GRUNNLAGET

Cognitive support for thinking and learning

the Nyborg concept teaching model,
its basis and relevance

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Magne Nyborg (1929-1996)

Norwegian professor at Oslo Universisty, dedicated to help children and adolescents learn. His Concept Teaching Model (CTM) is related to his model of basic concepts and conceptual systems (BCS) as well as to his person-situation-interaction model (PSI)

References: Hansen,1998, 2008; Hansen, Hem & Sønnesyn, 2002; Nyborg, 1971, 1985 (I), 1985 (II) 1990, 1993, 1994(I), 1994 (II), Sønnesyn & Hem, 1996; Sønnesyn, 2022.

WHAT?

..is it about?

Concepts, basic consepts....

HOW?

...to teach?

WHY?

...does it make sense?

...does it facilitate learning and development?

How can we help children learn?

Tanja, 7 years old, second grade in an inclusive school setting

- A small vocabulary
- Flare-ups and rigidity
- Resisting any paper-and-pencil activity - Expert advises: No writing and drawing
- General learning difficulties, like one out of thousand

The "order" was
to apply Nyborg's CTM –
which implies a *what* and *how*

(Nyborg, 1985, 1993, 1994)

WHAT?

Nyborg (Nyborg 1993, p 57-58)

«In my research it has proved valuable to distinguish between *concepts about categories* and *conceptual systems* of whole objects and whole events, on one hand; and *concepts about categories and conceptual systems of parts of wholes, attributes of parts and wholes, relationships between wholes and within wholes,* etc, on the other».

Nyborg also stated that these concepts are *basic to the learning of more complex phenomena- basic both to the learning of skills and to the learning of concepts and conceptual systems of classes of objects and events.*

Nyborg was not the first to think like this:

Aristotle used other terms, though – almost 2300 years earlier:

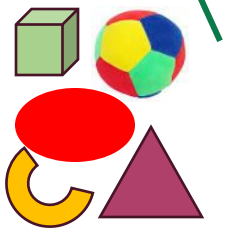
Expressions which are in no way composite signify substance, quantity, quality, relation, place, time, position, state, action, or affection

Aristotle: Categories.

Translated by E. M. Edghill, *eBooks@Adelaide, 2007*

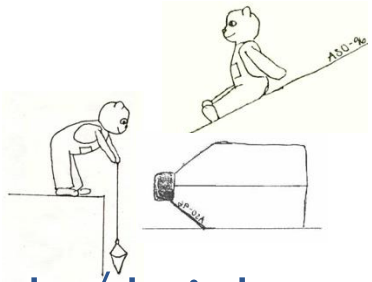
BASIC CONCEPTUAL SYSTEMS

basic for abstraction and analyses



Shapes

Colors

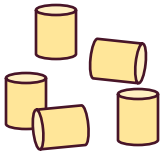


Positions

Sizes/ lengths/ heights

Location

Functions



Numbers

Wholes/ parts of wholes

Sounds

Substances

Properties of substances

Patterns

Temperatures

Weights

Tastes

Smells

Motions/directions/speeds

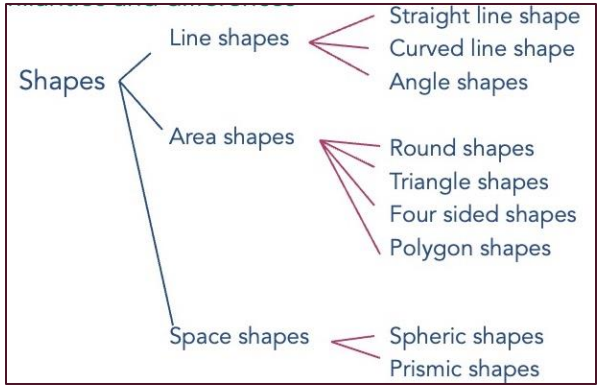
Changes

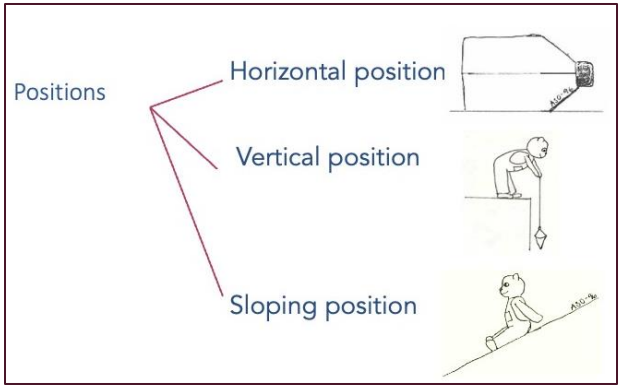
Time

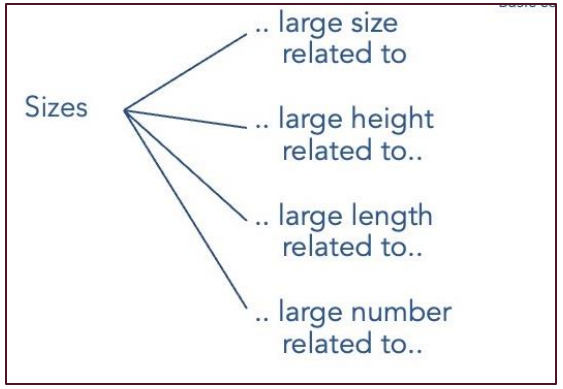
Value

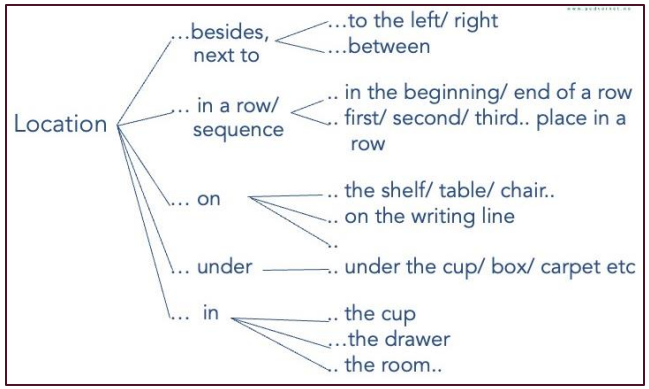
Alive – not alive

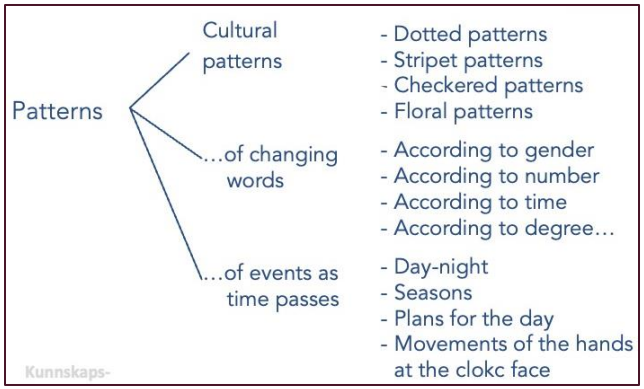
Some basic conceptual systems with examples

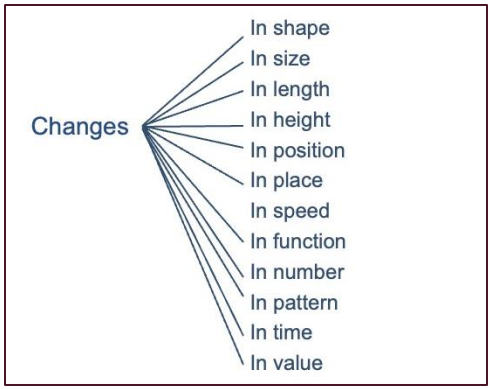


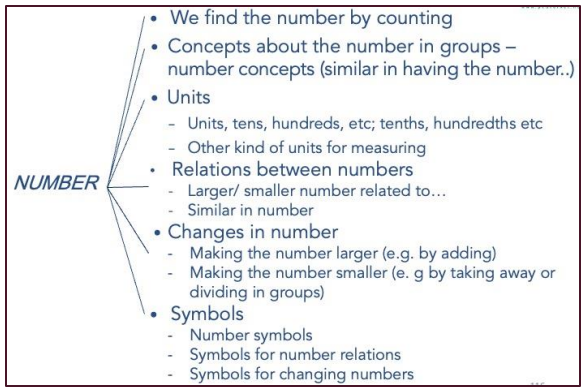


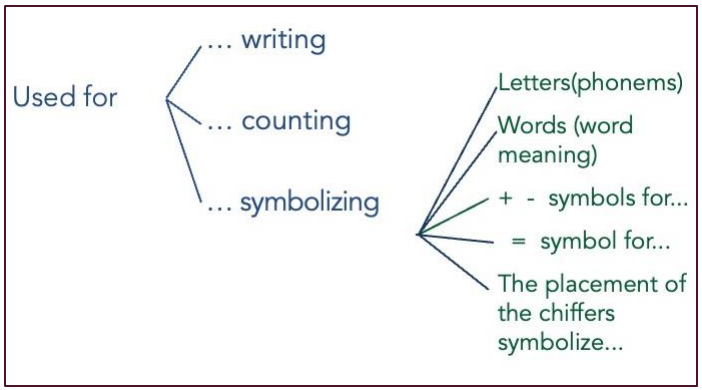


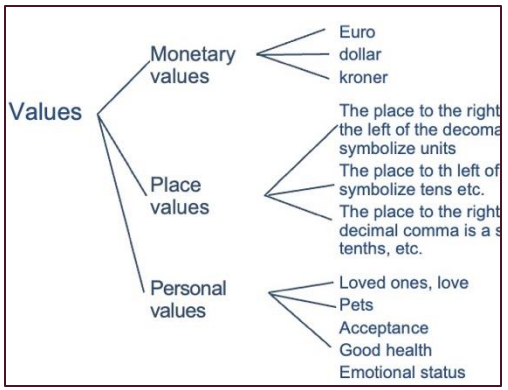




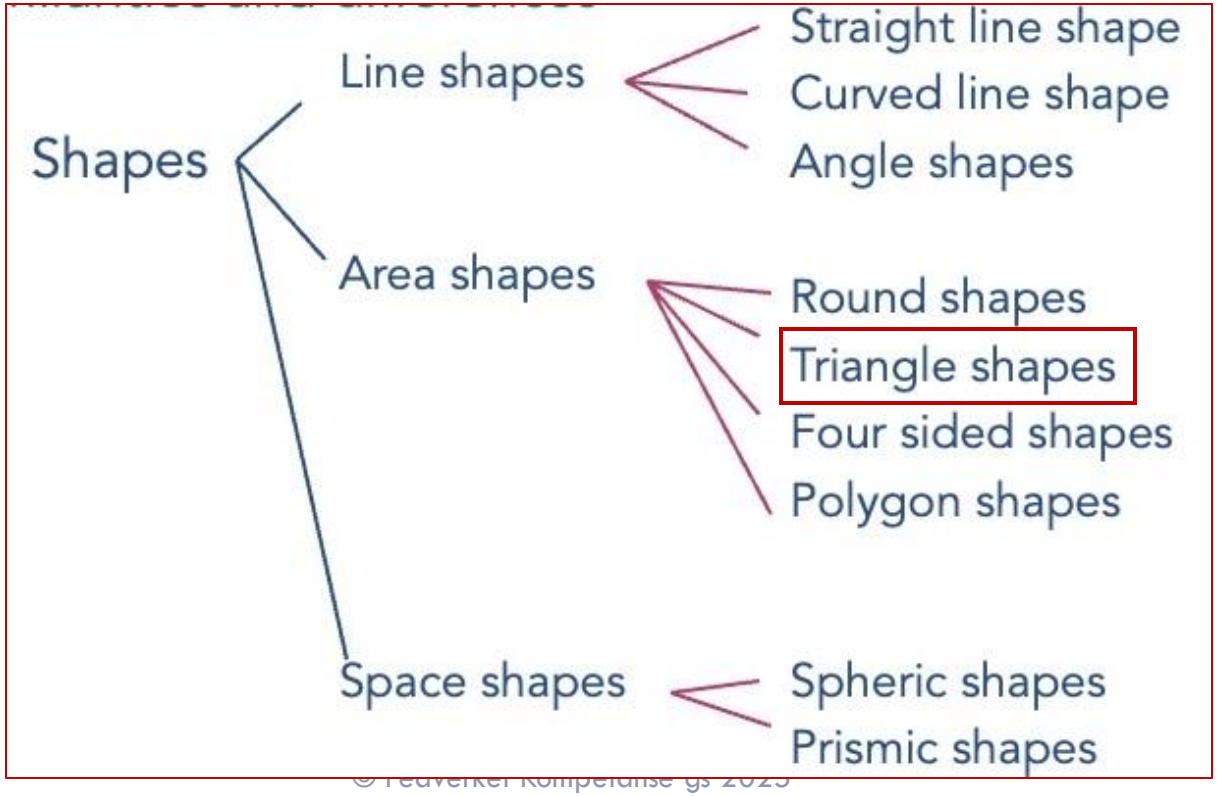




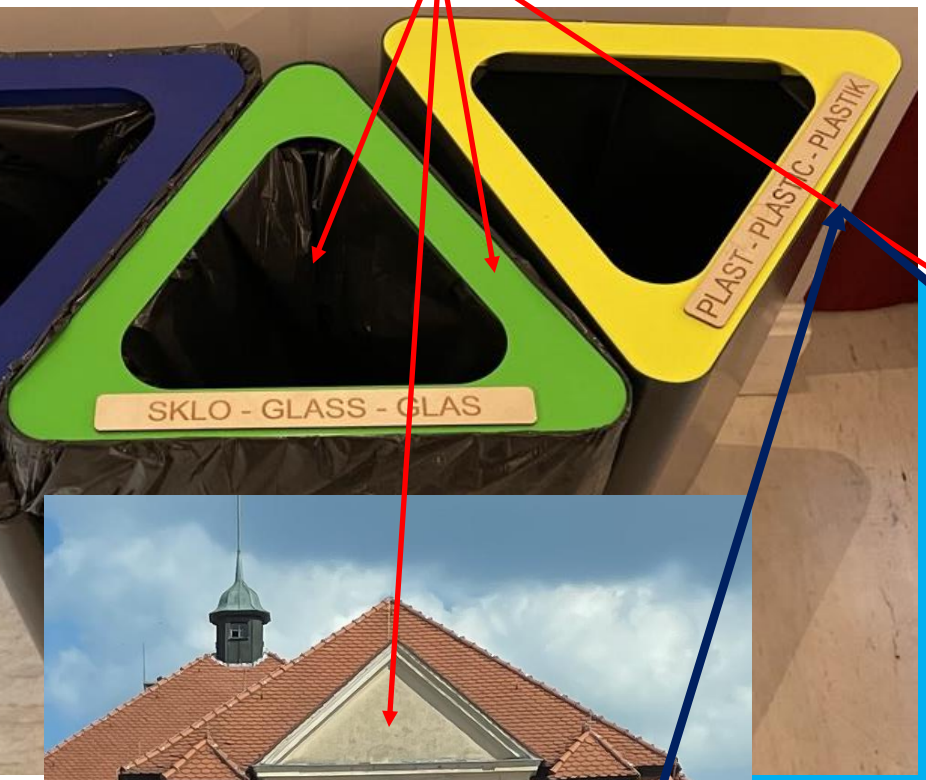


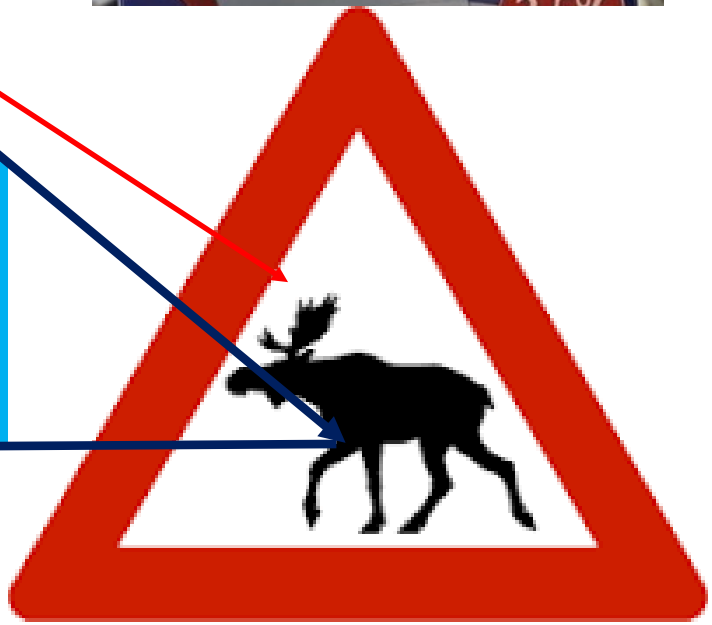


HOW?


Shapes
Line shapes
Straight line shape
Curved line shape
Angle shapes
Area shapes
Round shapes
Triangle shapes
Four sided shapes
Polygon shapes
Space shapes
Spheric shapes
Prismic shapes

It has a triangle shape.

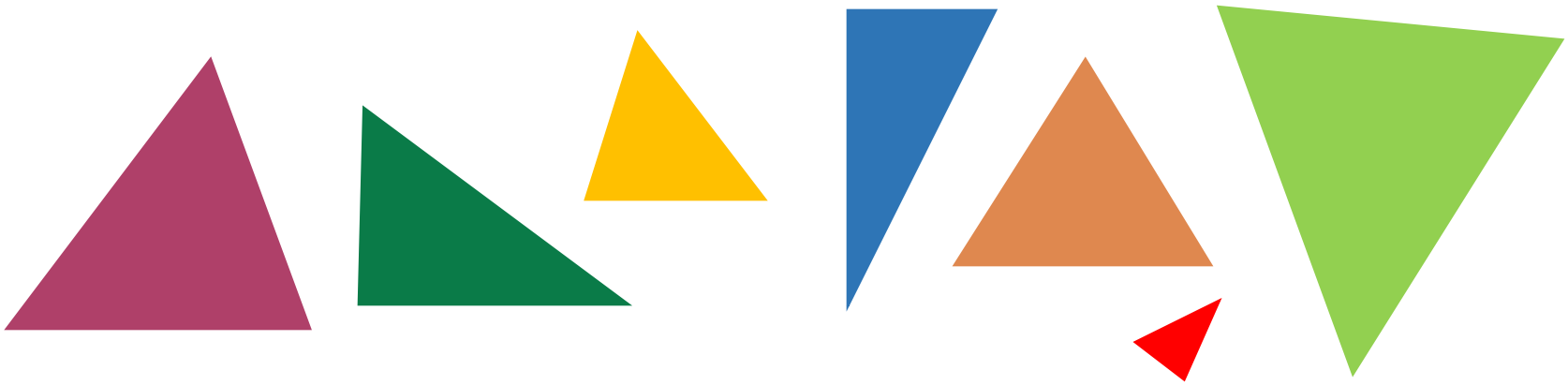




Nyborg's concept teaching model
1. Selective associations

"Naming" the identified triangle shape supports ***selective associations*** in the child's brain - association between the different *triangle shapes* and the term "*triangle shape*".

Notice how the name has two elements – ***triangle*** and ***shape.***



Vygotsky about changes in word function across time:

A child's ability to communicate through language is directly related to the differentiation of word meanings in his speech and consciousness.

....

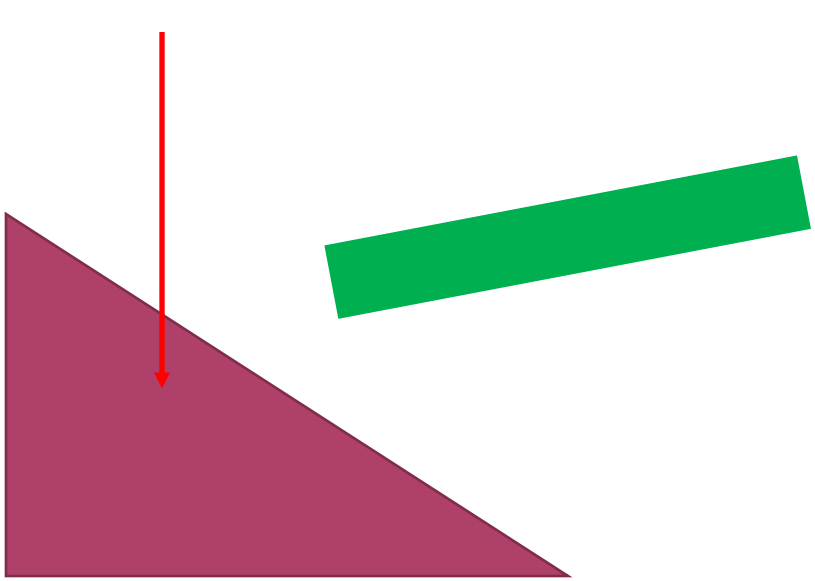
We distinguish the word's nominative from its significative function. ...

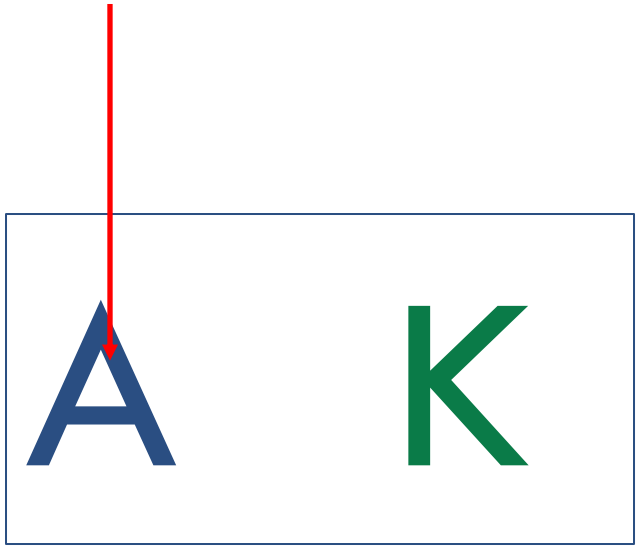
nominative

In the beginning only the nominative function exists; and semantically, only the objective reference; signification independent of naming, and meaning independent of reference, appear later and develop along the paths we have attempted to trace and describe.

Vygotsky, L. S. (1962) Thought and Language. M.I.T. Press Cambridge, Massachusetts page 129-130.

CTM, 2nd phase, selective discriminations





Which of them has a triangle shape?

Distinguishing between those having a triangular shape and those having other shapes.

Piaget:

Jean Piaget's theory of cognitive development describes cognitive disequilibrium as a state of cognitive imbalance [1]. We experience such a state of imbalance when encountering information that requires us to develop new schema or modify existing schema (i.e., accommodate). Disequilibrium is often an uncomfortable state for individuals; thus, we seek to quickly return to a state of equilibrium.

Kibler J. (2011). Cognitive Disequilibrium. In: Goldstein S., Naglieri J.A. (eds) Encyclopedia of Child Behavior and Development. Springer, Boston, MA.. DOI: 10.1007/978-0-387-79061-9

Piaget, J. & Inhelder, B. (2002). Barnets psykologi. Hans Reitzels forlag. København (Danish edition of La psychologie de l'enfant, 1966)

Which house
has a window
with triangle shape?

Which picture shows chips that have a triangle shape?

Nyborg's concept teaching model (2) Selective discriminations

2. (CTM second phase, selective discriminations)

In this example, distinguishing between elements having a triangle shape, and elements not having this property.

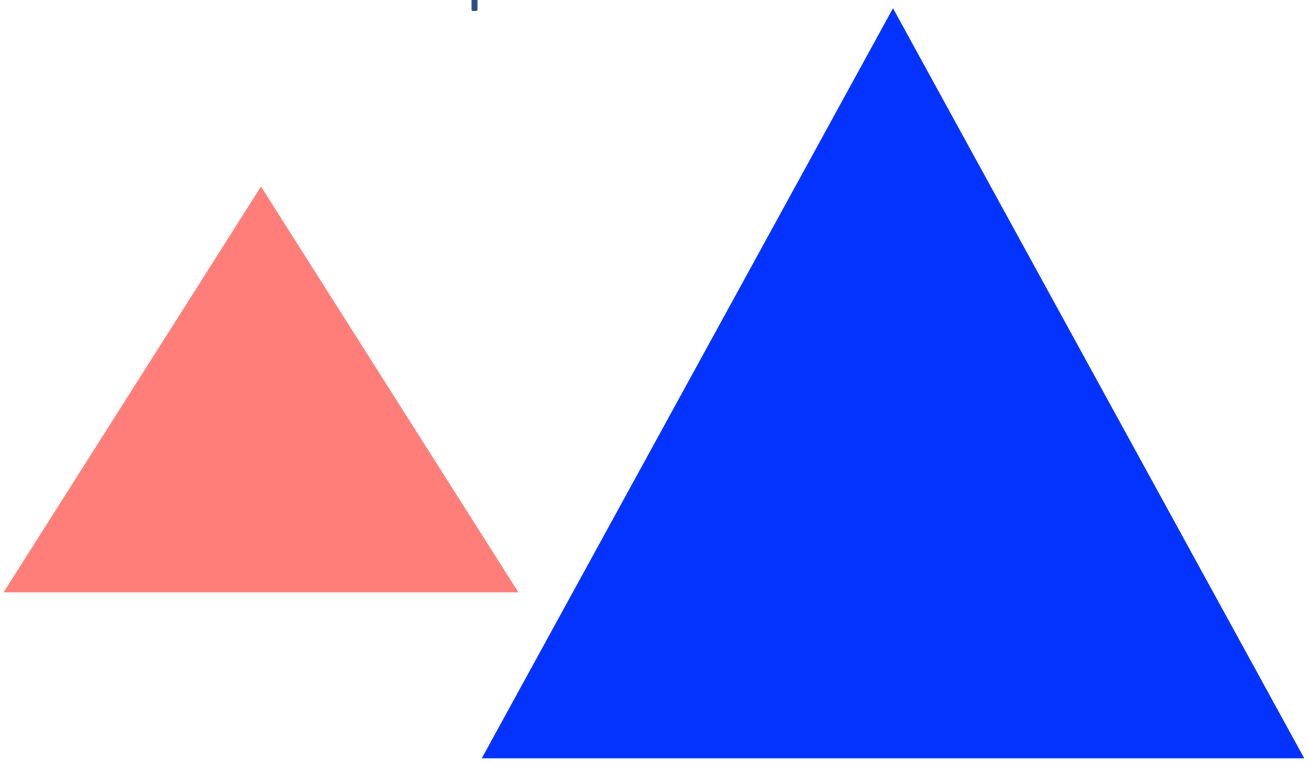
CTM, 3rd phase

They are similar, identical

CTM, 3rd phase, selective generalization

Can you see any similarity?

Correct, they are similar in shape



They are not similar in shape, but can you see any similarity?

Selective generalization – the similarity is ”selected” to be the shape.
Notice how this puts demands on the attention in the first place,
but in the next turn supports it.

Selective generalization

Can you find any similarity?

How are they similar?

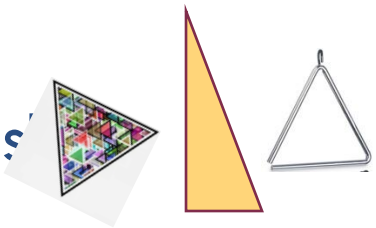
CTM 3rd phase *Selective generalizations*

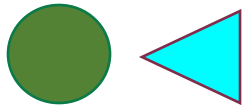
Discovering similarities across differences
and with transfer to new objects; providing for a significative function of the actual word.

...signification independent of naming, and meaning independent of reference, appear later and develop along the paths we have attempted to trace and describe. (Vygotsky)

Summary of Grunnlaget methodology, based on Nyborgs CTM

1. Selective associations – naming “members” of the actual category
2. Selective discriminations – distinguishing between “members” and “non-members” of the category
3. Selective generalizations – discovery and awareness of selected similarities,





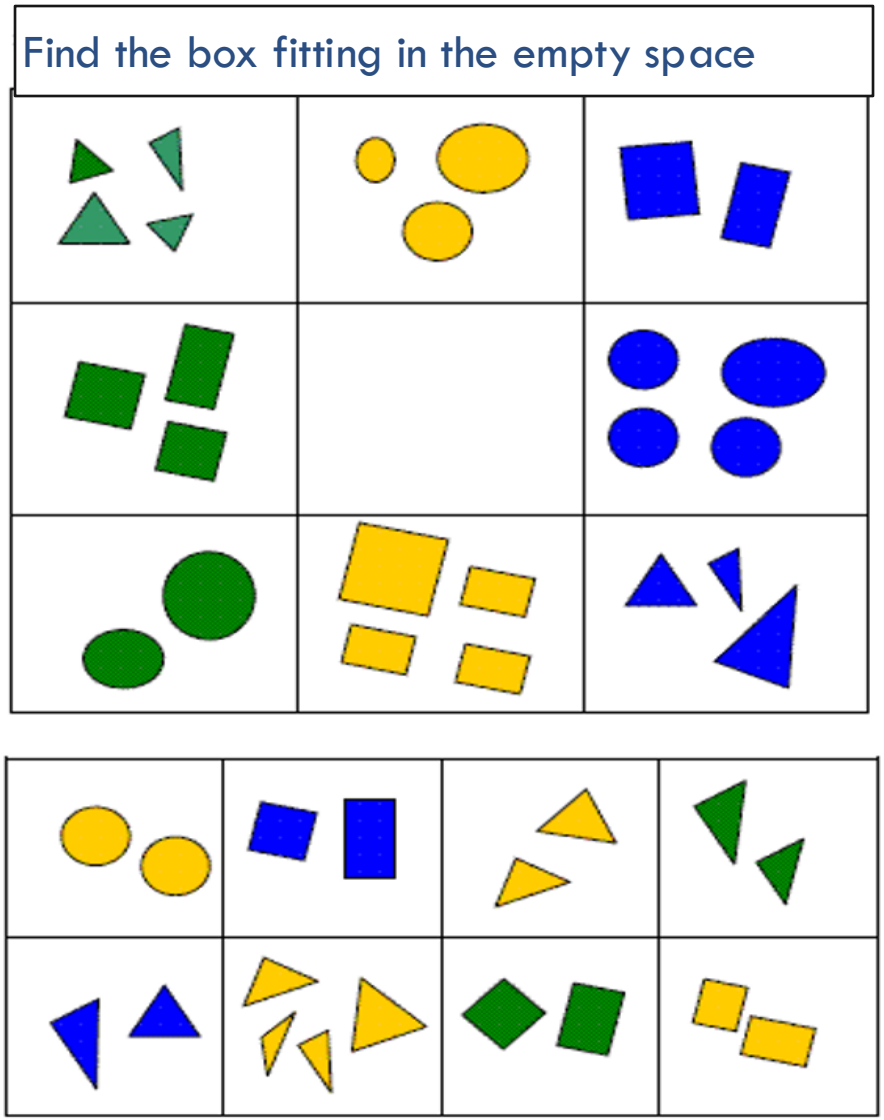
WHY?

- Abstract thinking
- Cognitive flexibility
- Reason independent of context

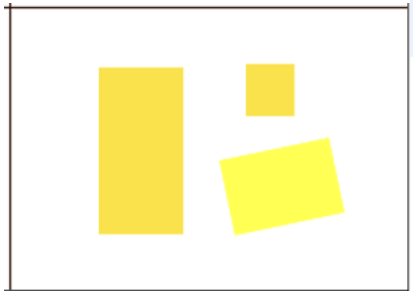
Analytic coding process – abstract thinking

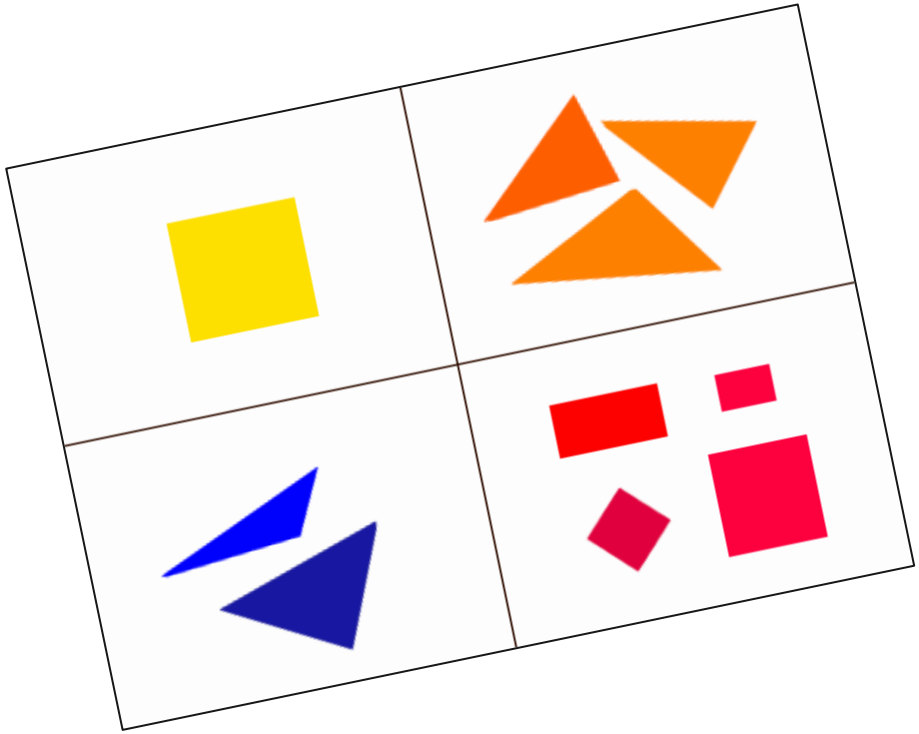
Cognitive flexibility

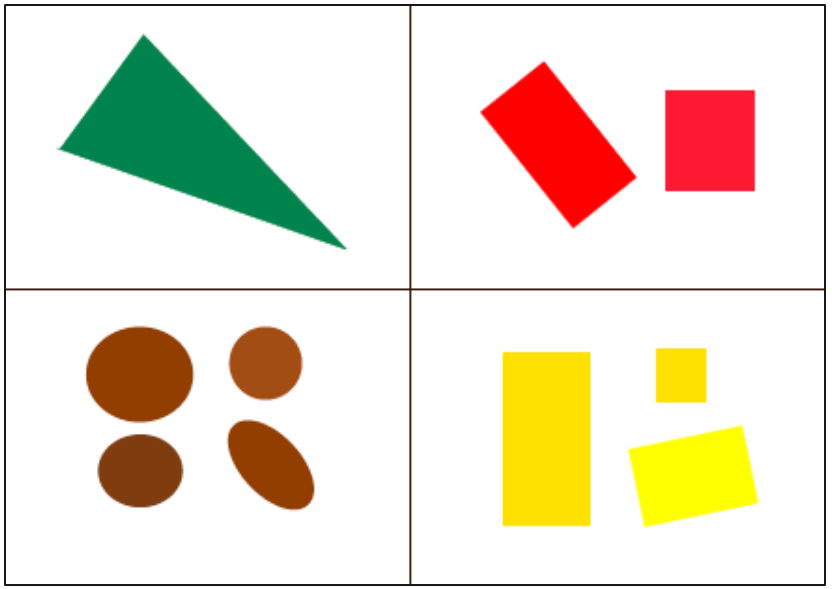
Analogical thinking



Analytic coding

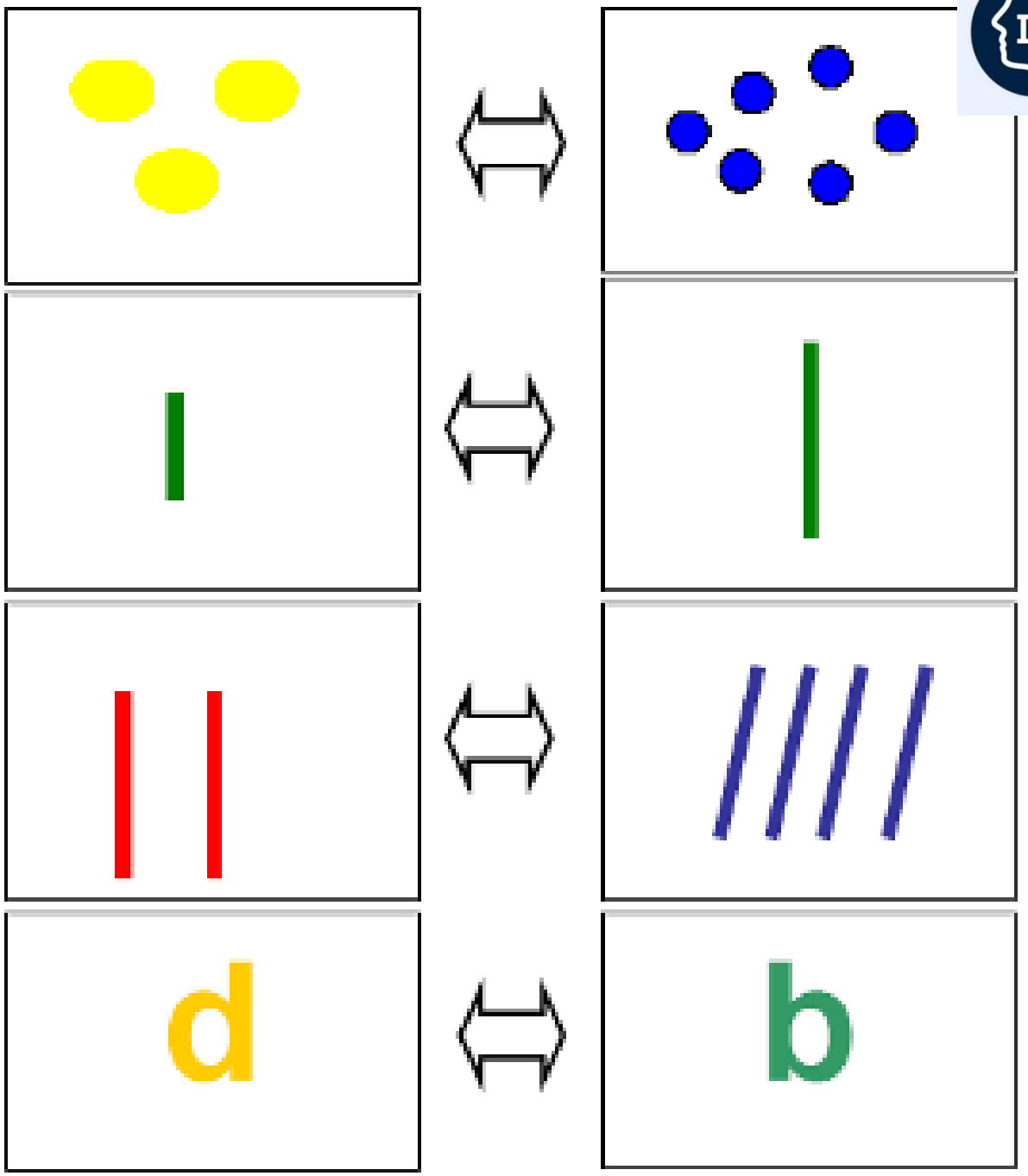






Compare the two pictures connected by arrows.

Describe similarities and difference



Three years teaching experiment, results in terms of relation between experiment group and control group		
Task	*E/K1*	*E/K2*
Concept transfer, complex tasks	2.05	2.03
Letter identification	1.17	1.07
Reading, self made test battery	1.57	1.45
Reading, standardized test	1.55	
Dictation; letters, words, sentences,	1.43	1.25
Number figure identification, dictation etc	1.39	1.26

Task	*E/K1*	*E/K2*
Number concepts	2.45	2.03
Number relations	2.70	2.01
Number operations	2.85	3.14
Measure units, ones/ tens	3.10	2.32
Standardized math test (after first year	2.33	
Flexibility test after 2. year	4.75	

(Nyborg 1985 II)

SITUATION

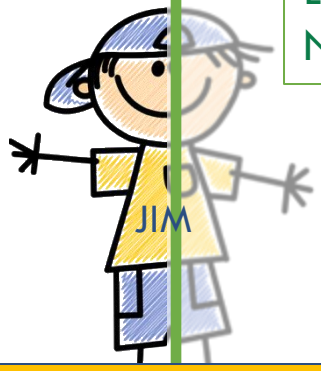
PERSON

Processes

Luria,
Naglieri & Das

Knowledge base

Hebb (1966)
Fuster (2003)
Das, Naglieri
& Kirby1994



PERCEPTION

Orienting Reactions

SENSATION

CODING

LTM

SHORT TERM MEMORY

WM

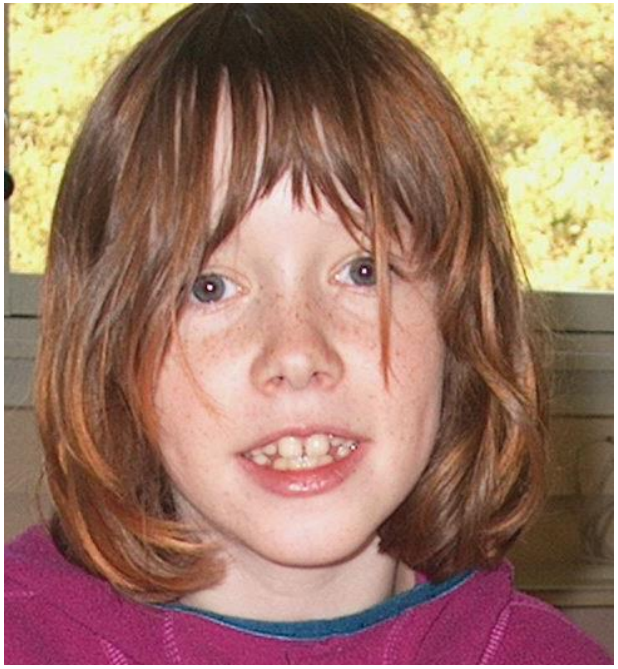
SENSORY MEMORY

"I can see Africa"

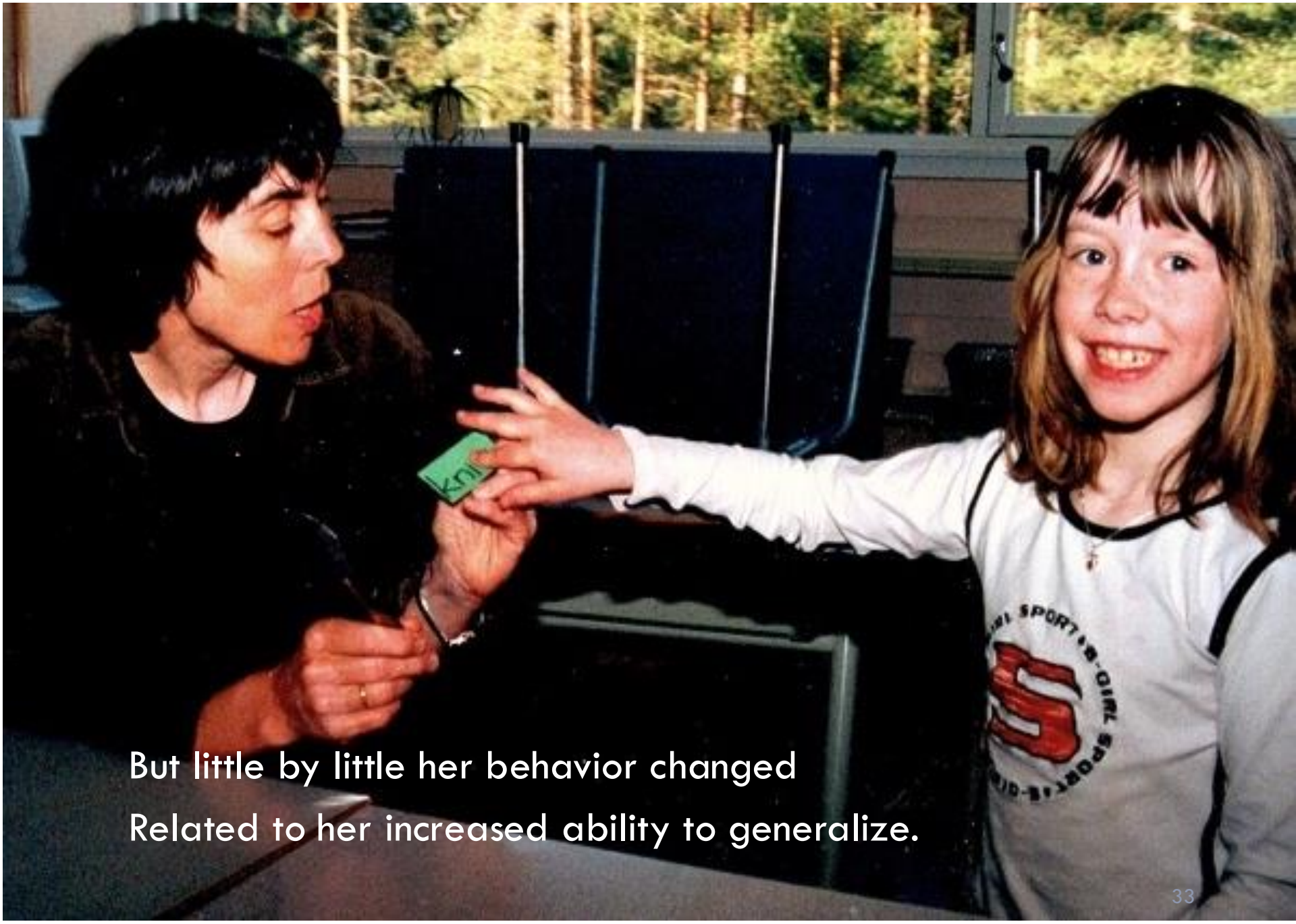
BASIC CONCEPTUAL SYSTEMS
basic for abstraction and analyses

Shapes	Patterns
Colors	Temperatures
Positions	Weights
Sizes/ lengths/ heights	Tastes
Location	Smells
Functions	Motions/directions/spee
Numbers	Changes
Wholes/	Time
Sunds	Value
Substanc	Alive – not alive
Prope substances	

What about Lena?



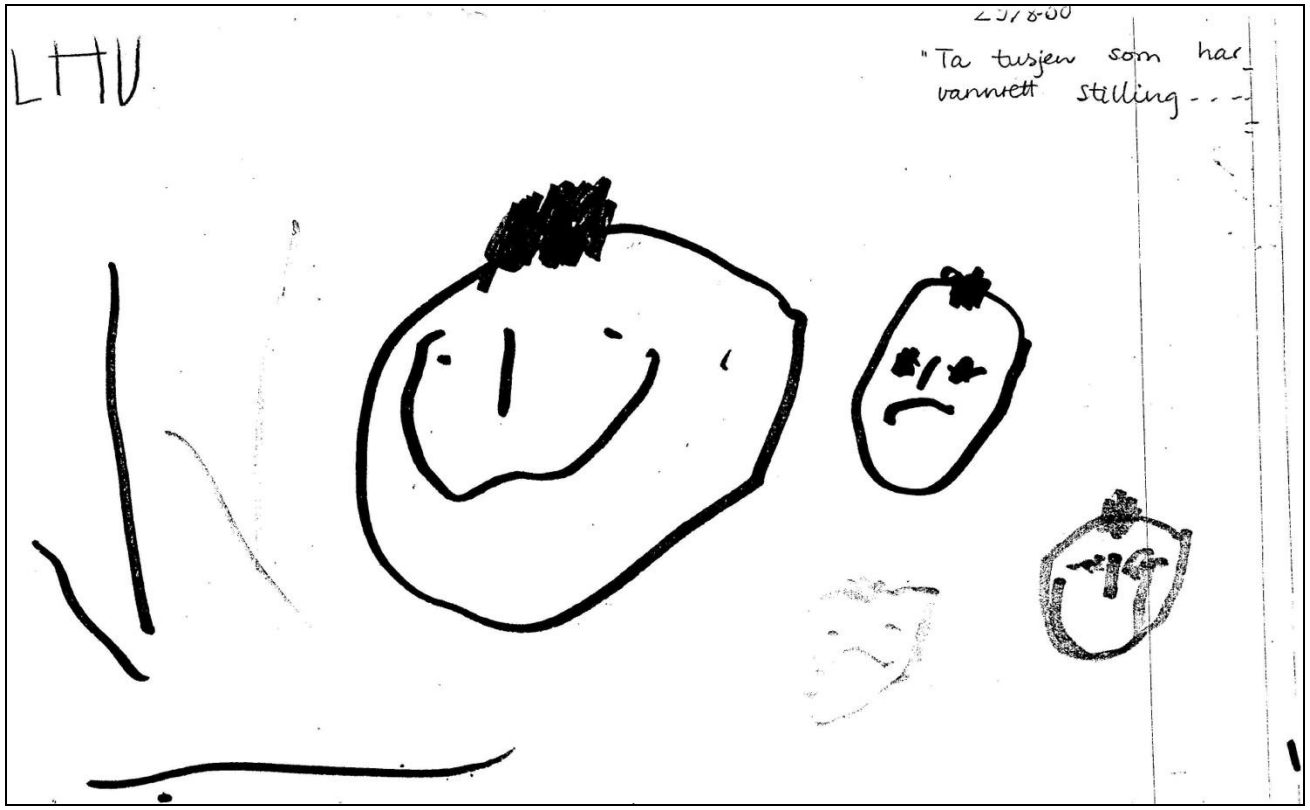
For a long time
she was not able to
generalize



But little by little her behavior changed

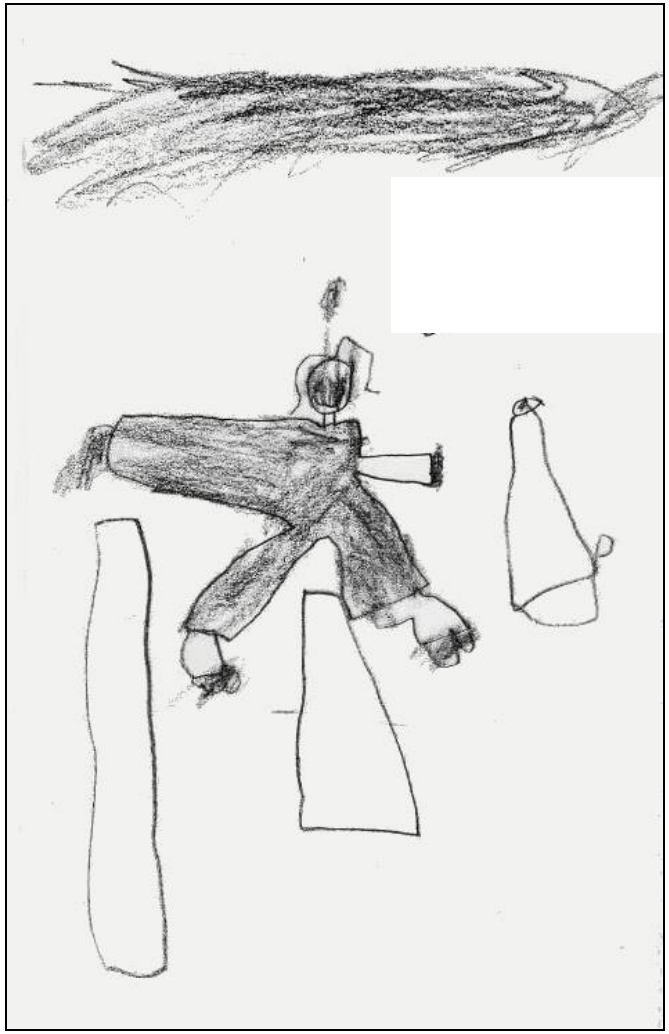
Related to her increased ability to generalize.

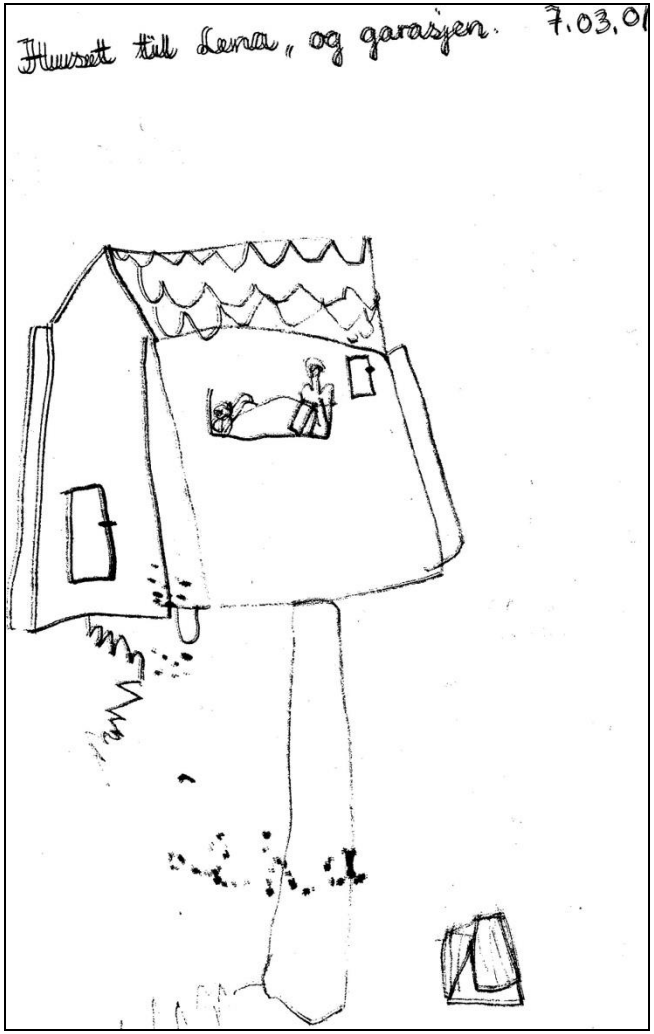
After one year with «learning how to learn, using Grunnlaget/ Nyborg's CTM-model, she made these drawings spontaneously



August, 3rd grade

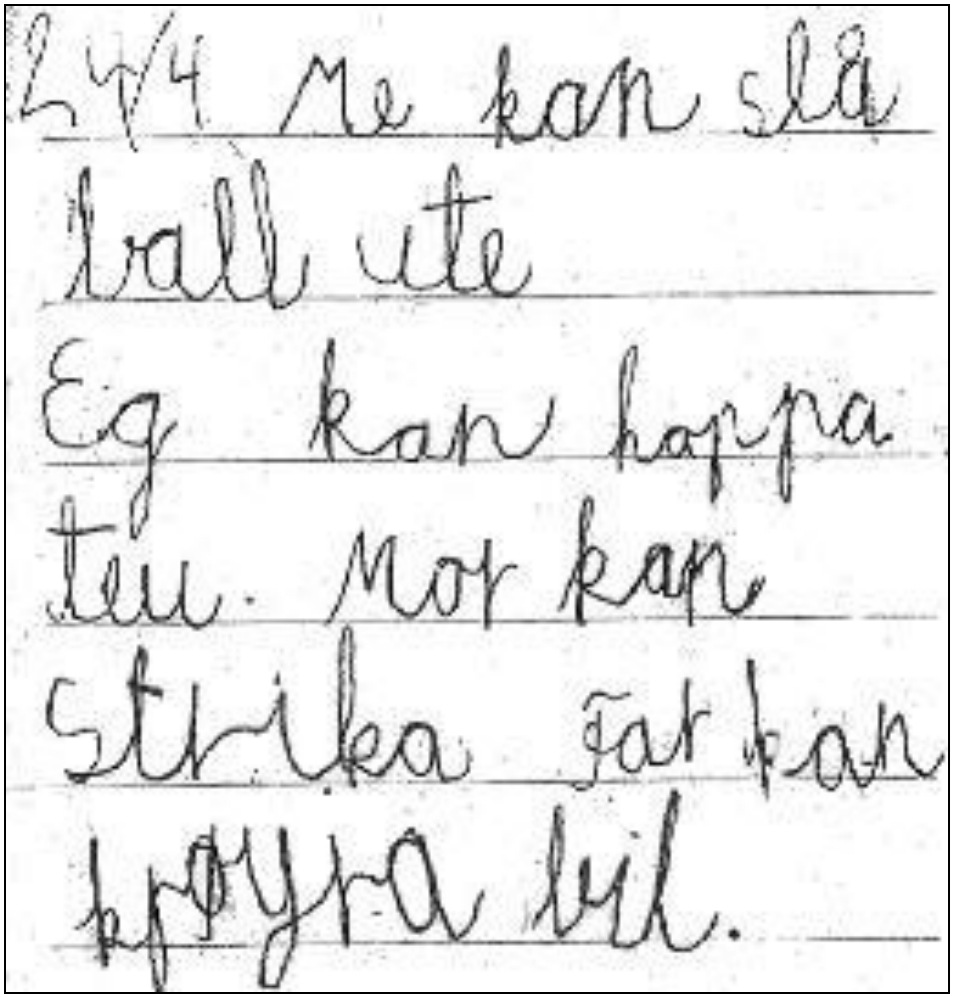
Five and seven months later:





Januar, 3rd grade

...and yet another year



Suddenly she was eleven…

Count with nine at a time

0 9 18 27 36 45 54 63 72 81 90

Kim puts 9 clinkers in every bag. How many beads are there in:

3 bags	clinkers
4 bags	clinkers
2 bags	clinkers
5 bags	clinkers
6 bags	clinkers
8 bags	clinkers

April, 6th grade

What about Tina today?

- She has turned 30 a couple of years ago
- She lives in her own flat, together with her fiancè.
- She goes to work every day
- She is on Facebook, and her posts are quite relevant
- She is included in the local society in many ways

On the shoulders of giants...

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Thank you very much!

I have put the presentation and the references on my web page, www.pedverket.no, where it will be available for a while.