

THEORETICAL BACKGROUND

The experiment attempts to envisage the cognitive differences between two phases in bottom-up approach (phase1: non-focused reading; phase2: focused reading), top-down (TD) and bottom-up (BU) reading approaches in text-picture comprehension (TPC).

It is noticed that...

- secondary school students are required to have skills in comprehending both text and pictures, esp. in scientific textbooks (Otero et al., 2002).
- in the preliminary study in BiTe (Text-Picture Integration), students adopted different reading approaches. Some read the items (like questions or tasks) first and then the text and pictures. Others looked at the text and picture first and later at the items. Due to the lack of literature, we define the first reading approach as TD approach and the other as BU approach.

Research has shown that...

- although research on TPC has flourished during the last two decades, the value of cognitive processes in TPC has only recently been recognised (Mason et al., 2013).
- very few studies have involved younger learners (Mason et al., 2013).
- the integrative Model of TPC has more advantages in building on other theories and elaborating them in TPC, e.g. sensory modalities, multiple memory systems, descriptive and depictive channels, Dual Coding Theory and Cognitive Theory of Multimedia Learning (Schnotz & Bannert, 2003).
- eye movements can reflect continuous mental procedures and reveal the structure of cognitive processing with external representations (Just & Carpenter, 1976).

AIMS AND OBJECTIVES

- Text:** to explore the differences of cognitive processing between two phases in BU approach and TD and BU approaches.
- Picture:** to investigate the differences of cognitive processing between TD and BU.
- Text & Picture:** to analyse and identify the differences in school and grades and to shed light on pedagogical implications.

DESIGN

2x2 (x3x3x2x2) factorial design

- 2 between factors:
 - school types (Gymnasium/ Realschule Plus)
 - grades (5/ 8).
- 4 within factors:
 - task difficulty (easy/medium/difficult)
 - hierarchical level (1/2/3)
 - image type (realistic images/graphs)
 - reading approach (top-down and bottom-up)

Table1. Sequence of six units (insect, banana, pregnancy, audibility, savanna, Europe)

Sequ- ence	1 st Phase: Bottom-Up			2 nd Phase: Top- Down		
	I ₁	P ₂	E ₂	B ₁	A ₃	S ₂
1	I ₁	P ₂	E ₂	B ₁	A ₃	S ₂
2	E ₃	I ₂	P ₁	S ₃	B ₂	A ₁
3	P ₂	E ₁	I ₃	A ₂	S ₁	B ₃
4	B ₁	A ₃	S ₂	I ₁	P ₃	E ₃
5	S ₃	B ₂	A ₁	E ₃	I ₂	P ₁
6	A ₂	S ₁	B ₃	P ₂	E ₁	I ₃

PILOT STUDY

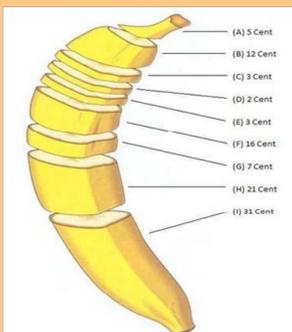
Sample

- N=17 (11 Males, 6 Females)
- Age: M= 12.7 years (SD=3.4 months)
- School: 8 (lower track), 9 (higher track).
- Grade: 3 (5th Grade), 9 (6th Grade), 3 (8th Grade)
- Intelligence: M=32.1 (SD=4.5).

Procedure

- IQ test
- Six units were presented on Tobii Eye-tracker and eye movements were recorded.
- Eye-tracking is conducted. Regarding to the characteristics of young participants, Tobii eye-tracker was selected due to its unique tolerance and comfort for head movements.

PILOT STUDY MATERIAL



Many people like to eat bananas. They are planted in countries like Ecuador, Costa Rica or Columbia and then exported to Europe. Undoubtedly, this is related to costs. The banana that you see in the picture costs just one Euro. This Euro includes...

- (A) salary of the farmers
- (B) cost of the fertilizer
- (C) cost for transporting to the harbor
- (D) profit of the plantation owners
- (E) tax for bananas
- (F) cost for shipping
- (G) profit of the wholesaler
- (H) costs for storage
- (I) profit of the retailer

PILOT STUDY RESULT

Table2. Means, standard deviations and p value of two phases in bottom-up approach.

	Phase1_BU	Phase2_BU	P
No of fix on picture	M=31.530 (SD=20.103)	M=45.688 (SD=26.968)	0.139
Average fix on picture	M=0.341 (SD=0.293)	M=0.31 (SD=0.066)	0.593
Fix on picture	M=9.813 (SD=7.079)	M=14.265 (SD=10.275)	0.203
No of fix on text	M=127.235 (SD=40.885)	M=43.438 (SD=29.143)	<.001
Average fix on text	M=0.341 (SD=0.300)	M=0.297 (SD=0.244)	0.561
Fix on text	M=39.663 (SD=10.970)	M=11.656 (SD=8.807)	<.001

Table3. Means, standard deviations and p value of bottom-up and top-down approaches.

	No of Fix on Picture	No of Fix on Text	p
BU	M=73.608(SD=36.336)	M=165.274(SD=52.0496)	0.000
TD	M=80.294(SD=58.203)	M=143.118(SD=51.708)	0.003

	Fix on Picture	Fix on Text	p
BU	M=23.018(SD=13.270)	M=49.769(SD=14.334)	0.000
TD	M=19.964(SD=14.547)	M=40.073(SD=17.576)	0.001

DISCUSSION

Between two phases in BU reading approach and between BU and TD reading approaches, the findings of pilot study demonstrate that...

- Picture:** phase 2 takes a bit longer than phase 1 because the readers try to integrate the information in text with pictures after knowing the content of text.
- Text:** phase2 takes significantly less time than phase 1 because the readers have purpose in mind and thus the reading is more focused.
- Reading is heavily text-based regardless of reading approaches. Top-down approach takes a bit less time than bottom-up approach

REFERENCES

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STATUS OF WORK

current status

