



LaurentianUniversity
Université**Laurentienne**



Cognitive Health
Research Laboratory

Laboratoire de Recherche
En Santé Cognitive

Where Are We Looking? Analyzing Eye-Movements During a Symbol Search Task

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Conseil de recherches en
sciences humaines du Canada

Canada

Introduction

- An individual can say 150 words per minute
- When using an AAC device, communication slows down to approximately 10 words per minute

(Trnka, Yarrington, McCaw, & McCoy, 2007)

Previous Studies

- **Vocabulary** (i.e. Burke, Beukelman & Hux, 2004; Light, Wilkinson & Drager, 2008)
 - Choice of vocabulary
 - Representation
 - Organization
 - Categorization
- **Visual information** (i.e. Wilkinson & Jagaroo, 2004; Wilkinson, Light & Drager, 2012)
 - Perception
 - Identification
 - Interpretation

Objectives

1. Observe and analyze the eye-movement patterns involved during a symbol search task.
2. Determine key zones on a speech grid to better understand the layout needed and facilitate programming of AAC systems.

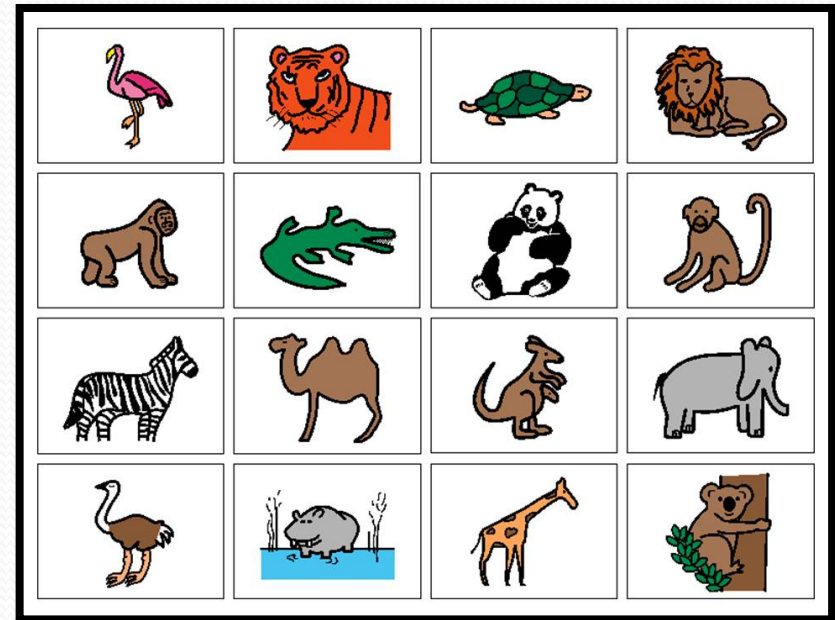
Eye movements

- **Fixation**: a period of time when the eyes become still on new information in the scene in order to allow information to be processed (Rayner, 2009).
- **Saccade**: eye movement within a visual scene, from one fixation to another (Rayner, 2009).

Method

Participants and Materials

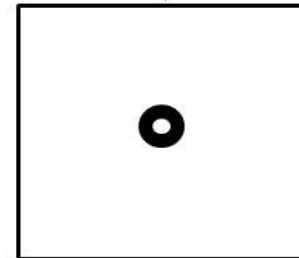
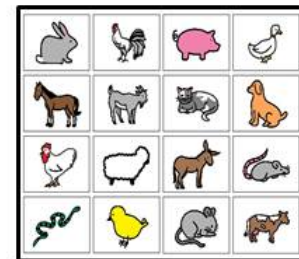
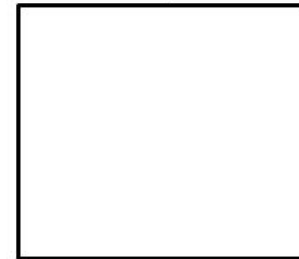
- 30 undergraduate students from Laurentian University, Canada
- Eye-Link II
 - SR Research Ltd.
- 120 grids with 16 symbols
 - Picture Communication Symbols (PCS)
 - Boardmaker® Plus!



Procedure

- One session lasting 30 minutes
 - Presentation of the target word
 - Presentation of a blank screen
 - Presentation of the symbol grid
- Participant selects the symbol
- Drift correct is presented between each trial

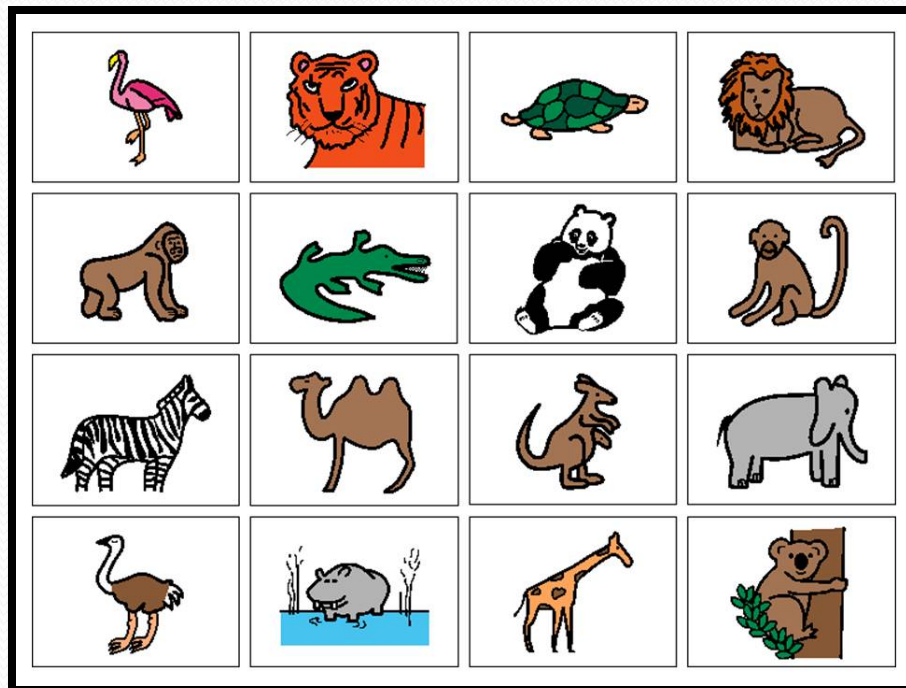
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Analysis and Results

Accuracy

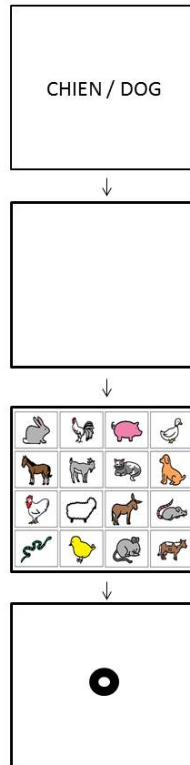
- Calculated by dividing the number of times where the participant selected the targeted cell with the number of total trial.



Accuracy – Results

Reaction time

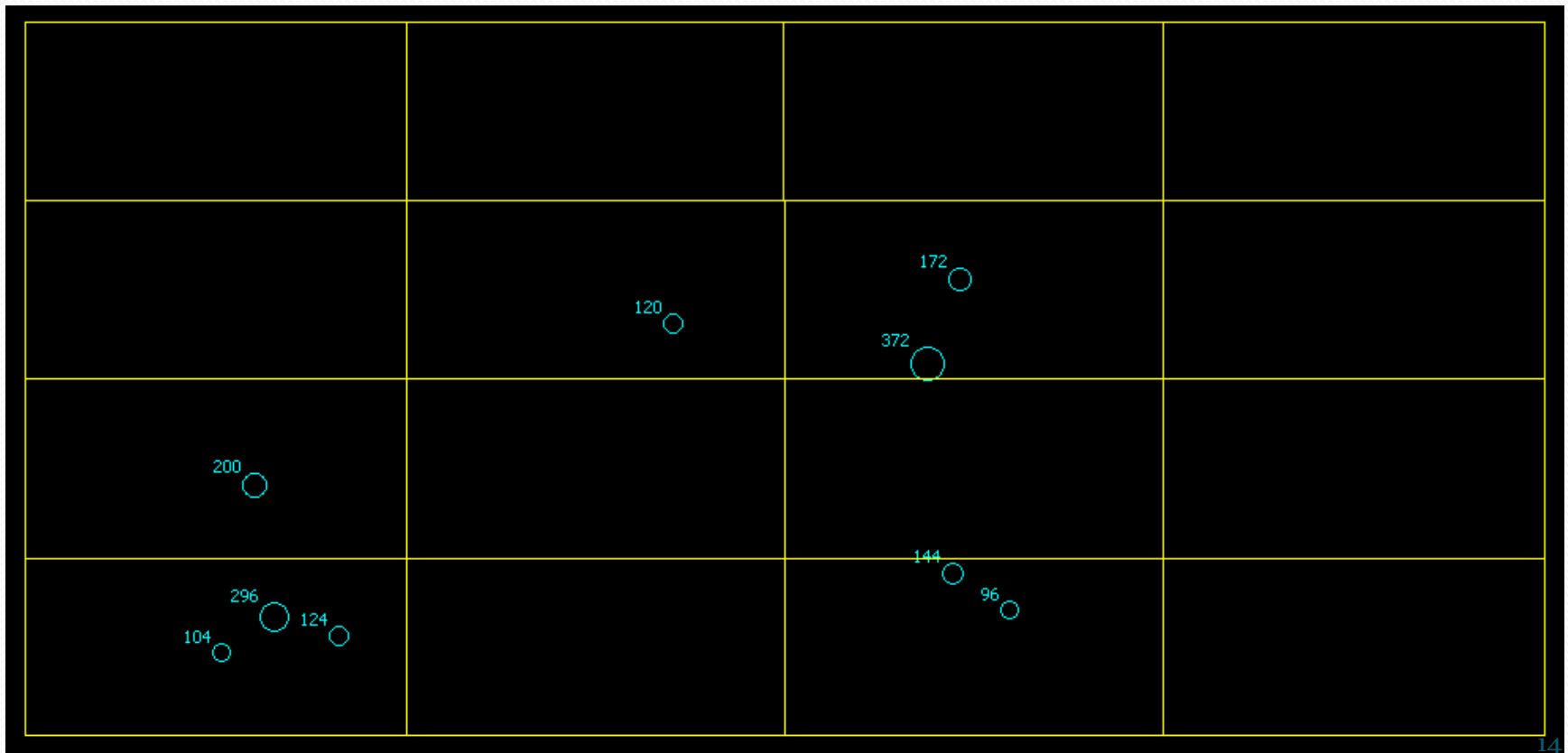
- Calculated from the moment where the symbol grid appears until the time the participant selects an image with the mouse.



Reaction time – Results

Fixation durations

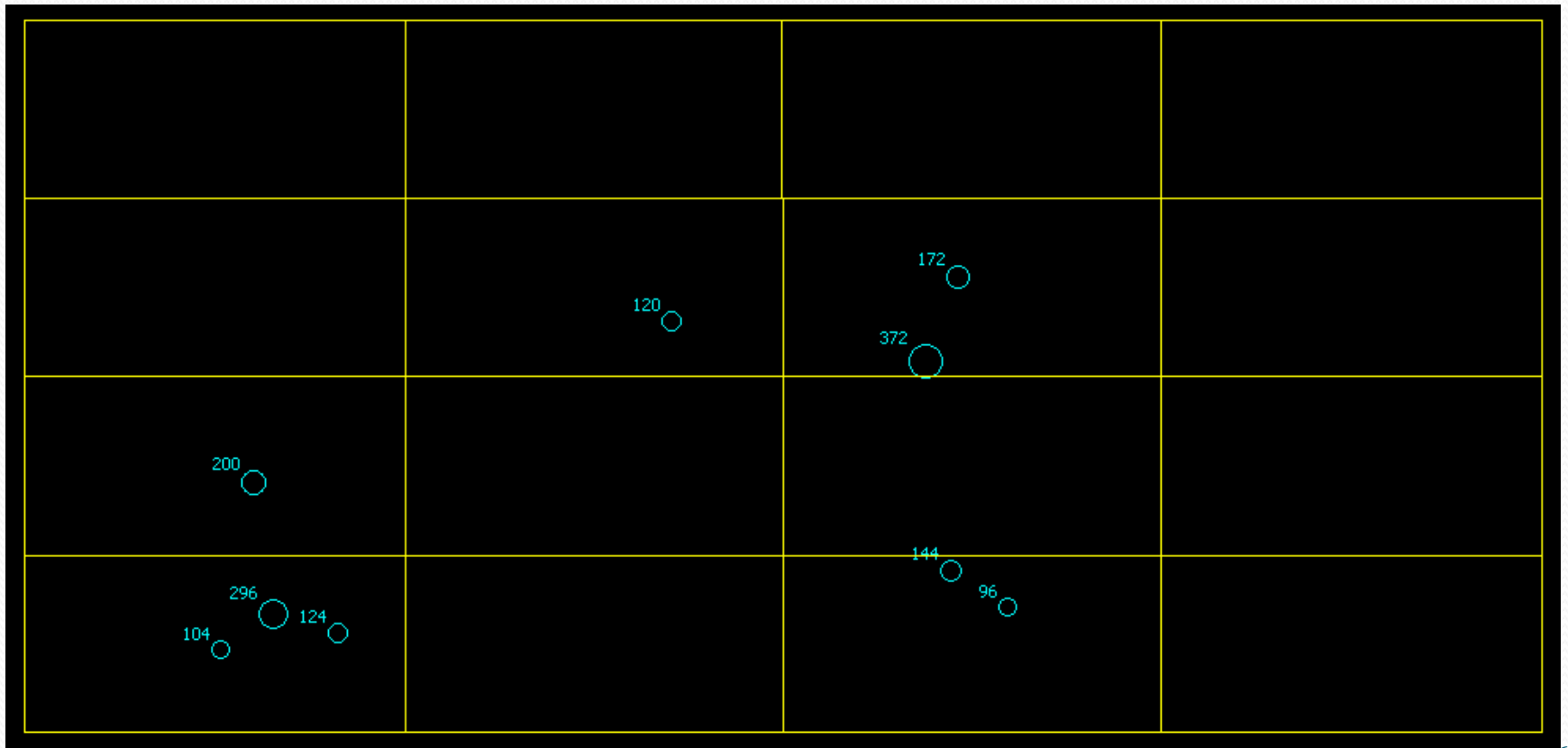
- Calculated by adding the time of each individual fixation within a cell.



Fixation durations – Results

Number of fixations

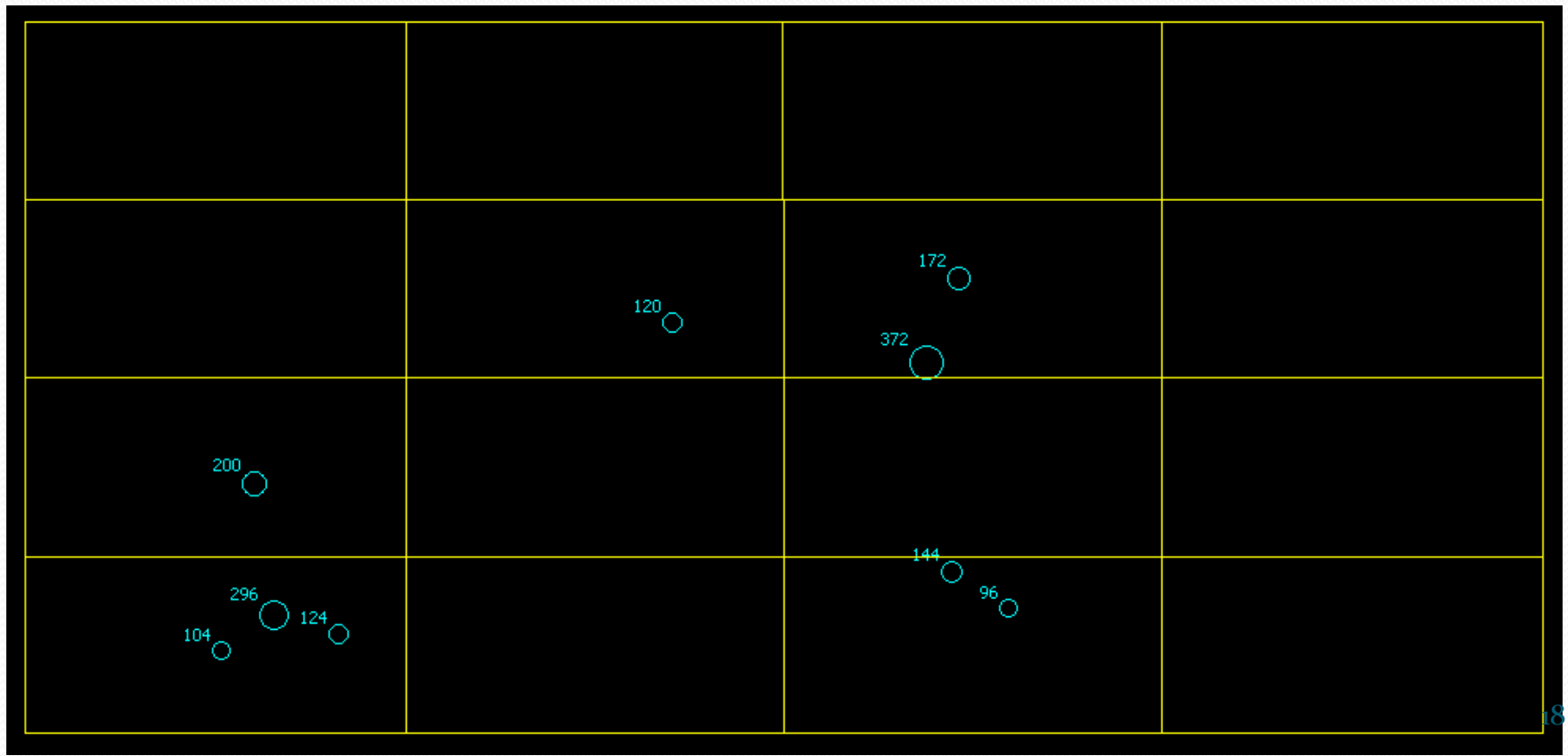
- Calculated by summing the fixations in each cell.



Number of fixations – Results

Probability of fixation

- Calculated by giving a score of 1 when the cell was fixated and 0 when it was not fixated for each trial
- Proportion was calculated by dividing the number of times a cell was fixated by the total number of trials



Probability of fixation – Results

Conclusion

Conclusion

✓ Useful tragedies when programming an AAC system:

1. Placing high frequency symbols in the following cells:

- Cell 3
- Cell 6
- Cell 7
- Cell 10
- Cell 11

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

2. Placing repetitive symbols in the bottom row (i.e. main page, next page, toilet, help...)

Current & Ongoing Study

– Comparison with Children

Comparison of the 2 studies

Adults-

University Group

- 120 trials
- 16 symbol grid
- Word stimulus was presented visually

Children-

Kindergarten Group (age 4-5)

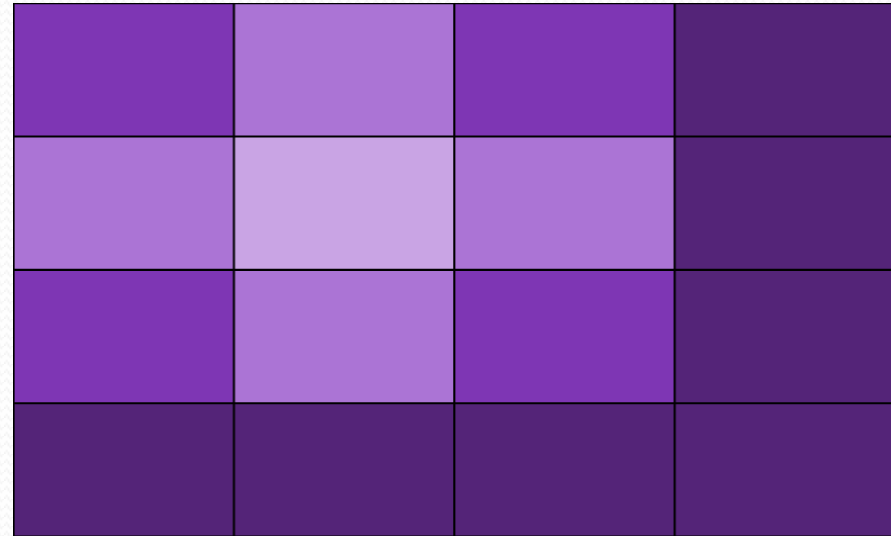
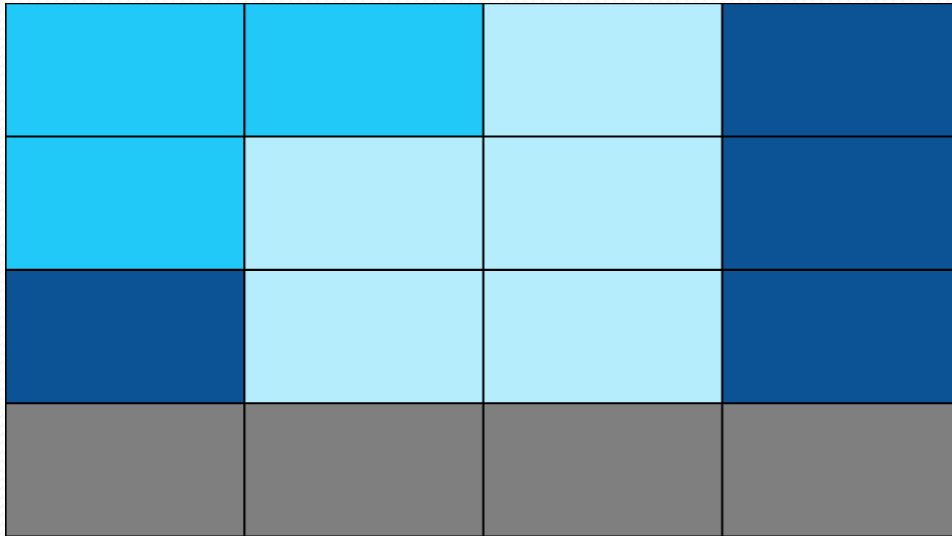
- 60 trials
- 16 symbol grid
- Word stimulus was presented visually and with audio
- Addition of evaluating cognitive abilities
 - Sustained attention
 - Cognitive flexibility

General results – Kindergarten

General results – Kindergarten

General results – Kindergarten

Comparison of conclusions



Influence of cognitive abilities

- Sustained attention = good predictor of participants reaction times and their accuracy
- Cognitive flexibility = no link with either of these two aspects

Limits

- Using a typically developing population versus AAC users or people with CCN
- Using a static display versus dynamic displays
- Using strictly symbols

Thank you!

QUESTIONS?

References

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- Light, J., Wilkinson, K., & Drager, K. (2008). Designing effective AAC systems: research evidence and implications for practice, *Paper presented at the Annual Conference of the Annual American Speech-Language-Hearing Association*, Chicago. November.
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