



HAL
open science

De-symbolisation in learning a new symbolic system

Gilles Dieumegard

► **To cite this version:**

Gilles Dieumegard. De-symbolisation in learning a new symbolic system. Meeting EARLI-SIG 2 “Comprehension of texts and graphics”, Aug 2012, Grenoble, France. , 2012, Staging knowledge and experience: How to take advantage of representational technologies in education and training?. hal-01693408

HAL Id: hal-01693408

<https://hal.science/hal-01693408>

Submitted on 26 Jan 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

DE-SYMBOLISATION IN LEARNING A NEW SYMBOLIC SYSTEM

Gilles Dieumegard

(LIRDEF, Universities of Montpellier 2 & Montpellier 3)

Context

- The adaptation of a theoretical and methodological framework for the cognitive task analysis (**course-of-action ; Theureau, 2003, 2004, 2006**) :

from cognitive ergonomics to instruction and the understanding of students' activity.

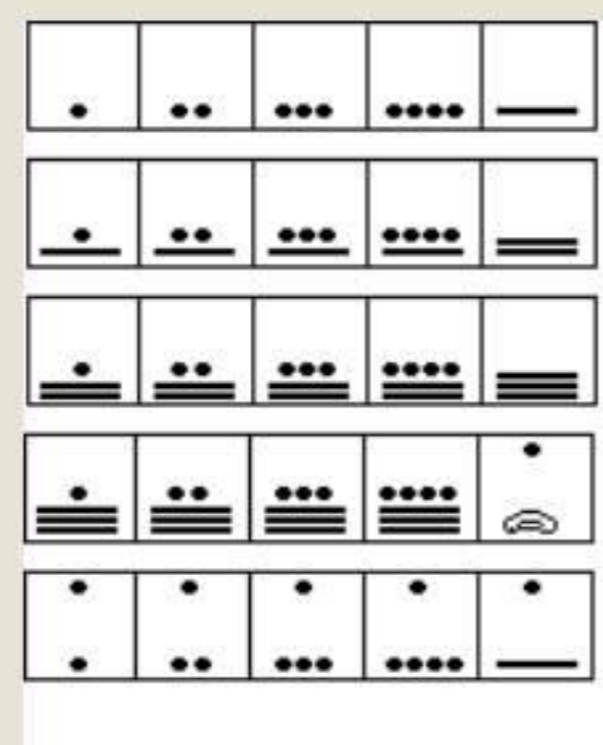
Aim

- Peirce : symbols are signs with an arbitrary structure, they are conventionally related to what they represent.
- The **learning of symbolic systems** (and symbolic conventions) : an important goal for school.
- The study of learning a new symbolic system as a testbench for the adaptation of course-of-action for instructional purposes.

Data collection

- Observing how subjects solve a problem in which they had to learn Maya numbers system.

Mayas live before in Central America. They employ only three symbols in order to write numbers. Here's the Maya writing for numbers 1 to 25. Write in the Mayas' way the continuation of numbers until 50. How do the Mayas write number 100? And 120? 137? 169? 200?



- Subjects were asked to think aloud and were videotaped.

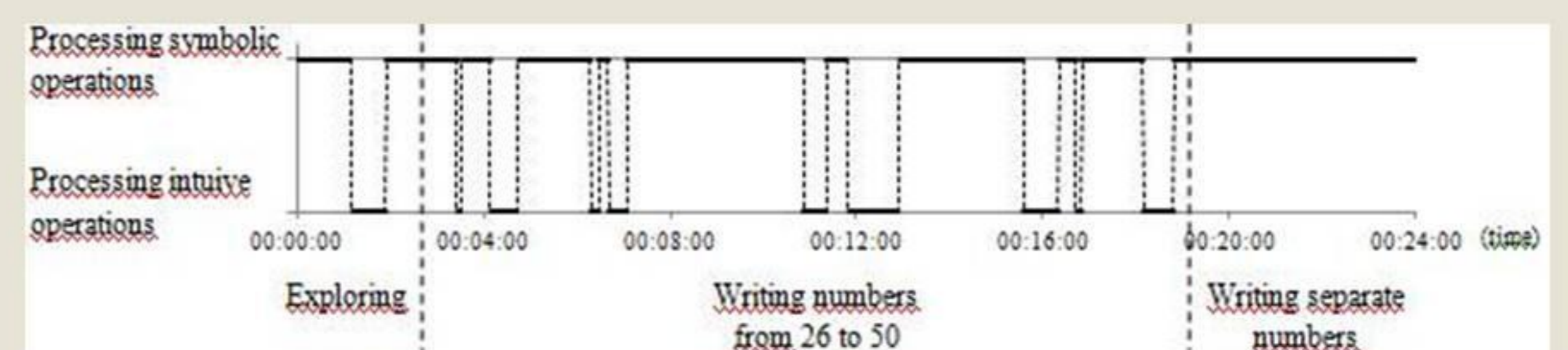
Data analysis

- Identification of units of action relying on subjects' words, writings and gestural behaviors. Succession of units = course-of-action.
- Categorisation of units :
 - **Symbolic operations** : when the subjects interpreted the signs relying on identified relations between signs and identified numbers ;
 - **Intuitive operations**, when the subjects imagined or wrote signs without knowing the numbers they represented, e.g. increasing one-by-one the quantity of some elementary signs, copying signs or parts of signs.

Desymbolisation

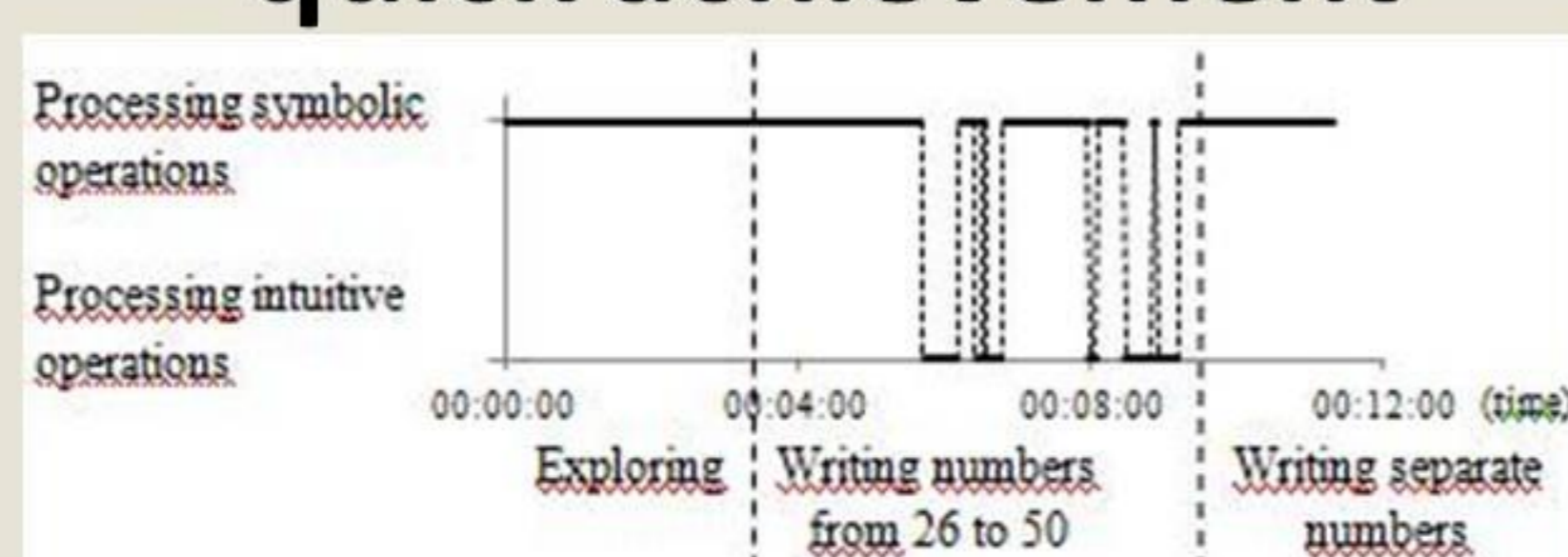
- In every course of action : subjects learned conventional relations (symbolic operations) and then forgot them for a while (intuitive operations).
- Desymbolisation : not surprising. Elby (2000) : learners use intuitive perceptual cues.
- What is the **influence of desymbolisation** in learning new symbolic systems ?

Desymbolisation → failure



- Repeated alternation between symbolic and intuitive operation prevents stabilization of symbolic relations (i.e. : a line represents sometimes five and sometimes ten, and a dot up, sometimes ten and sometimes twenty).

Desymbolisation → quick achievement



- Desymbolisation allows quick and easy drawing of a lot of correct signs during the phase "writing numbers 26 to 50".
- A functional role for desymbolisation : quicken the resolution of the problem (decreasing cognitive load ?).

Prospects

- A more quantitative study in order to precise the influence of desymbolisation in solving Maya numbers problem.
- In Maya numbers, symbols are not purely arbitrary, but partially based on quantities of signs. Researches with other symbolic representations taught in schools are necessary.