Reading, writing and syntactic structures

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Outline

- Research **overview**

- Topics for the group **discussion**

- **Ideas** for concrete projects

Introduction

- Investigation of the processes active during written sentence production

- Picture description task: Participants were trained to describe a constellation of coloured shapes in one type-written sentence

- Data acquisition: interkey intervals & eye movements

Method: Stimulus Material
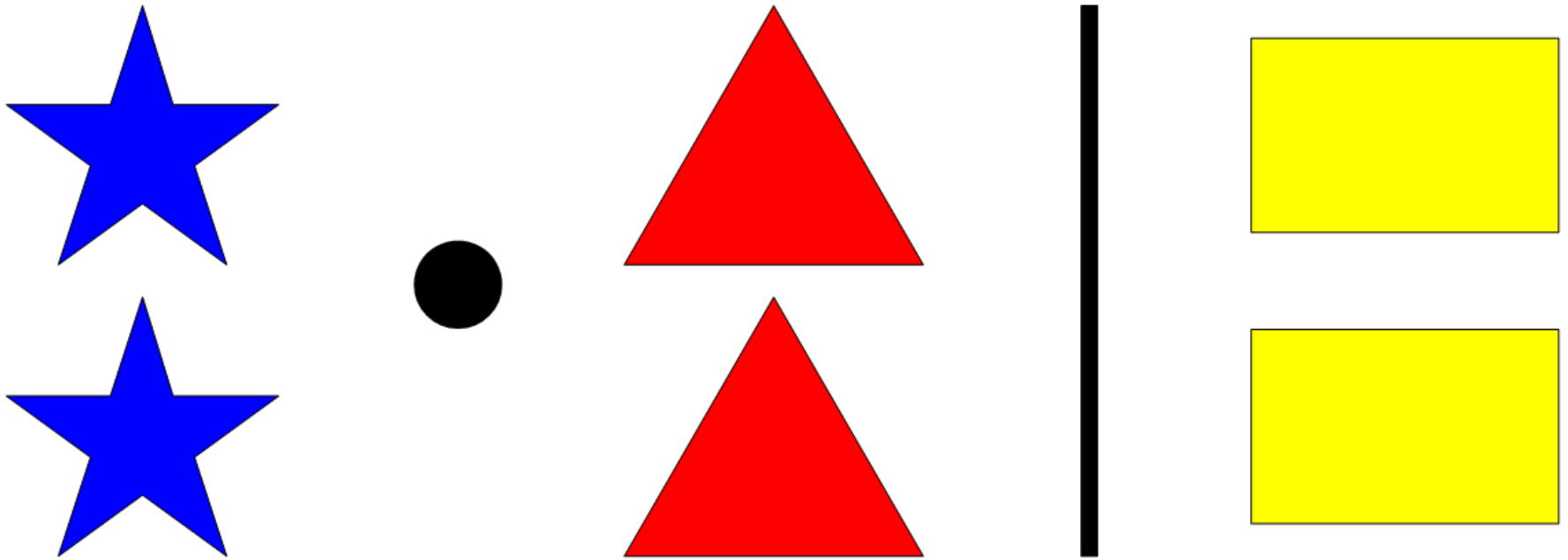
Die blauen Sterne **und** die roten Dreiecke sind neben den gelben Rechtecken.
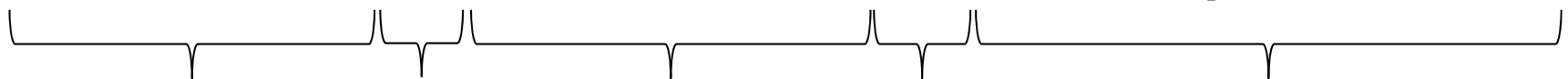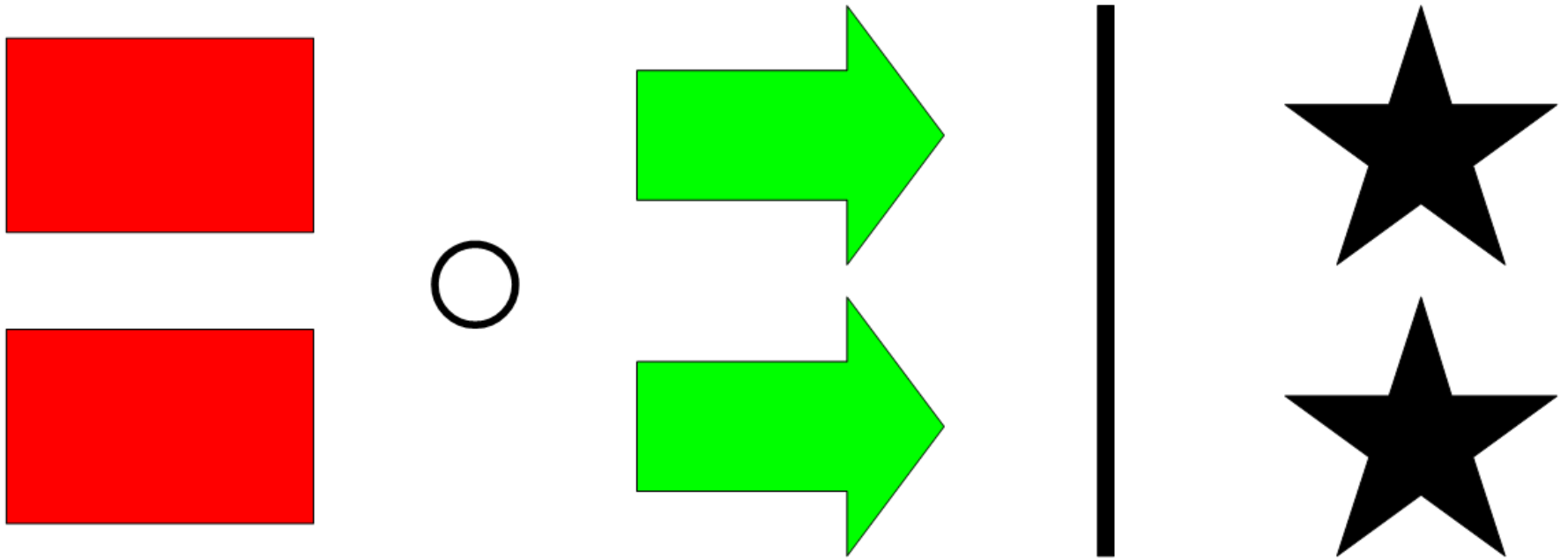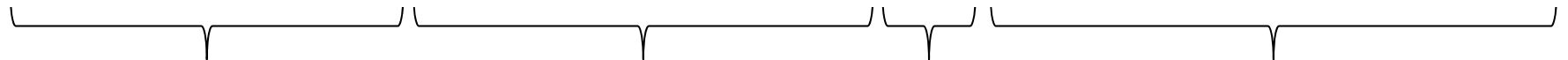
| NP | Conj | NP | V | PP |

Method: Stimulus Material

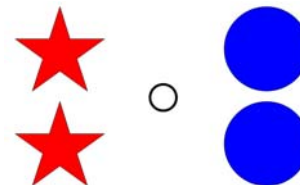Die roten Rechtecke **mit** den grünen Pfeilen sind neben den schwarzen Sternen.

| NP | PP | V | PP |

Method: Stimulus Material

A

NP

NP — N' — NP — N'

Det | Adj | N | Conj | Det | Adj | N

die | *roten* | *Sterne* | *und* | *die* | *blauen* | *Kreise*
the | red | stars | and | the | blue | circles

B

NP — N' — N' — PP — NP — N'

Det | Adj | N | Prep | Det | Adj | N

die | *roten* | *Sterne* | *mit* | *den* | *blauen* | *Kreisen*
the | red | stars | with | the | blue | circles
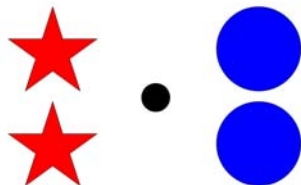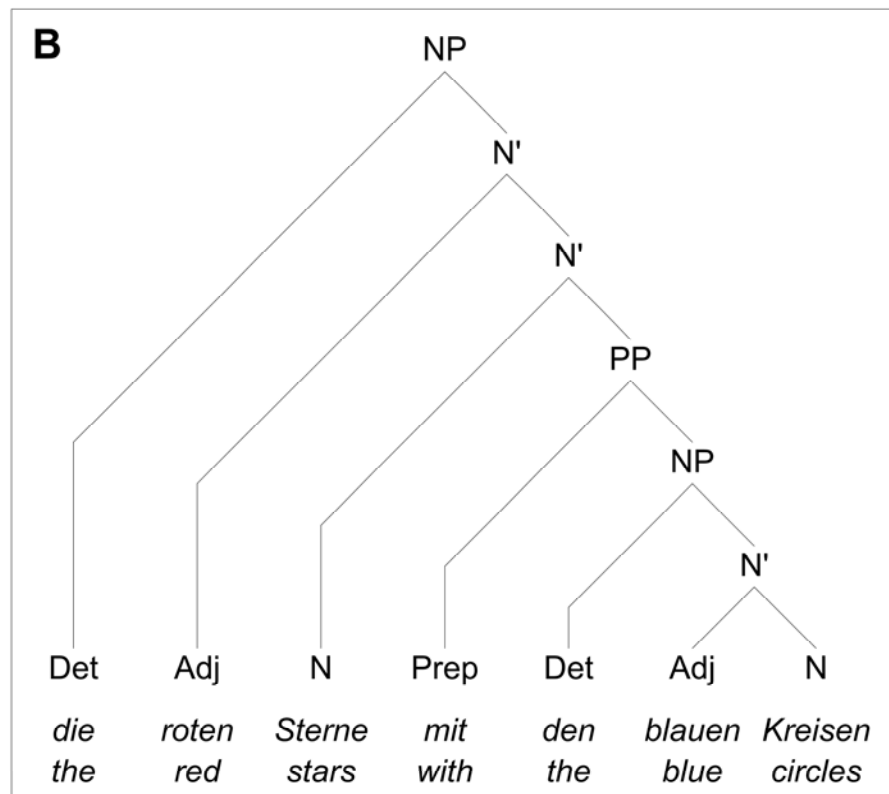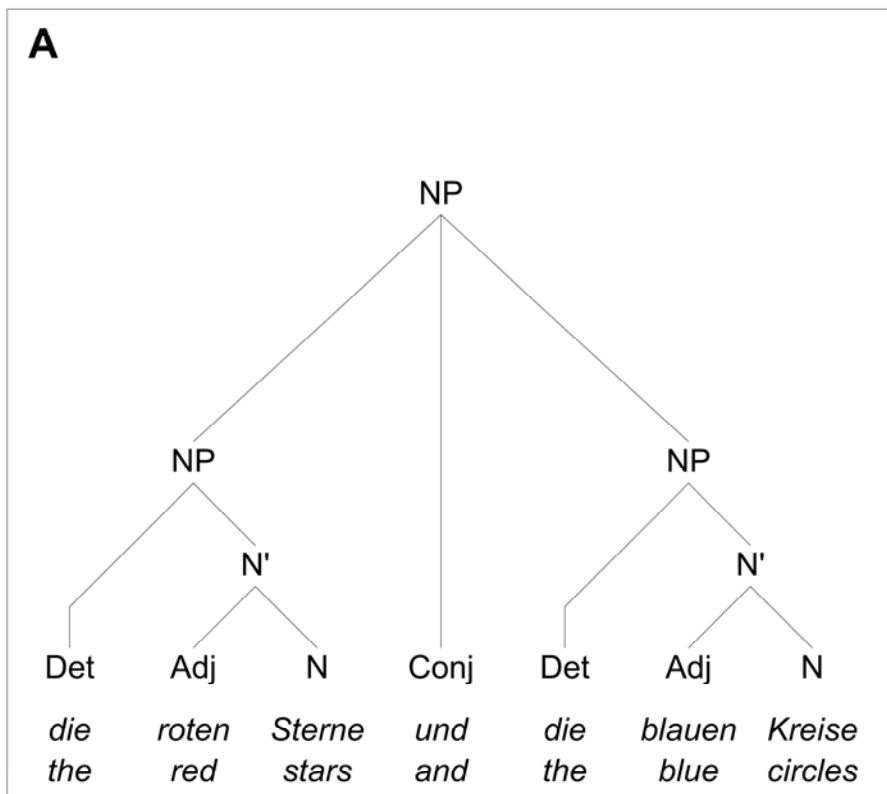
Method

Stimuli

- 40 images (20 coordinated, 20 subordinated)
- 10 pretest items (with text below)
- 5 shapes, 5 colours
- three different colours/shapes in every image
- every colour/shape appears 8 times (4*co/4*sub) in each of the three positions (NP1, NP2, PP)

Procedure

- Drift correction (self paced)
- blank screen for 1 second
- stimulus presentation (randomly assigned)
- start signal after 7 seconds

Method

Apparatus

- 19'' CRT, resolution 1024*768 px
- EyeLink I., binocular recording, 250 Hz
- Key logging

Participants

- 23 undergraduates
- mean age 24.9 years (SD 3.5)
- 18 female / 5 male
- normal or corrected to normal vision
- 8 participants typed with 2 fingers, 10 typed with 4-6 fingers, 5 touch typists

Hypothesis

- The time course of typing sentences is influenced by it's syntactic structures.

- Different syntactic structures (here: coordinated vs. subordinated noun phrases) are processed dissimilar.

- Two coordinate phrases can be planned independently with balanced loads, whereas a larger structure of one phrase with a subordinated one should be cognitively more costly.
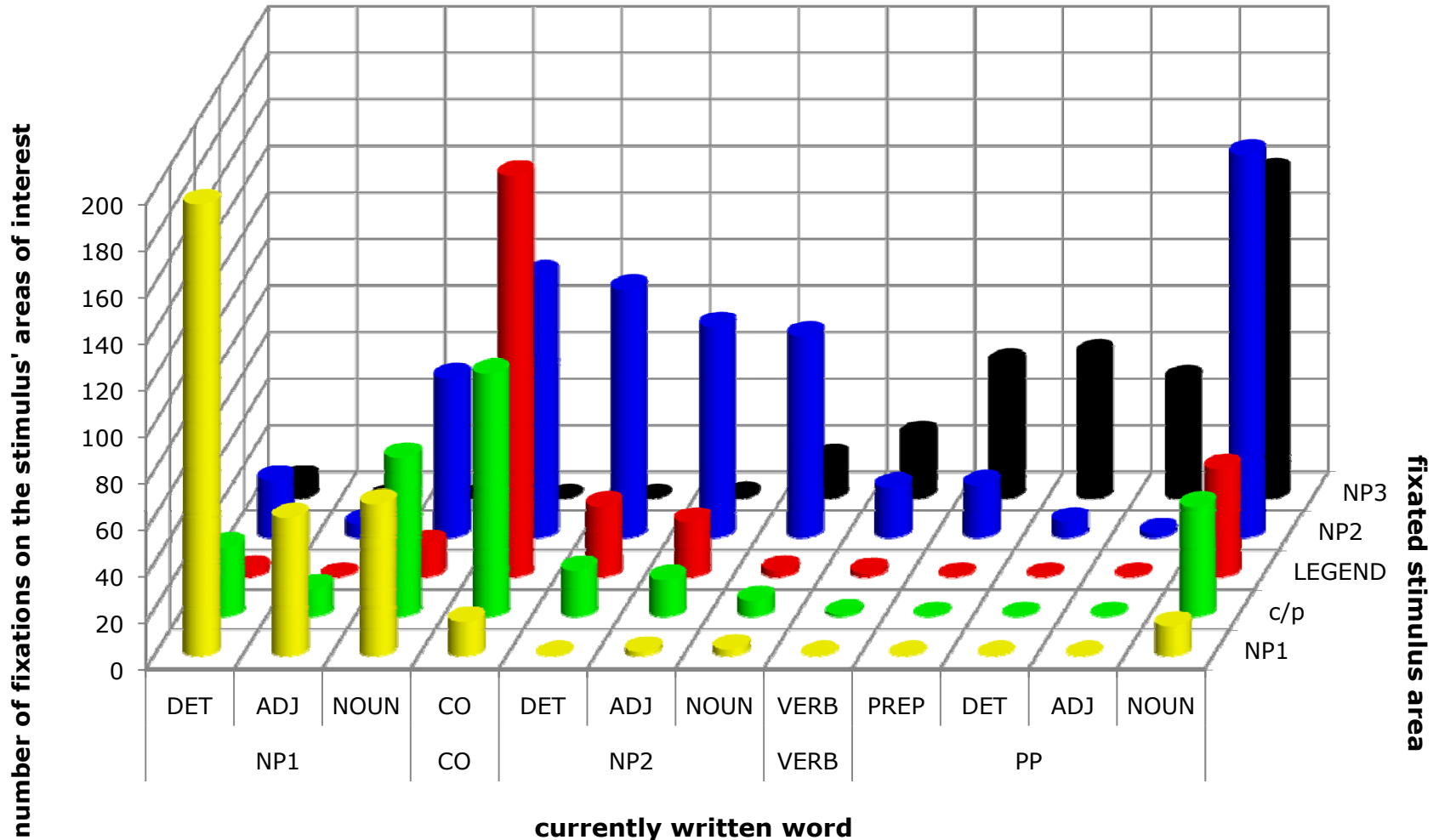
Results: Interkey Intervals
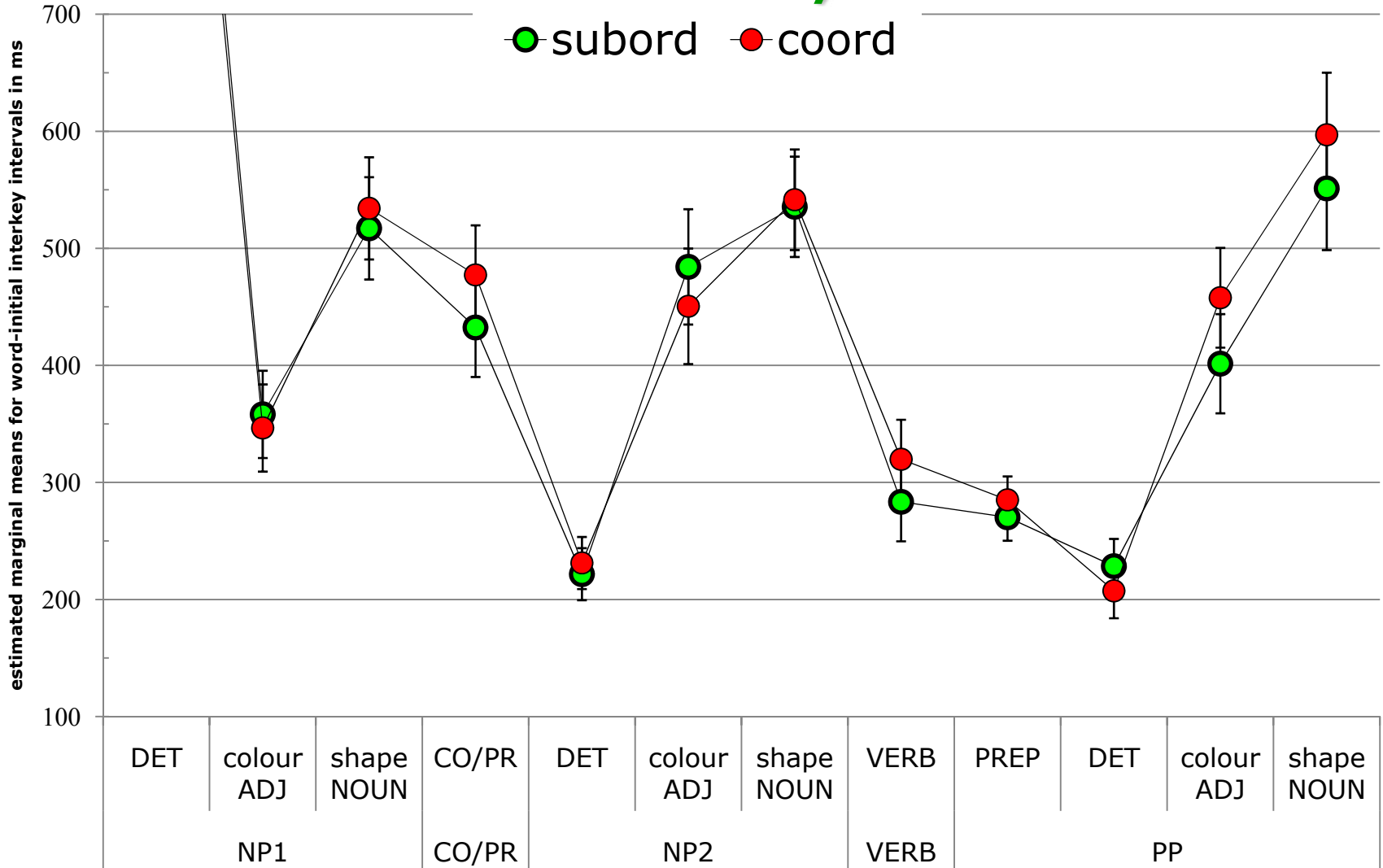
Results: Eye Movements

subordinated syntactic structure
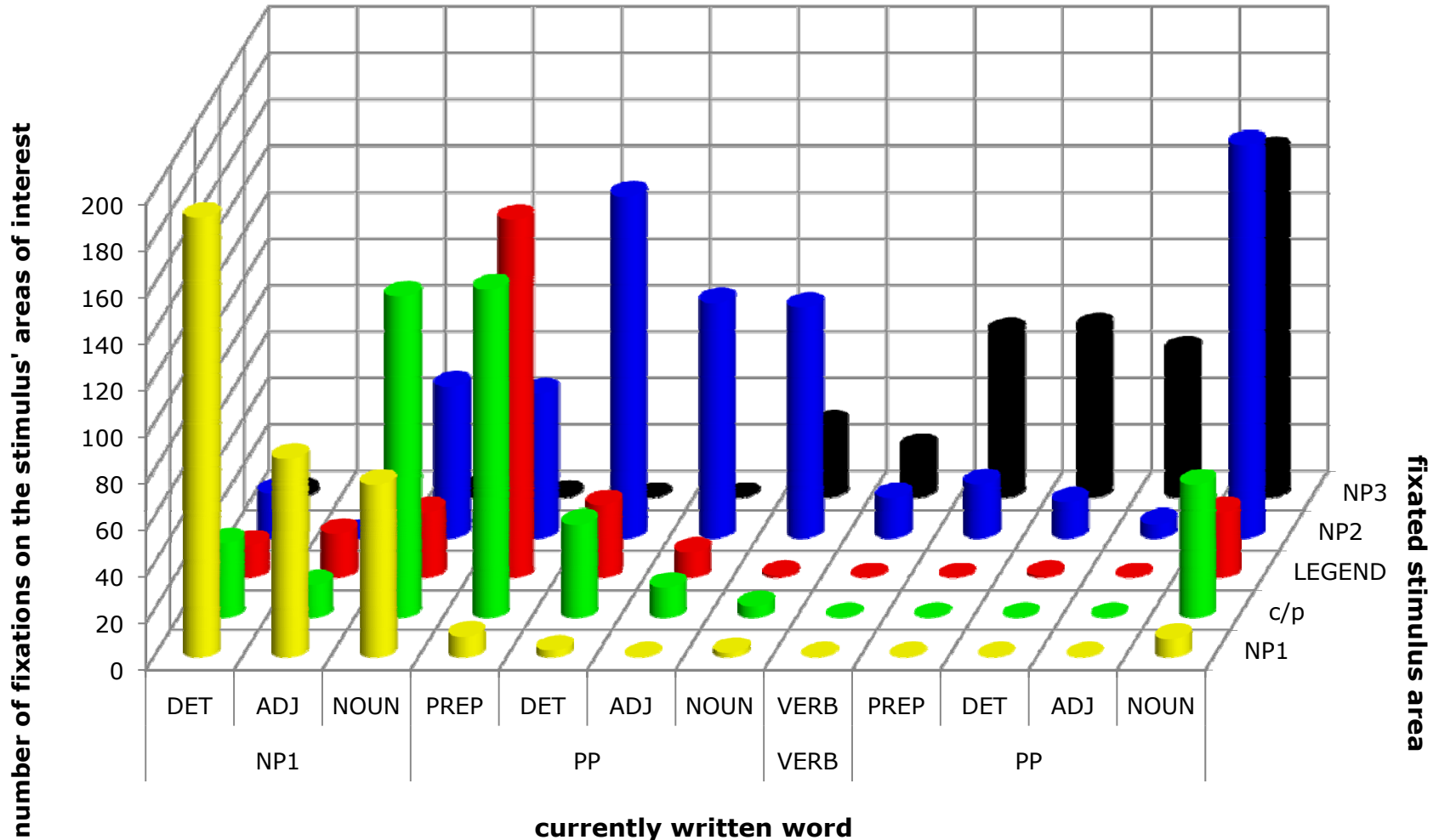
Results: Eye Movements

coordinated syntactic structure

Results & Discussion

- The coordinated syntactical structure leads to intensified incremental production, i.e. local planning (longer IKIs at coordination and verb).

- In the coordinated condition, eye movement and keystroke data point in the same direction: Starting at the end of the first phrase and culminating during the typing of the coordination, the participants showed a higher number of fixations on the stimulus area NP2.

Eye Movement Strategies

1. on the *stimulus before* the respective phrase was written.

2. on the *stimulus during or after* typing the related phrase/word

3. Re-reading of the *text produced so far*

4. Reading the *emerging text* (or even anticipating it)

Ideas for Discussion

What can we learn from studies on spoken sentence production?

- A large body of research of very basic and highly controlled experiments

- Methods for investigating conceptual, grammatical and phonological planning separately

- Sophisticated and testable models of speech production

Ideas for Discussion

In order to name an object, a speaker/writer? must

- access a visual representation of the object

- retrieve semantic information about it

- retrieve the corresponding name from the mental lexicon

- access the lemma (specification of the syntactic properties)

- access the corresponding phonological form

Conceptual Planning

- Manipulating conceptual planning (Contour deletion affects the speed of object identification; Meyer, Sleiderink & Levelt, 1998)
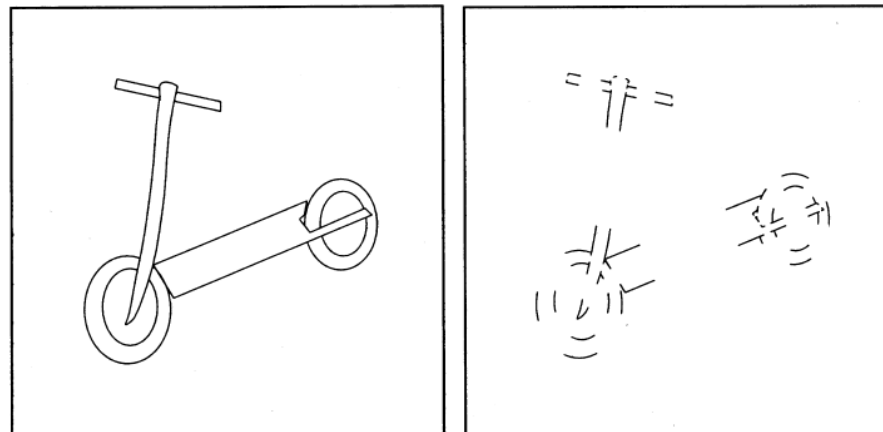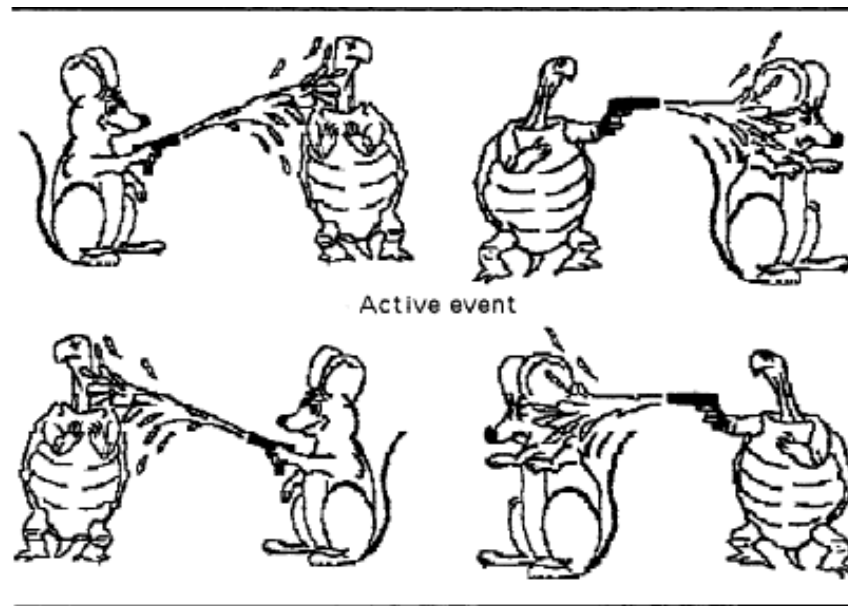

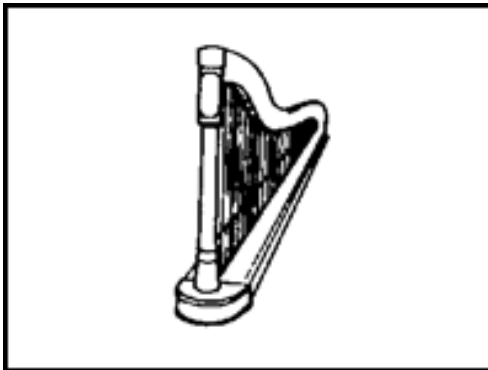Fig. 1. Experimental object with complete and partial contours.

Conceptual Planning

- Manipulating the amount of conceptual planning, i.e. grammatical role assignment (Griffin & Bock, 2000)
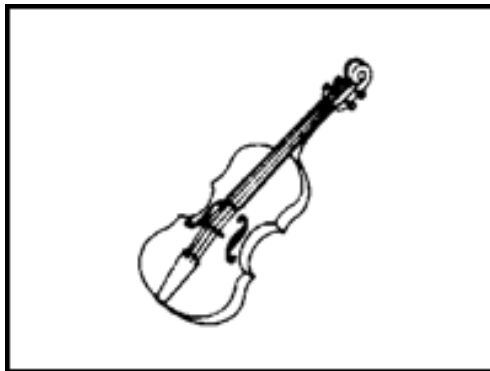

Active event

Spoken Sentence Production

- Manipulating the ease of name retrieval by high and low frequency items (during access to the phonological form of the object name).
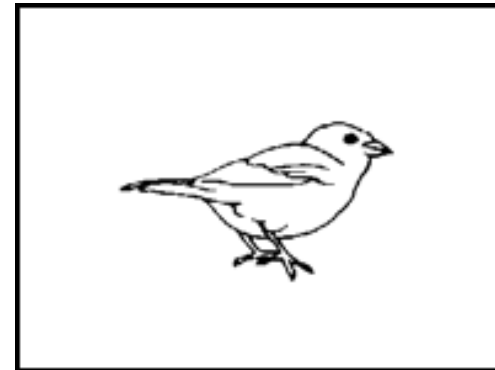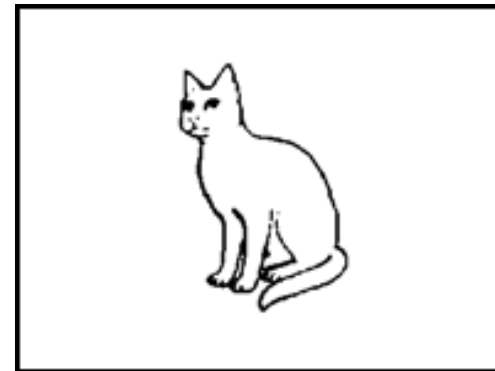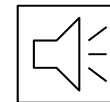
Spoken Sentence Production

- Picture-word interference tasks: picture presentation combined with auditory presentation of a semantically or phonologically related distractor word
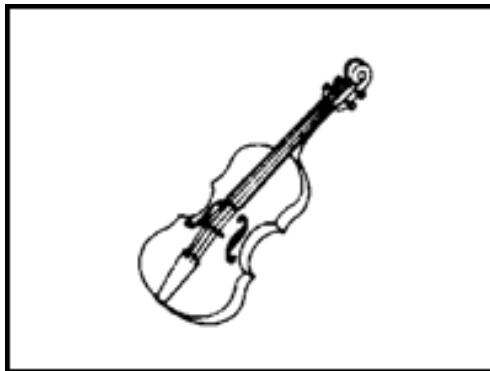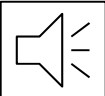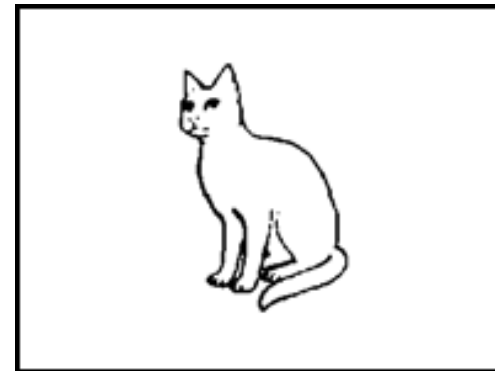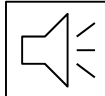
 /gitarə/

 /hʊnt/

Spoken Sentence Production

- Picture-word interference tasks: picture presentation combined with auditory presentation of a semantically or phonologically related distractor word

 /faɪɡə/

 /matraʃə/

Project idea

- Pilot study

- Preliminary results

Pilot study

- Picture description task: Naming of two to four objects

- simple vs. complex Noun Phrases:
  - simple/simple: *The tree is above the star.*
  - simple/complex: *The fish is below the tree and the star.*
  - complex/simple: The ring and the tree are above the fish
  - complex/complex: *The tree and the star are below the fish and the ring.*

Pilot study: Sample Trial
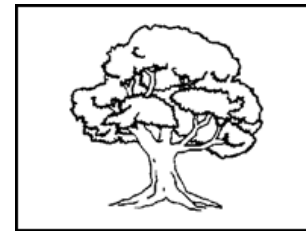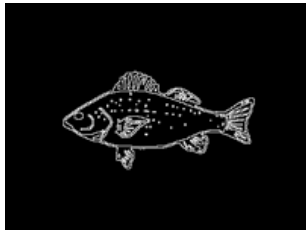
The fish and the ring are above the tree.

Pilot study

- Experiment 1: pictures disappear as soon as typing starts
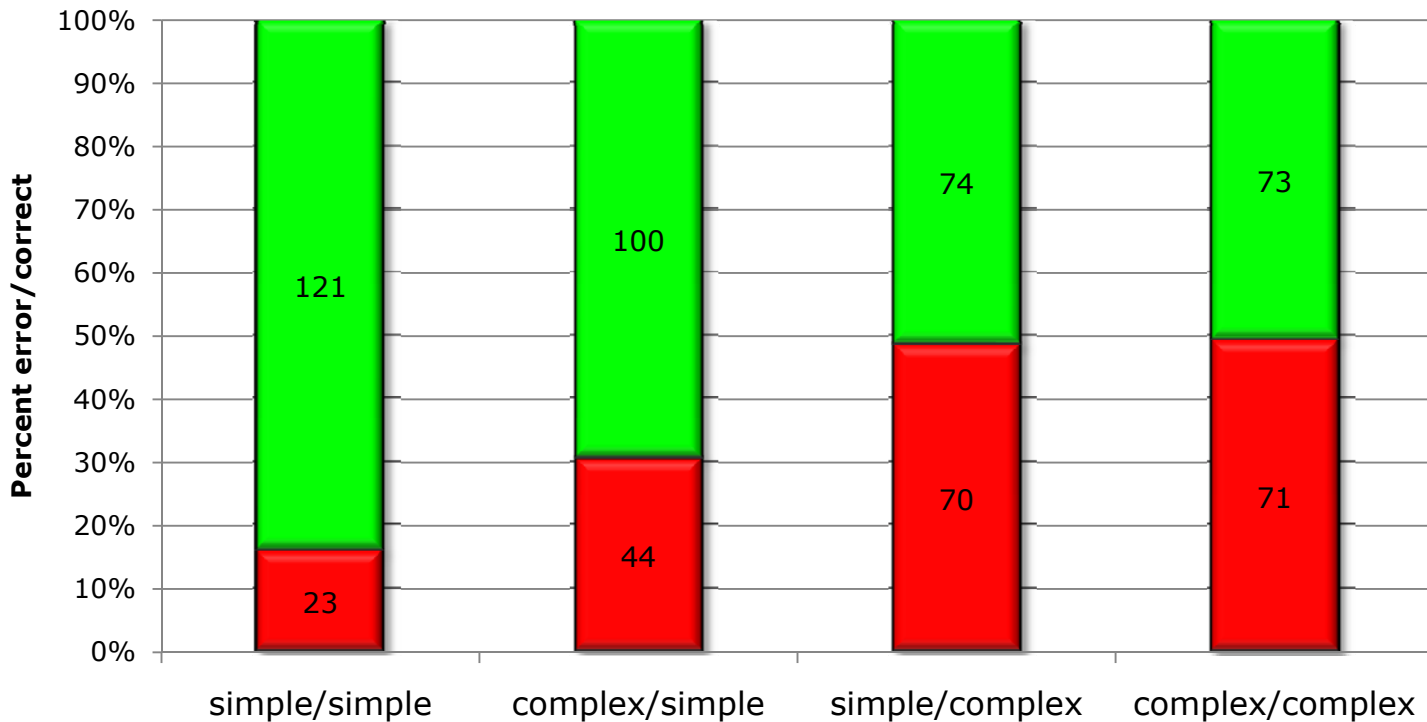- Experiment 2: pictures stay

Preliminary Results

Error analysis:

- Errors concerned:
  - typing errors
  - confusion of above/below
  - confusion of object order (in complex condition)
  - replacement of one or more objects
  - omission of one or more objects
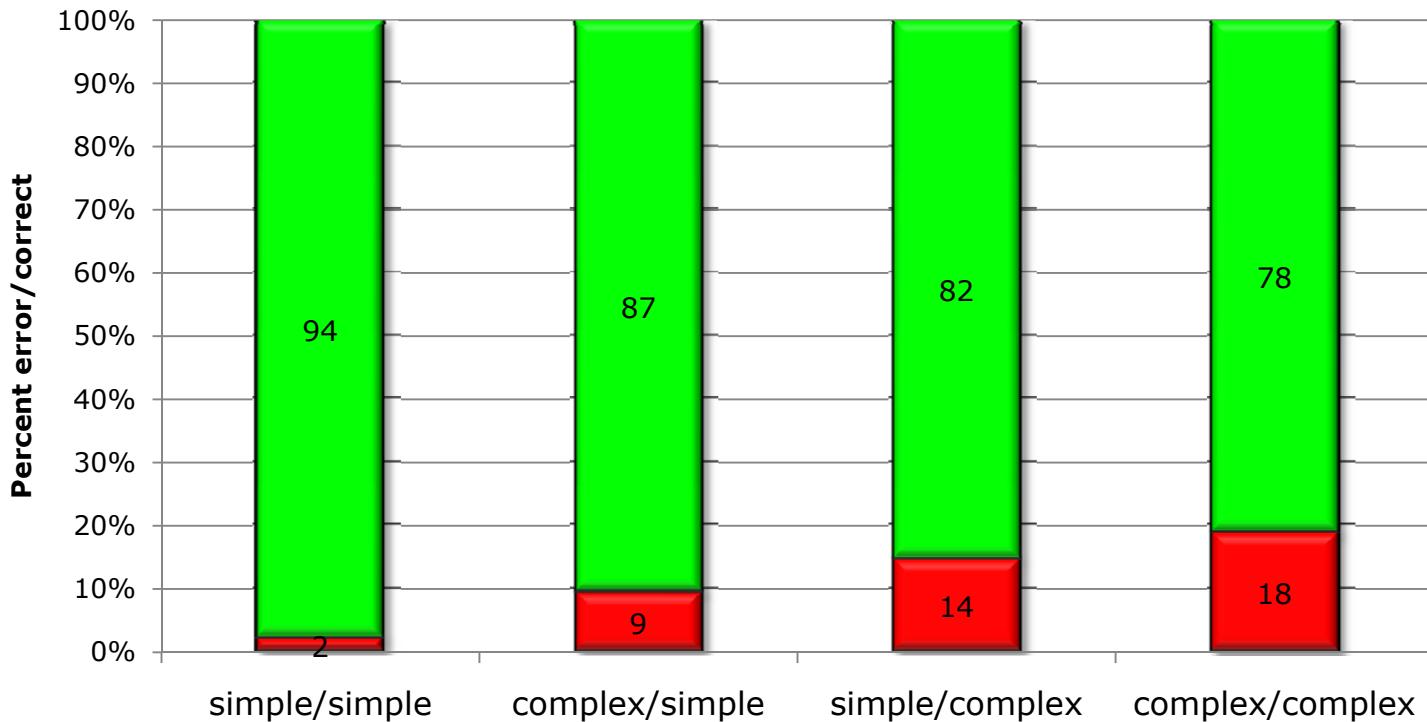 - addition of one or more objects

Error analysis
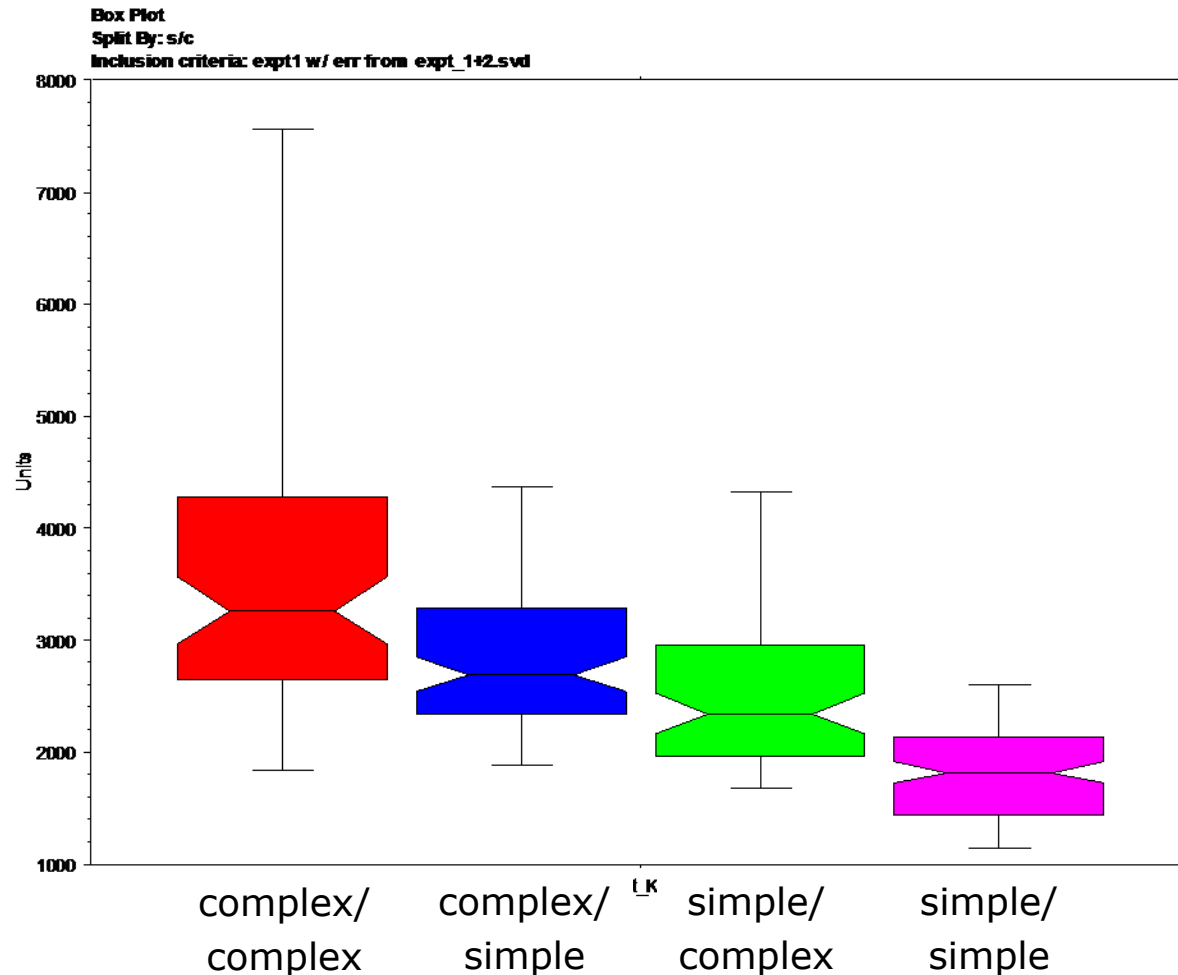
Experiment 1 (pictures disappear)

Error analysis

Experiment 2 (pictures stay)

Expt. 1: RT First Keystroke

Expt. 2: RT First Keystroke

Box Plot
Split By: s/c
Inclusion criteria: expt2 from expt_1+2.svd