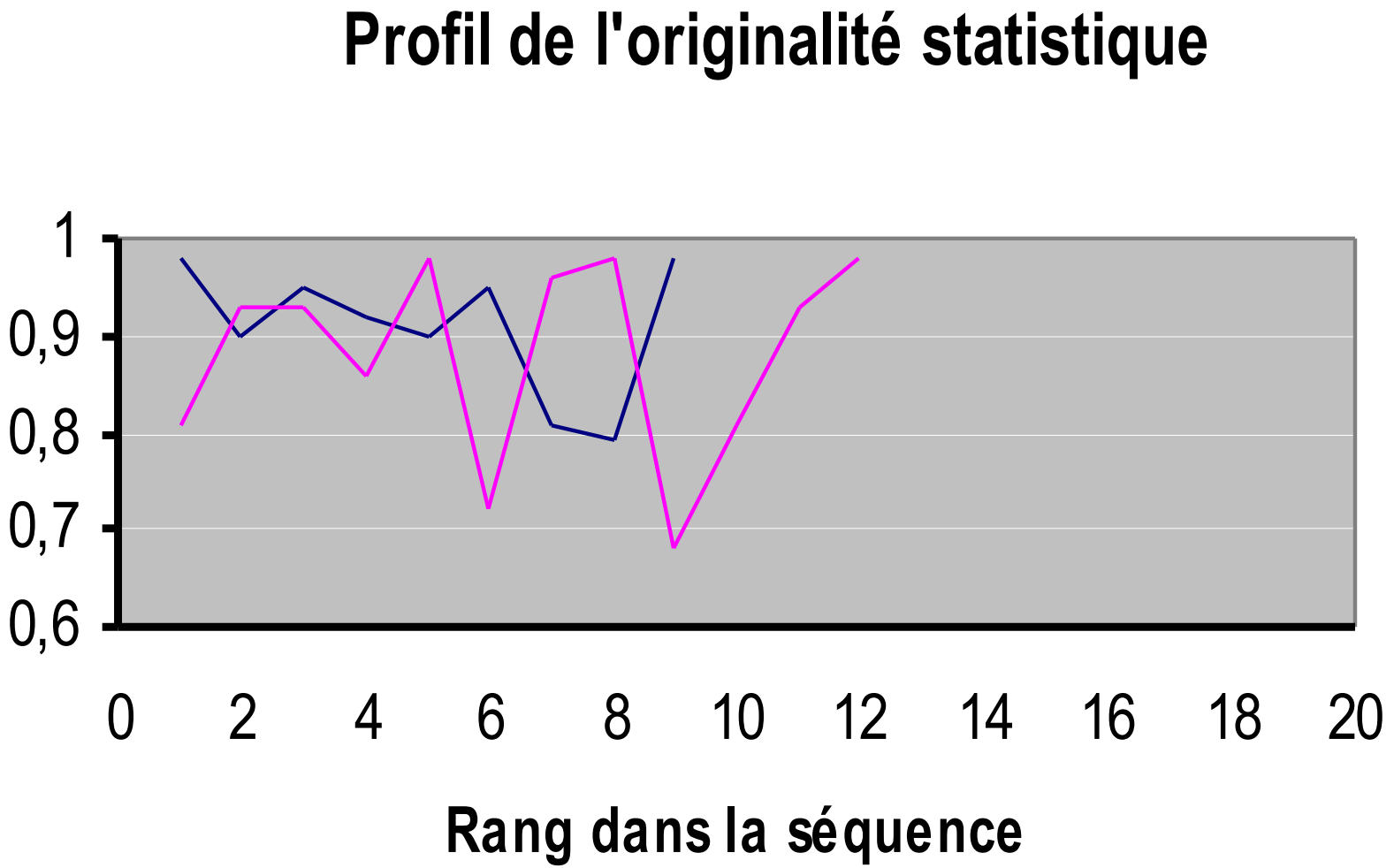
Convergent-integrative: original synthesis

# Why fluency ?

Make as many drawings as you can with the given graphic form.

Try to be imaginative.


Profile of statistical originality
1
0,9
0,8
0,7
0,6
0
2
4
6
8
10
12
14
16
18
20
Rank in the sequence


Profil de l'originalité statistique
1
0,9
0,8
0,7
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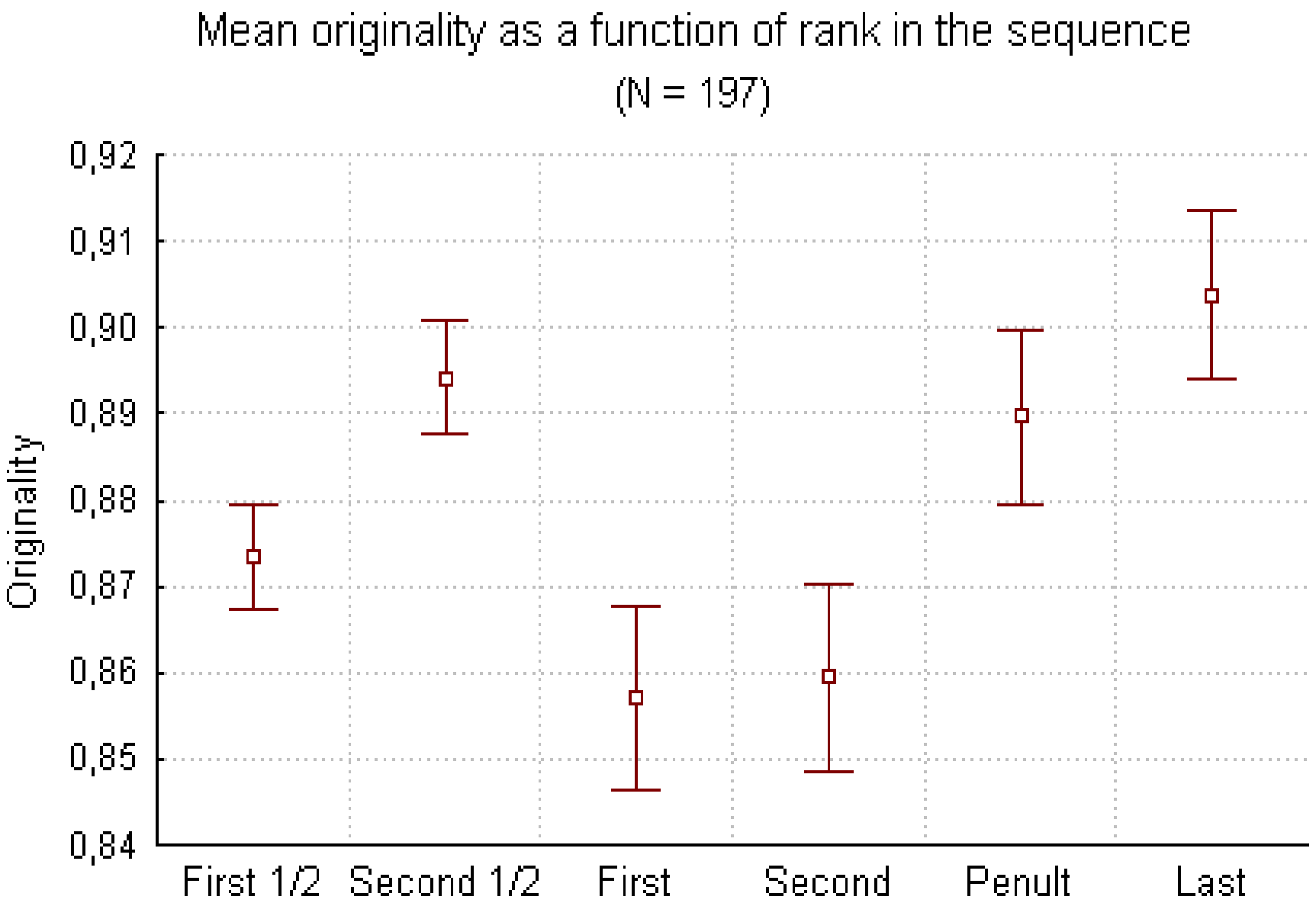
2
4
6
8
10
12
14
16
18
20
Rang dans la séquence




Mouchiroud & Lubart (2003)

# EPoC Scoring: overview

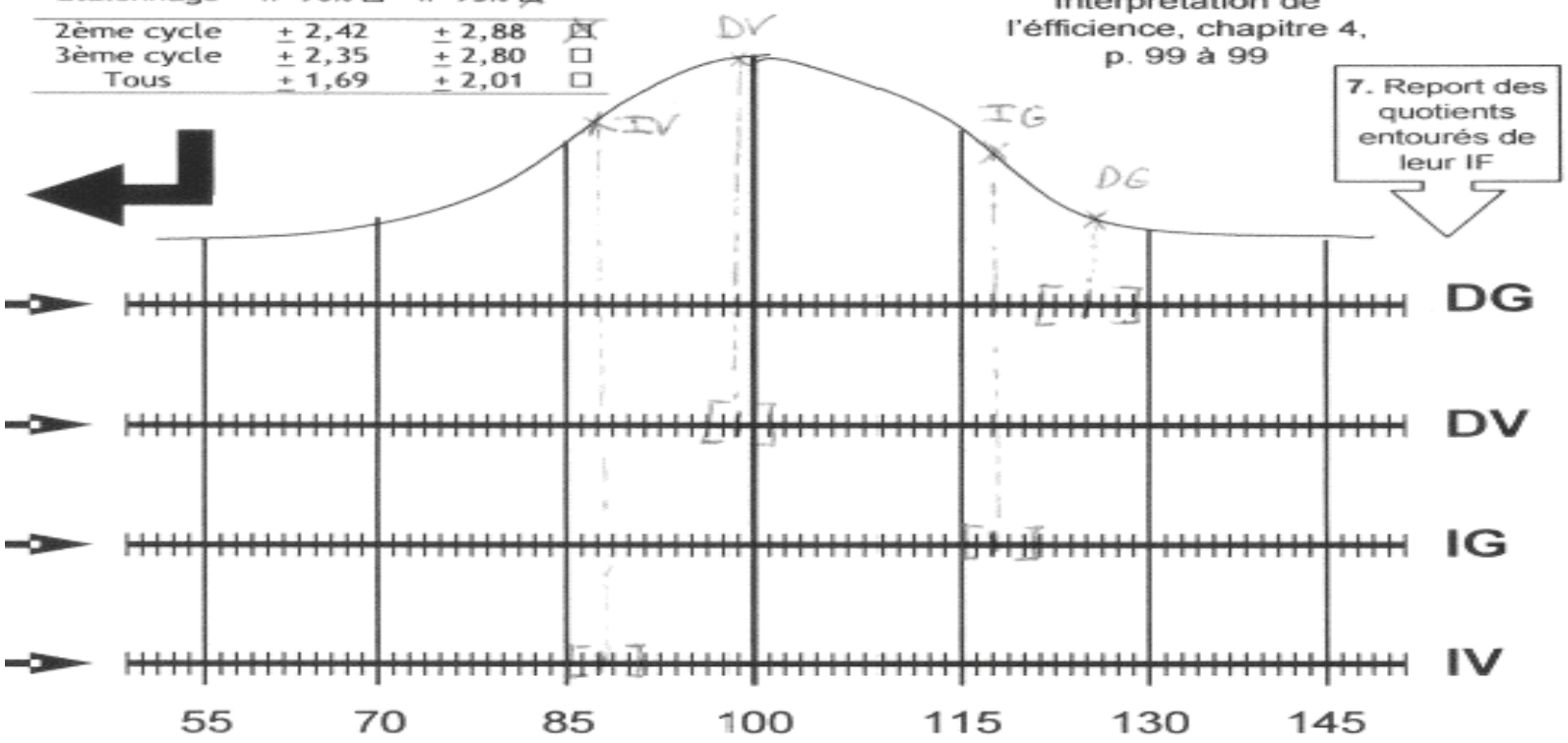
Intervalles de confiance (seuil 90 et 95%) autour des valeurs de quotients

| Etalonnage | IF 90% ☐ | IF 95% ☒ |
|---|---|---|
| 2ème cycle | ± 2,42 | ± 2,88 ☒ |
| 3ème cycle | ± 2,35 | ± 2,80 ☐ |
| Tous | ± 1,69 | ± 2,01 ☐ |

## Efficience

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

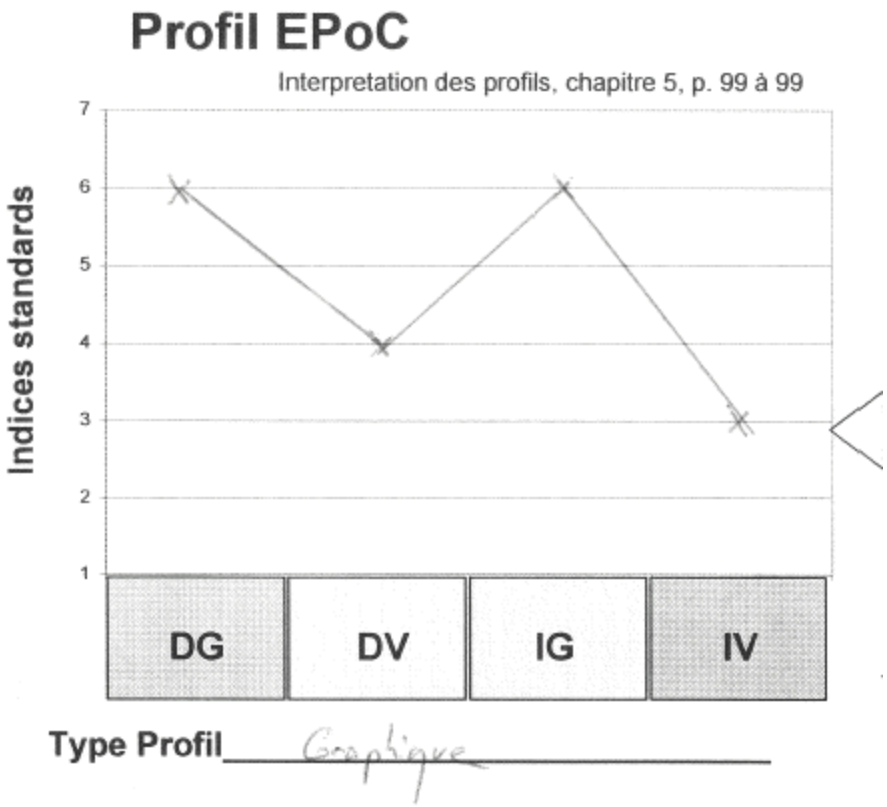
7. Report des quotients entourés de leur IF



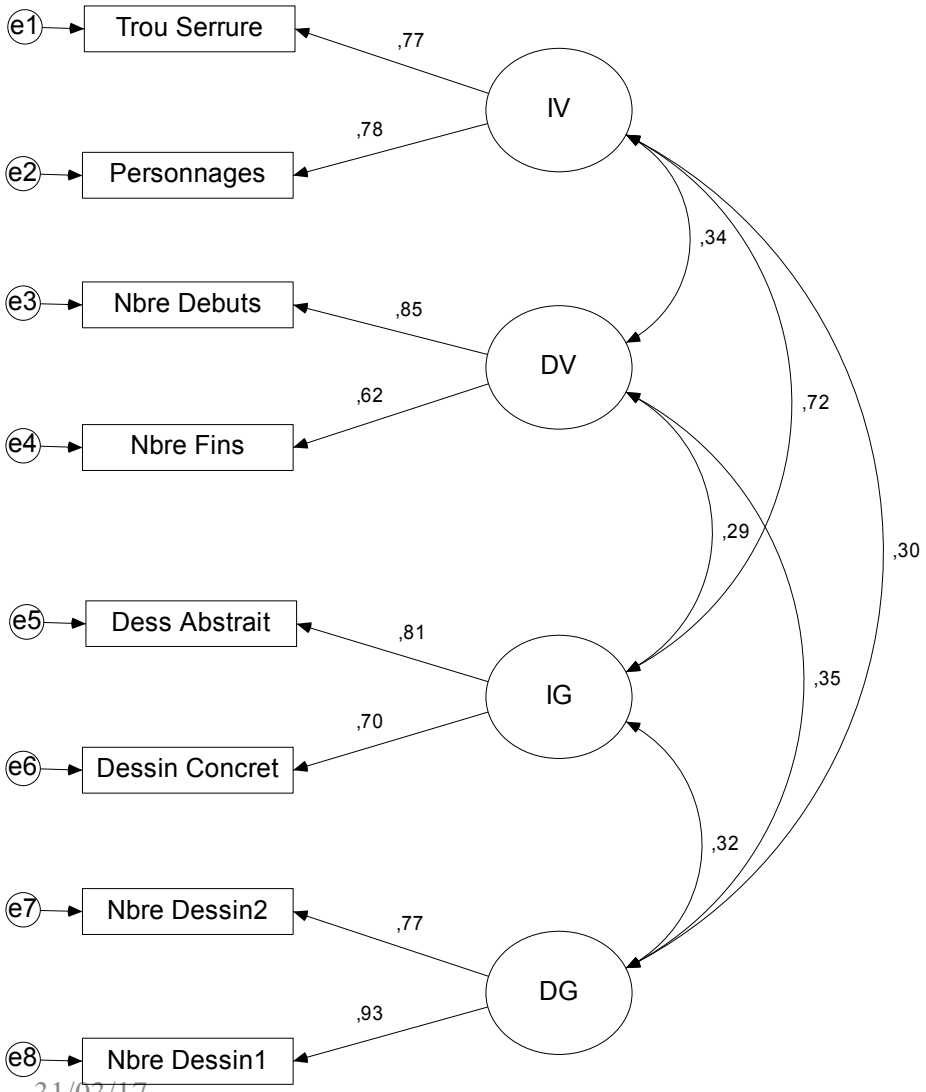

| Indice | Très limité | Limité | Normal faible | Moyen | Normal fort | Supérieur | Très supérieur |
|---|---|---|---|---|---|---|---|
| | 69 et moins | 70-79 | 80-89 | 90-109 | 110-119 | 120-129 | 130 et plus |
| DG | ☐ | ☐ | ☐ | ☐ | ☐ | ☒ | ☐ |
| DV | ☐ | ☐ | ☐ | ☒ | ☐ | ☐ | ☐ |
| IG | ☐ | ☐ | ☐ | ☐ | ☒ | ☐ | ☐ |
| IV | ☐ | ☐ | ☒ | ☐ | ☐ | ☐ | ☐ |

Synthèse efficience

# EPoC Scoring: overview



# EPoC : Construct validity




CFA consistent with the theoretical model

# EPoC : Relation to Intelligence

| | | EPoC | | | |
|---|---|---|---|---|---|
| | | **DG** | **DV** | **IG** | **IV** |
| **WISC4** | *Compréhension verbale (ICV)* | .14 | .16 | .21 | **.26** |
| | *Raisonnement perceptif (IRP)* | -.24 | -.07 | .11 | .06 |
| | *Mémoire de travail (IMT)* | -.15 | -.07 | .19 | .09 |
| | *Vitesse de traitement (IVT)* | -.23 | .13 | **.28** | .10 |
| | *Quotient intellectuel total (QIT)* | -.14 | .07 | **.28** | .21 |

# Additional EPoC Domains

Graphic-Artistic: Abstract and Concrete

Verbal-literary: Titles and Characters

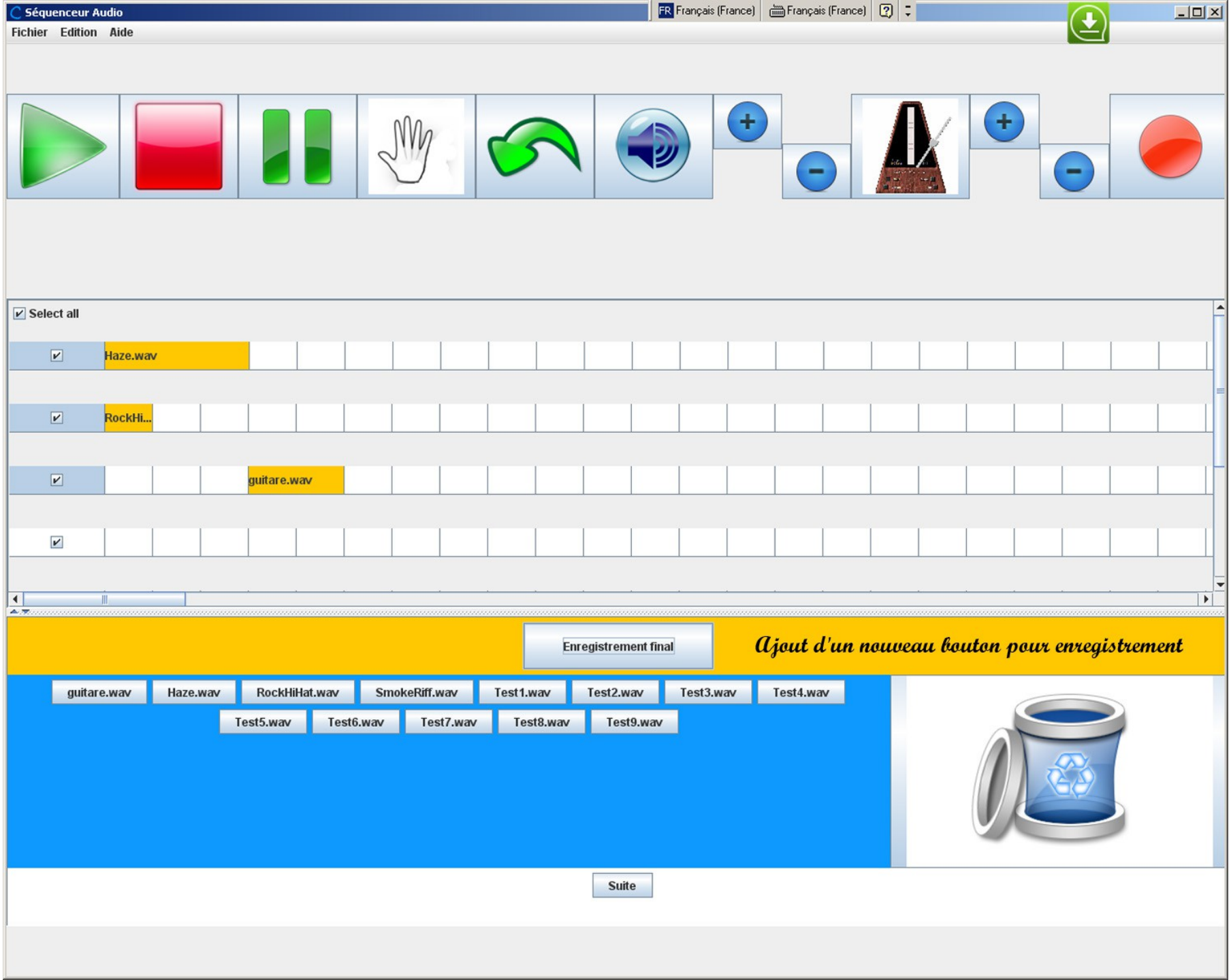
Science: Natural and Human sciences

Social: Peers and Others, Dyad and Group

Math: Numbers and Figures

Musical: Instruments and Objects

Corporal-Kinesthetic: Individual and Collective


Séquenceur Audio
Français (France)
Français (France)
Fichier
Edition
Aide
Select all
Haze.wav
RockHi...
guitare.wav
Enregistrement final
Ajout d'un nouveau bouton pour enregistrement
guitare.wav
Haze.wav
RockHiHat.wav
SmokeRiff.wav
Test1.wav
Test2.wav
Test3.wav
Test4.wav
Test5.wav
Test6.wav
Test7.wav
Test8.wav
Test9.wav
Suite

1x9+2-4 = 7


4 numbers, 3 operations

1x9 = 9
9+2 = 11
11-4 = 7

2x6+2-7 = 7
(2+9-8)x3-2 = 7

Before you begin the real task, play with this special calculator.

Try to get 7. Alerts will tell you when you do something not allowed :

divisions must give only whole numbers, no fractions

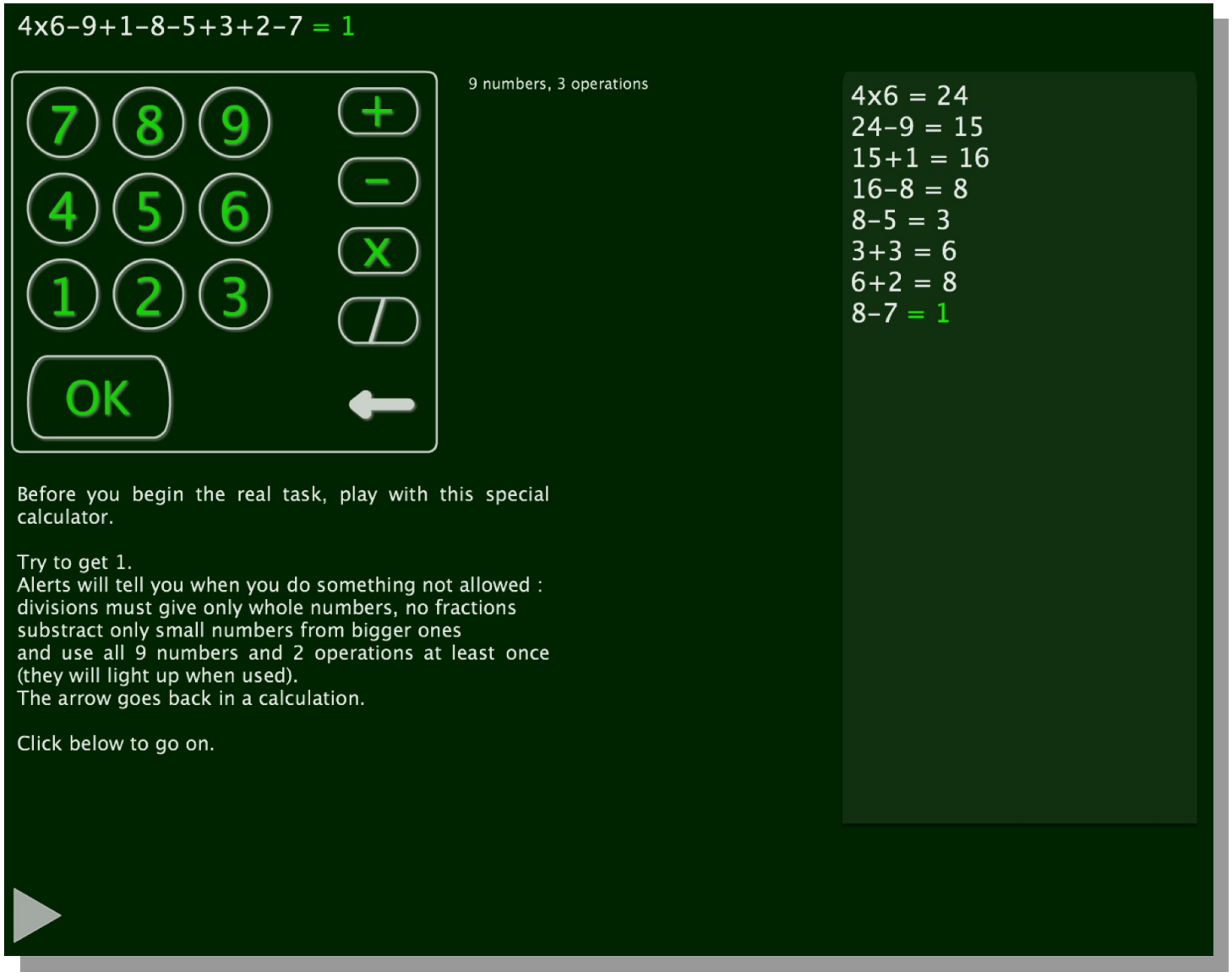
substract only small numbers from bigger ones

and use at least 3 different numbers and 2 operations (they light up when used).

Hit OK when green, to record your calculation.
The arrow goes back in a calculation.

Click below to go on.

# Numbers: Convergent thinking



# Examples of low and high responses for the “Numbers” divergent task

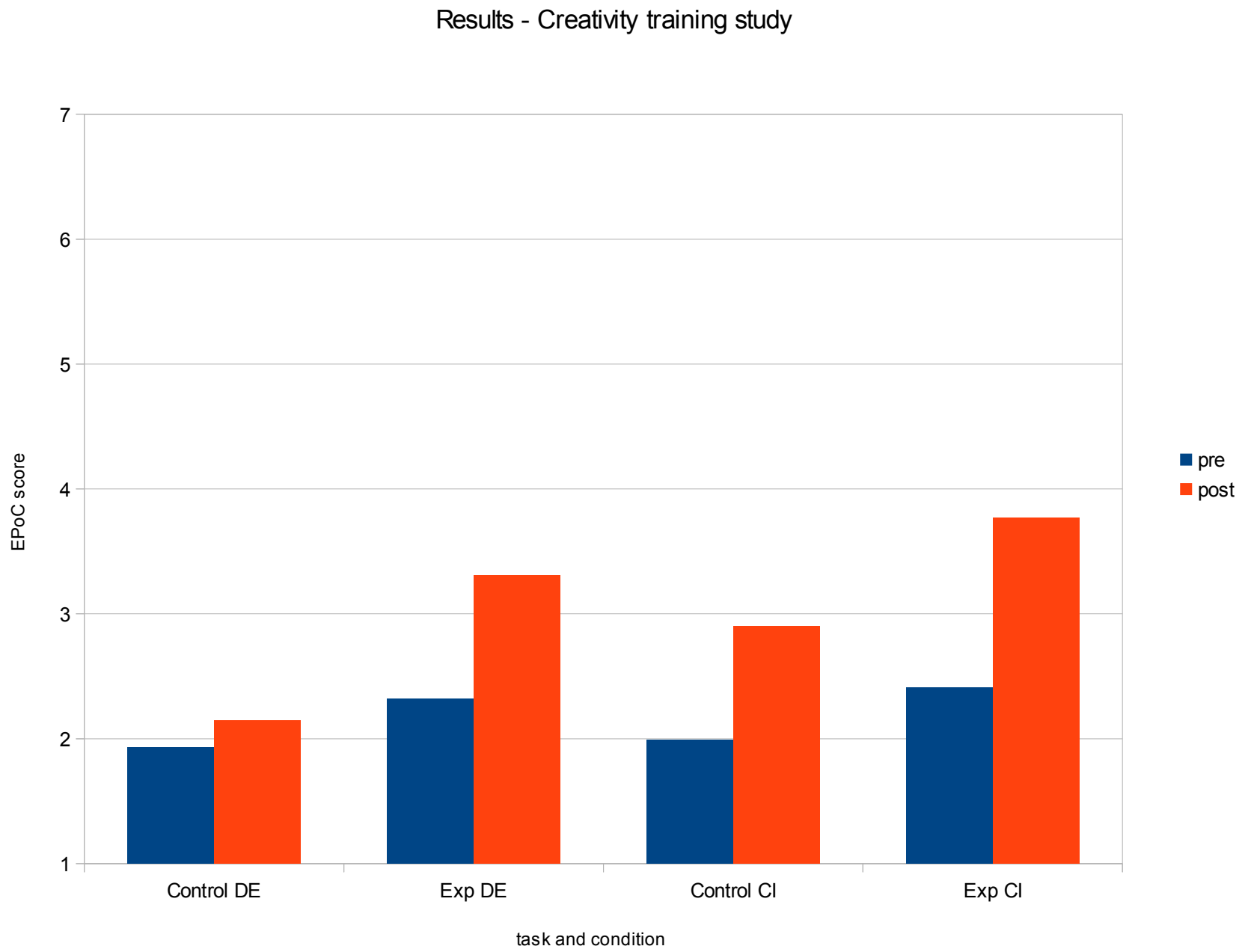
- Fluency (number of calculations produced in 10’)
  - Mean: 13.5
  - Standard deviation: 8.7
  - Minimum: 1
  - Maximum: 54
- Originality
  - Low (High frequency): 5 + 4 - 1 = 8
  - High (Frequency ≤ 1%): (2 + 6) x 2 - 8 = 8

# Uses of EPoC

*Education*: used to pre test, and post test children and adolescent to see effects of educational training

*Education*: used as a screening tool for entry into some schools, or programs (“creative gifted”); used to detect children's profiles and guide differentiated educational activities based creative domain abilities

*Clinical*: used as part of psychological testing, complementary to IQ tests, to provide a better vision of a child as a whole


Results - Creativity training study
7
6
5
4
3
2
1
EPoC score
Control DE
Exp DE
Control CI
Exp CI
task and condition
pre
post

# Summary of the main points

- Creativity: involves multiple psychological factors, and two processes

- Evaluation: a new measurement technology, EPoC: theoretically grounded – domain-situated approach, easy to administer and score

- Creative potential can be measured and developed

# Contact :

Todd Lubart

todd.lubart@parisdescartes.fr

Lubart, T., Besançon, M. & Barbot, B. (2011). *Evaluation of Potential for Creativity. Paris: Hogrefe*