From context to text
LESLLA learners between situated learning and logic reasoning

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Overview
- Literature review
  - Literacy and metalinguistic awareness
  - Literacy and processing of linguistic information
- Literacy and cognition
  - Taxonomic classification
  - Syllogistic reasoning

A few observations

- Reading
  - Could you read this letter to me?
  - Hassans tooth ache
  - Fatma goes to school
- Writing:
  - A book of my life
  - Emergent writers
- Out of school learning
  - Somali interpreter

Emergent writers

- Fatima
- Jahmila
- Kwaku

Literature review

- Long lasting research
  - Does literacy impact metalinguistic awareness?
  - Does literacy impact logic/deductive reasoning? → Today’s topic
- More recent research
  - Does literacy impact the processing of (linguistic) information

Literacy and metalinguistic awareness

- Phonological awareness
  - Sounds: (how many sounds in cat?)
  - syllables
- Word awareness
  - What is a word?
  - What is the last word you heard?
  - How many words in John takes the train?
- Print awareness
  - Street signs, letters, register
Results metalinguistic tasks

- On nearly all tasks:
  - non-literates differ strongly from readers
    - Exception: rhyme recognition and segmentation in syllables

Segmentation sentences and words

- Could you segment into pieces (orally)
  - I come from the south of Somalia
  - The old man
  - In the shop
  - Tomatoes

Examples non-literates

- I come from the south of Somalia
  - I come / from south Somalia
  - You have the south and the north, is that it?
- The old man
  - No you can't
  - Do you mean old men and young men?
- In the shop
  - No, that is one place
- Tomatoes
  - Every one a tomato
  - Into four parts
  - To / ma /toes

Could someone write this?

- I live in Holland
- Outside
- I was raining yesterday
- Ten
- A baby is very old

Examples non-literates

- Yes, because I do live in Holland.
- You could write ’tree’ but not ’outside’
- Ten, yes, that can be written
- No, because it was not raining yesterday
- If it was raining yesterday, you could write that down.
- No, of course not, a baby is not old.
- You could write it down, but it is still nonsense

Impact on language processing

- Repeat table, repeat hable (word and pseudo-word) n
- Verbal fluency
  - Mention as much words as you can with a p
  - Mention as much animals/food as you can
- Working memory: repeat strings of digits or words

- Results:
  - no [big] differences between non-literates and literates in using semantic information,
  - but big differences in processing phonological information
Language Processing: word repetition

<table>
<thead>
<tr>
<th>% correct</th>
<th>Words</th>
<th>Pseudo words</th>
</tr>
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<tbody>
<tr>
<td>Non-literate</td>
<td>92%</td>
<td>33%</td>
</tr>
<tr>
<td>Literate</td>
<td>98%</td>
<td>99%</td>
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</tbody>
</table>

Literacy and cognitive operations

- Claim Vygotsky and Luria: literacy changes ways of (deductive) reasoning
- Studies reveal different outcomes
- However: simple syllogistic reasoning tasks reveal intriguing consistent results.


Examples research on reasoning

(Luria, 1975)

Taxonomic classification
The odd one out
- glass, pan, glasses, bottle
- rifle, bow and arrow, gun, bird
- saw, hammer, log, axe

Syllogisms:
All bears on Nova Zembla, far up in the North, are white.
Last year, my cousin saw a bear on Nova Zembla
What was the colour of the bear?

Syllogistic reasoning: All X are Y

<table>
<thead>
<tr>
<th>Premise-based</th>
<th>Non-literate</th>
<th>Literate</th>
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</thead>
<tbody>
<tr>
<td>Luria (1930)</td>
<td>22.5%</td>
<td>100%</td>
</tr>
<tr>
<td>Scribner (1997)</td>
<td>22.3%</td>
<td>75%</td>
</tr>
<tr>
<td>Scribner&amp;Cole (1981)*</td>
<td>27%</td>
<td>29% / 50%</td>
</tr>
<tr>
<td>Kurvers (2002)</td>
<td>20%</td>
<td>68%</td>
</tr>
<tr>
<td>Haan (2007)</td>
<td>14%</td>
<td>-</td>
</tr>
<tr>
<td>Counihan (2007)</td>
<td>30%</td>
<td>66%</td>
</tr>
</tbody>
</table>

* First experiment, percentages literates: resp. Vai-literate and schooled literate

Study Kurvers (2002)

- Comparison of three groups:
  - preliterate children, non-literate adults, low-educated literate adults
- Tasks:
  - metalinguistic tasks and cognitive tasks
- Question: Impact of literacy or something else?
  - if children differ from adults (irrespective of literacy experience) \(\Rightarrow\) no impact of literacy
  - if readers differ from non-readers (irrespective of age) \(\Rightarrow\) impact of literacy

Respondents

- Pre-literate children, last term
  Kindergarten \((N=23)\)
- Non-literate adults \((N=25)\)
- Low-educated literate adults, 4 years primary school \((N=24)\)
- All: Berber, Somali, Turks, same backgrounds; adult second language learner of Dutch
Cognitive tasks

- Raven SPM: nonverbal IQ test, culture free (adults only) (k=42)
- Taxonomic classification (k=8)
- Simple syllogisms (k=5)

- Tasks conducted in L1 (Berber, Turkish, Somali) unless respondent preferred L2.

Cogniton: Raven SPM

Results Raven SPM (max=42)

Examples classification 1

- Most Literates
  - Picture, because the other three are for reading
- Non-Literates
  - Picture, because that is on the wall
  - Newspaper, because you can throw it away when you have finished reading.
  - Letter, because that comes through the postbox
  - Photo, because you need a son for the other three

Example classification 2

- Most literates
  - Fish
- Non-literates
  - Dog, because we do not eat dogs
  - Rabbit, because not useful for people
  - Rabbit, does not live in the Netherlands
  - Dog, because a dog is allowed in the living room
  - Fish, because the others do not live in the water
Analysis classification

- Example: Saw, hammer, log, axe
- Taxonomic
  - (wood)log, because other three are tools
- Situational/functional
  - You also need the wood, because otherwise there is nothing to saw or hammer
- Idiosyncratic
  - The saw, because you cannot saw with the other three

Results classification

<table>
<thead>
<tr>
<th></th>
<th>Child</th>
<th>Non-literate</th>
<th>Literate</th>
</tr>
</thead>
<tbody>
<tr>
<td>taxonomic</td>
<td>38%</td>
<td>55%</td>
<td>77%</td>
</tr>
<tr>
<td>situational</td>
<td>19%</td>
<td>26%</td>
<td>16%</td>
</tr>
<tr>
<td>idiosyncratic</td>
<td>43%</td>
<td>19%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Boxplots classification taxonomic

Examples syllogism

- All women in Markey are married
- Fatma is not married
- Does Fatma live in Markey?
  - All stones on the moon are blue
  - A man went to the moon and found a stone.
  - What was the colour of that stone?

Examples reasoning Syllogism task

- Does Fatma live in Markey?
  - Most literates:
    - No, because all women are married there
  - Non-Literates:
    - No, because I know Fatma. She lives here.
    - How should I know, I have never been there.
    - We have to ask Fatma.
    - It can not be that there is a country where all women are married.
    - Should I give my opinion, or react on your words?

Examples reasoning Syllogism task

- What was the colour of that stone?
  - Most literates:
    - Blue, because all stones are blue there
  - Non-Literates:
    - Black, because it is very hot there
    - How should I know, I have never been there
    - There are no stones on the moon
    - Brown, just look outside.
    - I think blue, because the sky is blue.
    - Black or white, that depends
Types of arguments

- **Premise based**
  - Because all stones on the moon are blue
  - Because otherwise he should have had three heads
  - Because you told me all stones are blue
  - If she lived there, she was married

- **Experience based**
  - Because I have been in Amsterdam
  - I know Fatma, she is married
  - Because of the color of the water
  - We have to ask Fatma
  - People told me it is a nice city

Types of arguments Ctn.

- **Discussion premise (also experience based)**
  - It cannot be that there is a country where all women are married
  - There are no stones on the moon
  - A human person cannot have three heads

- **Don’t know/ no argument**
  - How would I know?
  - You didn’t tell me.

Frequencies arguments by group

<table>
<thead>
<tr>
<th></th>
<th>Child</th>
<th>Non-literate</th>
<th>Literate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premise based</td>
<td>33%</td>
<td>19%</td>
<td>67%</td>
</tr>
<tr>
<td>Experience</td>
<td>39%</td>
<td>75%</td>
<td>27%</td>
</tr>
<tr>
<td>No argument</td>
<td>28%</td>
<td>6%</td>
<td>6%</td>
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</table>

Pearson Correlations

<table>
<thead>
<tr>
<th></th>
<th>Classification</th>
<th>Raven</th>
<th>Print awareness</th>
<th>Meta-linguistic</th>
<th>L1 reading</th>
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<tbody>
<tr>
<td>syllogisms</td>
<td>.26</td>
<td>.39*</td>
<td>.57**</td>
<td>.77**</td>
<td>.59**</td>
</tr>
</tbody>
</table>

** \( p < .000 \), * \( p < .05 \)

Differences between 5 items?

1. All Cities in Holland are nice
2. All women in Markey are married
3. All stones on the moon are blue
4. All people on Mars have three heads
5. Achmed went for a walk (all stones in the river were yellow)

- Story embedded syllogism

Means by group Item 1-5
Conclusions syllogism 1-5

- Differences between adult non-literate and literates strongest for the moon (syllogism 3) and the river syllogism/story (syllogism 5)
- Children seem to profit from story-embedding (syllogism 5), non-literate adults do not
- Reasoning non-literate in story embedded syllogism similar
  - White, because God made the stones white
  - I don’t know, I have never been there
  - Blue, because the water made them blue
  - It must be a beautiful colour. We don’t know the colour

A closer look at reasoning

- Is it the question?
- Is it the verbal aspect?
  - Box task (Haan 2007)
- Is it the meaning of the concept “all”?
  - Brothers (Haan 2007)
- Some in-between answers


- E: All Kpelle men are rice farmers. Mr Smith is not a rice farmer. Is he a Kpelle men?
- S: I don’t know the man in person. I have not laid eyes on the man himself.
- E: Just think about the statement.
- S: If I know him in person, I can answer that question, but since I do not know him in person I cannot answer that question.

Kurvers, 2002

- E: Listen (repeats syllogisme). Does Fatma live in Markey?
- Arkem: Fatma lives in Markey, or in Turkey (laughs). Fatma is not married, hé? All women are married, she is not. But why is she not married?
- E: Does she live in Markey, you think?
- Arkem: I don’t know. She might live there, or here.

Verbal aspect: Box task

(Haan, 2007)

- Three red boxes in a tray.
- Each box contains a ping-pong ball (show).
- Close all three boxes, hide the three boxes, show one of the red boxes again.
- “What is in this box?”

- Correct: 69%
- Respondents can deduce information from the ‘premises’ if the information is presented visually.

Concept all? (Haan, 2007)

- Simplified syllogism
  - I have three brothers. All three of my brothers live in Rotterdam. Jan is one of my brothers. In which city does Jan live?

- Correct: 25%
- What is the difference with the box-task?
Example brothers’ task

• Exp: Where does Jan live?
Lahcen: [long pause] You did not tell me where Jan lives. You told me that your brothers live in Rotterdam, but not where Jan lives.
• Exp: All three of my brothers live in Rotterdam, all three. Jan is one of my brothers. Where does Jan live?
Lahcen: Those three brothers of yours live in Rotterdam, he may be one of them.
• Exp: Jan is one of my brothers.
Lahcen: Then they all live in Rotterdam.

In-betweens

• High scoring non-literates
  – Khadizja (1 experience based, 4 deductive)
  – Habiba (1 experience based, 4 deductive)
  – Lionel (2 experience based, 3 deductive)
• On no task all in-betweens do differ from the average of the whole group, except for metalinguistic awareness and print awareness

Ways of reasoning in-betweens

• Blue, you told me all stones are blue there
• If she lived in Markey, she would have been married
• I think yes, although I have never been there.
• No, she is not married. That is not allowed.
• Yes blue, all stones are blue there, isn’t it.
• Shall I give my opinion, or react on your words?

Compare

• Lahcen: You did not tell me where Jan lives
  – Implicit question: “Do you remember what I told you about Jan?”
Khadizja: Blue, because you told me
  – Answer to a different question: “Where does Jan live when A and B are true?”

Conclusions

• Literacy opens new ways of handling verbal information
• Default handling: relating verbal statements (separate facts; exemplars) successively and one by one to the immediate, outside context, the direct world; situated cognition, combining and integrating acting and speaking: contextual verbal reasoning
• Literate (metalinguistic) handling: relating verbal statements first of all to each other, within the text: textual verbal reasoning.
• The literate (metalinguistic) point of view: integrating verbal (textual) information before contextual checking
• Next step, ‘symbolic’ cognition, with within (inside, text-bound) true and false values: symbolic reasoning, formal logic

References

Counihan, M. (2001). Looking for logic in all the wrong places: an investigation of language, literacy and logical reasoning. Amsterdam: ILLC.
Thank you!

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Do inbetweens differ

- Background (age, schooling etc)?
- Non-verbal intelligence?
- Memory?
- The concept all?
- Ways of reasoning?
- What else?

Relevant tasks / tests
Literacy and raven, adults only

<table>
<thead>
<tr>
<th>Relevant tasks / tests</th>
<th>Coefficients</th>
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<tr>
<td>Correlations</td>
<td>Unstandardized</td>
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<td></td>
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Predicting syllogisms

Syllogisms highest correlation with metalinguistic abilities

Background NL in-betweens

<table>
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<tr>
<th>Age</th>
<th>L2</th>
<th>school</th>
<th>textL1</th>
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<tr>
<td>74</td>
<td>25</td>
<td>5 mth</td>
<td>yes</td>
</tr>
<tr>
<td>76</td>
<td>47</td>
<td>2 mth</td>
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<tr>
<td>131</td>
<td>37</td>
<td>10 mth</td>
<td>Some decoding</td>
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Average group 38.8 2.3 0.4 no
Example brothers’ task

- Exp: Can you remember what I told you about my brothers?
- Zina: You told me you have three brothers and one sister, and the place you mentioned I don not know/I cannot remember. [...]  
- Exp: All three of my brothers live in Rotterdam. Jan is one of my brothers. In which city does Jan live?  
- Zina: I don’t know.

Predicting syllogistic reasoning

<table>
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<tr>
<th>Model</th>
<th>Coefficients</th>
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<th>Sig</th>
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