



Did you see what you said first?

Influences of visual priming on eye-movements and sentence structure



Overview

- Introduction
(basics, studies, problems)
- Empirical Question
- Pretest
- Experiment



Introduction

Basic assumption:

There is a link between eye-movements and language production!

Measuring eye-movements thus could give rise to underlying (production) processes.

Possible measures to use:

viewing time,
amount of fixations,
fixation duration,
first fixation,
eye-voice span...

Introduction

One link between eye-movements and language production is the tendency of people to look at what they are talking about (if possible).

Earlier studies have shown that lexical access seems to take place during the fixation of an object (Griffin, 2001; Meyer, Sleiderink & Levelt, 1998; ...)

Even the initiation of the phonological encoding process seems to happen during fixation.

--> This can be interpreted in favour of a supportive effect of fixating an object for naming it.

Introduction

This supportive effect of fixating an object does not fit into existing models of language production:

- Models so far mostly account for isolated speech.
- Context is usually interpreted as linguistic context (given information is linguistically given).
- Visual stimuli activate concepts which then activate wordforms.

--> It is thus unclear why people keep looking at an object until its phonological form is activated.



Introduction

One way to clarify the influence of visual input on production processes is to test the strength of the beneficial effect.

In V.d. Meulen, Meyer & Levelt (2001), people did look significantly less often at already familiar objects.

Still, the percentage of looks was unexpectedly high.

However, in their experiments, subjects did already know that they would see an object repeatedly and which of the objects this would be.

Introduction

The repeated use of pictures (giving some sort of visual context in a way) might be comparable to given linguistic context.

In Prat-Sala & Branigan (2000) subjects had to answer questions using the information given in a picture. Each picture was preceded by an auditive preamble in which the entities of the picture were introduced.

Example:

“There was this old red scooter standing in a playground near a swing, with rusty wheels and scratched paint. What happened?”

(followed by the picture of swing hitting a scooter)

Introduction

The results of Prat-Sala & Branigan (2000) showed that (linguistic) context affected the order of following production; relatively more salient entities were more likely to appear in an early sentence position.

This effect seemed to be due to two types of accessibility:

- an inherent accessibility (human entities are more accessible than non-human entities) and
 - a derived accessibility (context increases accessibility)
- which are additive.



Experiment

Empirical Questions:

Does the presentation of a visual stimulus (a prime) affect conceptual accessibility and thus word order?

Does fixating an object support word retrieval and lead to more looks to primed objects?



Experiment



Experimental design:

Presentation of black and white drawings depicting an action between a human and an animal.

Thematic role of entities was varied.

Example:

a tourist pulling a donkey

a donkey pulling a tourist



Pretest

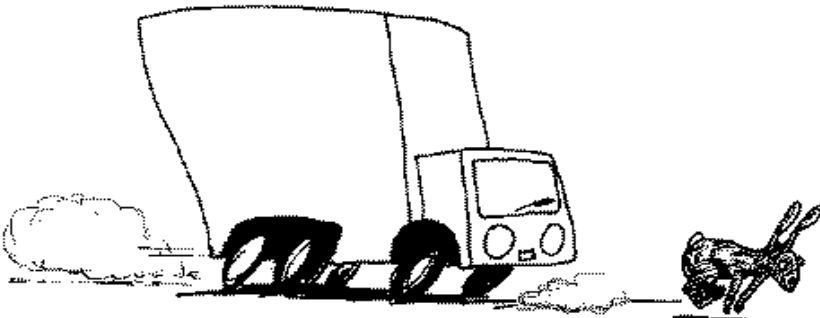
Experimental design:

To ensure identical naming by all subjects, a pretest was administered.

In this pretest, 36 subjects described the action pictures in written form. The test was performed using a web based experimental tool (webexp).

Pretest

Experiment



jagen

|

18 von 23

The image is a pretest slide for an experiment. It features a central line drawing of a truck with a large canopy, moving from left to right. A rabbit is running away from the truck to the right. Below the drawing, the German verb 'jagen' (to hunt) is written. At the bottom of the slide, there is a horizontal bar with a vertical line at the left end, and the page number '18 von 23' is located in the bottom right corner.



Pretest

Results of pretest:

Out of 21 action pictures, 12 turned out to be reliable.

An interaction between agent status of the human entity and sentence structure was found: When subjects formulated passive constructions, it was significantly more often a human patient condition that was described.

Experiment

Experimental design:

Each picture was preceded by a prime showing either the agent or the patient of the following scene.

Example:

picture of a tourist

picture of a tourist pulling a donkey

or

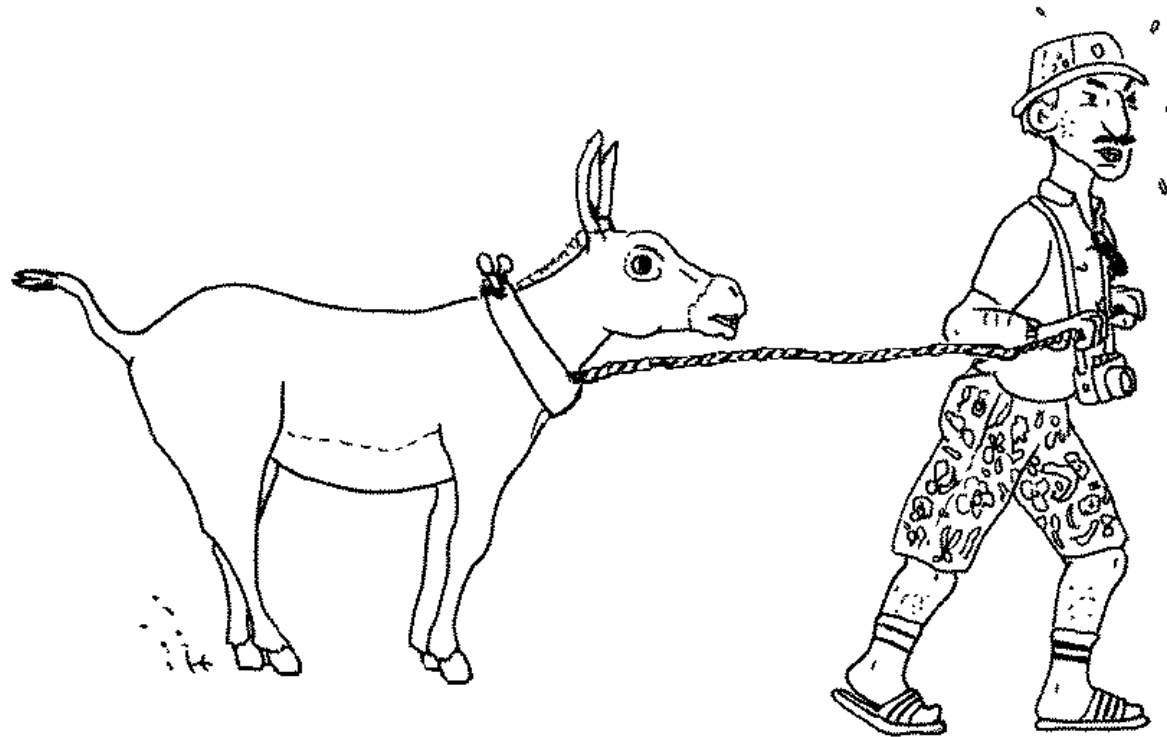
picture of a tourist

picture of a donkey pulling a tourist

Example



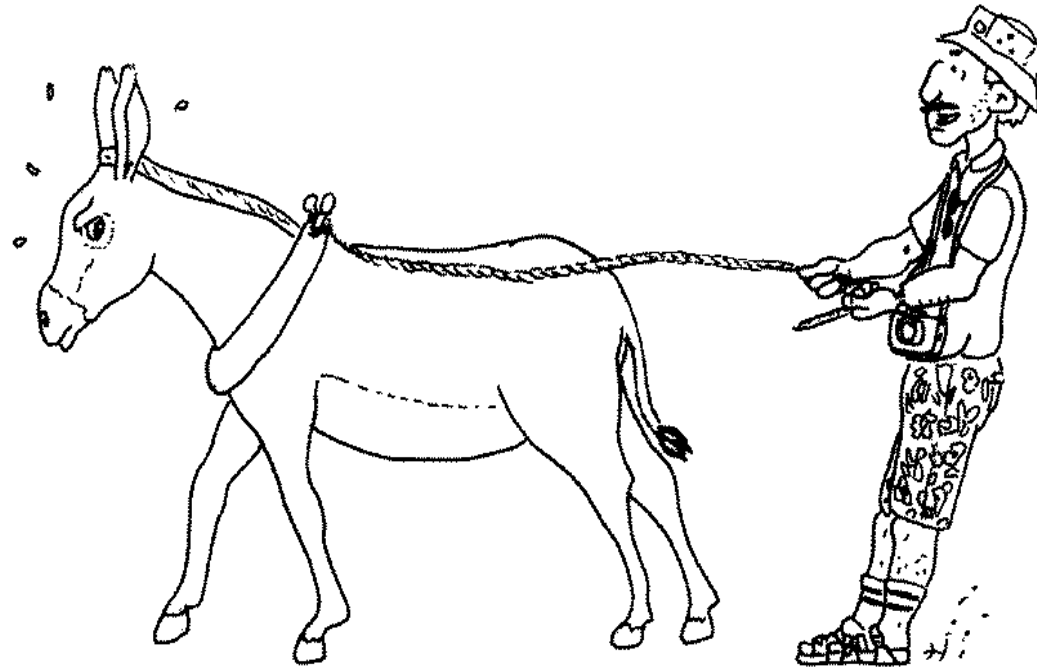
Example



Example



Example





Experiment

Experimental design:

Additionally to the thematic roles, the picture orientation was varied (all action pictures were mirrored).

Referring nouns to entities on each picture were matched with respect to the amount of syllables and frequency (in CELEX).



Experiment

Analyses:

Subjects' eye movements and utterances were recorded using the eye-tracker and a mini-disc recorder respectively.

Eye-movements (fixations and durations), onset latencies and content of utterances were analysed.



Experiment

Results:

The data of 12 subjects was exemplarily analysed (so no serious significances can be reported yet).

To make interpretations easier, only some of these preliminary results will be shown here.

Experiment

		human	animal	sentence	firstnp
Human agent (l-r)	no prime				SVO h
	human prime				SVO h
	animal prime				OVS a
Human agent (r-l)	no prime				SVO h
	human prime				SVO h
	animal prime				OVS a
Human patient (l-r)	no prime				pass h
	human prime				pass h
	animal prime				SVO a
Human patient (r-l)	no prime				pass h
	human prime				pass h
	animal prime				SVO a

Experiment

		human	animal	sentence	firstnp
Human agent (l-r)	no prime				h h
	human prime				h h
	animal prime				h a
Human agent (r-l)	no prime				h h
	human prime				h h
	animal prime				h a
Human patient (l-r)	no prime				a h
	human prime				h h
	animal prime				h(a) a
Human patient (r-l)	no prime				h/a h
	human prime				h(a) h
	animal prime				h/a a

Experiment

		human	animal	sentence	firstnp
Human agent (l-r)	no prime			2,2	h h
	human prime				h h
	animal prime				h a
Human agent (r-l)	no prime			4,6	h h
	human prime				h h
	animal prime				h a
Human patient (l-r)	no prime			2,3	a h
	human prime				h h
	animal prime				h(a) a
Human patient (r-l)	no prime			4,0	h/a h
	human prime				h(a) h
	animal prime				h/a a

Experiment

		human	animal	sentence	firstnp
Human agent (l-r)	no prime	2,5	4,7	2,2	h h
	human prime	2,4	6,1	1,8	h h
	animal prime	3,6	5,2	3,4	h a
Human agent (r-l)	no prime			4,6	h h
	human prime				h h
	animal prime				h a
Human patient (l-r)	no prime			2,3	a h
	human prime				h h
	animal prime				h(a) a
Human patient (r-l)	no prime			4,0	h/a h
	human prime				h(a) h
	animal prime				h/a a

Experiment

		human	animal	sentence	firstnp
Human agent (l-r)	no prime	2,5	4,7	2,2	h h
	human prime	2,4	6,1	1,8	h h
	animal prime	3,6	5,2	3,4	h a
Human agent (r-l)	no prime			4,6	h h
	human prime				h h
	animal prime				h a
Human patient (l-r)	no prime			2,3	a h
	human prime				h h
	animal prime				h(a) a
Human patient (r-l)	no prime	5,0	4,9	4,0	h/a h
	human prime	3,9	4,5	3,0	h(a) h
	animal prime	2,8	3,4	2,1	h/a a

Experiment

		human	animal	sentence	firstnp
Human agent (l-r)	no prime	2,5	4,7	2,2	h h
	human prime	2,4	6,1	1,8	h h
	animal prime	3,6	5,2	3,4	h a
Human agent (r-l)	no prime	5,4	6,8	4,6	h h
	human prime	4,4	6,0	3,6	h h
	animal prime	3,0	4,5	2,6	h a
Human patient (l-r)	no prime	4,3	2,7	2,3	a h
	human prime	3,8	5,3	3,3	h h
	animal prime	4,4	5,8	3,6	h(a) a
Human patient (r-l)	no prime	5,0	4,9	4,0	h/a h
	human prime	3,9	4,5	3,0	h(a) h
	animal prime	2,8	3,4	2,1	h/a a

Experiment

Analyses of eye-movements:

In no-prime conditions, the eye-movements seem also to be guided by a left-to right “reading preference”.

This preference seems to interact with a tendency to fixate the agent first.

In priming conditions, the pattern of first fixations is not totally consistent.

In most conditions, the primed entity is fixated first.

But it is yet unclear what happens after this first fixation (the author didn't work hard enough to find this out until now...).

Interpretation

Interpretation of preliminary results:

Subjects seem to have a preferred way of describing pictures going from left to right.

This tendency is (until now) only partly reflected in the first fixations of the subjects.

Further on, subjects seem to be sensitive to priming.

Priming the human entity leads to faster naming latencies and priming the animal seems to inhibit production.

Interpretation

Interpretation of preliminary results:

This inhibition might be interpreted in favour of a structural preference which is disturbed by the prime.

Lexical entry of the primed entity is still activated, but, because of the structural preference, the entry for the human entity gets activated from conceptual level. This leads to competition and thus delayed utterance onsets.

The question remains on which level the visual prime accesses the language process (conceptual, lexical) and how the effect of priming and of the connection between eye-movements and language production could be integrated in a model.