

# Experimental Pragmatics

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UCL Linguistics Short Courses 25/26

Negation Processing I

Shenshen Wang

✉ [shenshen.wang@ucl.ac.uk](mailto:shenshen.wang@ucl.ac.uk)

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# Outline

- Findings in Negation Processing
- Current Accounts of Negation Processing
- The Dynamic Pragmatic Account and some empirical evidence

# Today's Scope

A word ? (e.g., unhappy, non-words)

A phrase? (e.g., not too far away)

or a sentence? (e.g., the coat isn't blue.)

Sentential negation: S is not P.

In classical logic, negation changes the truth value of a proposition.

-If  $p$  is true, then  $\neg p$  is false.

In natural language, for example, 'It is not cheap'...

# Negation processing: Two Main Findings

(1) Negative sentences are harder to process than positive sentences.

Positive: The window is open.

Negative: The window isn't open.

(2) Processing widely assumed to proceed via the positive argument of negation.

- The window isn't open.
- [The window is open]
- Not [The window is open]

# Finding 1: Negation is difficult to process

Negation-related difficulty has been found in various tasks.



## Sentence Completion Tasks

(Wason, 1961):

\_\_\_ is an even/odd number.

\_\_\_ is not an even/odd number.

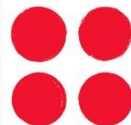
## Sentence Verification Tasks

(Mckinstry et al., 2008; Wales & Grieve, 1969; Wason, 1961):

An elephant is/is not a mammal.

(Carpenter & Just, 1975; Clark & Chase, 1972; Gough, 1965; Trabasso & Rollins, 1971):

The dots are not red.



## Memory Recall Tasks

Cornish & Wason (1970):

**Affirmative:** It is bright/tall.

**Negative:** It is not bright/tall.

Howard (1975):

Memory set:

WDT SR O CLMZ

Recall probe:

**Plus condition:** SR

**Minus condition:** SR

## Logical Reasoning Tasks

Prado & Noveck (2006):

**If there is an H, then there is not a square.**

**If there is not an H, there is a square.**

Longer response time,  
More errors...

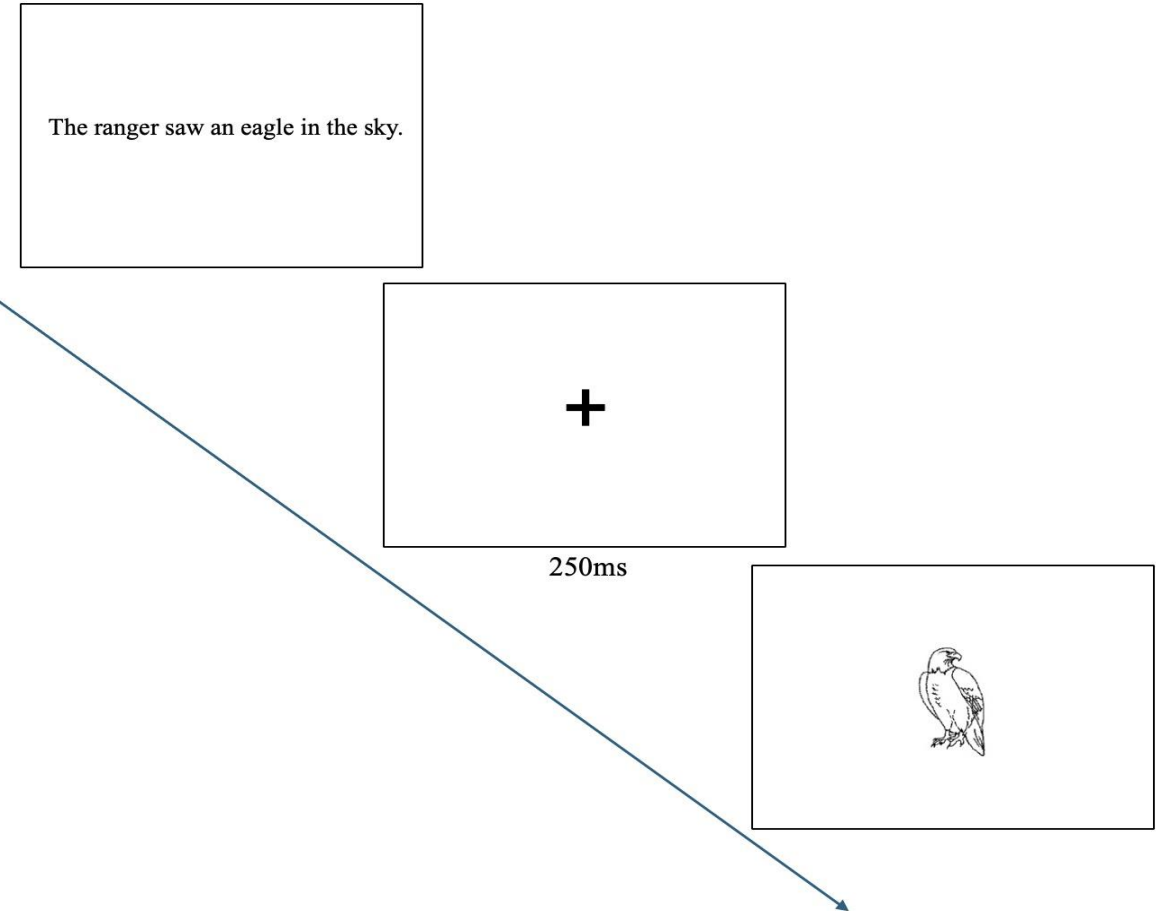
# Finding 2: The Presence of the Positive Argument

## Image Probe Recognition Task

Zwaan et al. (2002)

The ranger saw an eagle in the sky/nest.

$$RT_{\text{match}} < RT_{\text{mismatch}}$$



# Finding 2: The Presence of the Positive Argument

## Image Probe Recognition Task

Kaup et al. (2007)

There was an eagle in the sky.

There was no eagle in the sky.

### Depicted Situation

Negated

Other



➤ For affirmatives:  
 $RT_{\text{match}} < RT_{\text{mismatch}}$

➤ For negatives:  
 At short interval,  
 $RT_{\text{match}} > RT_{\text{mismatch}}$

At longer interval,  
 $RT_{\text{match}} < RT_{\text{mismatch}}$

# Finding 2: The Presence of the Positive Argument

## Word Probe Recognition Task

Hasson and Glucksberg (2006)

My brother is a rock.

My brother is not a rock.

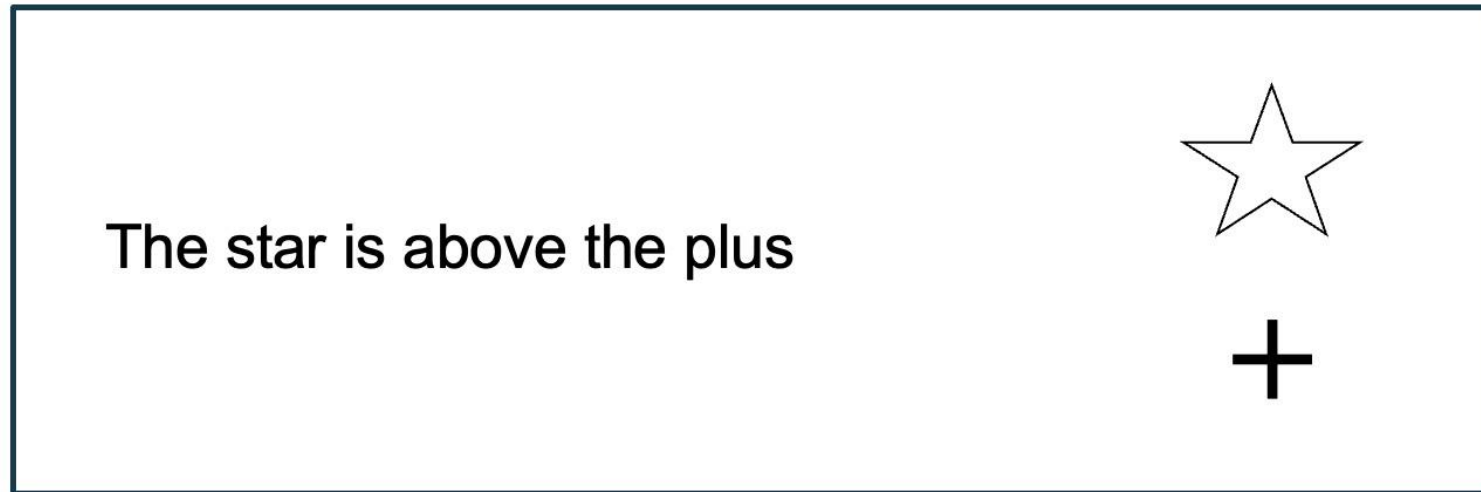
**strong**

- For positive metaphors, RT to vehicle-consistent words were facilitated at all delays;
- For negative metaphors, there were facilitation initially but it was gone at longer delay.

# Finding 2: The Presence of the Positive Argument

## Sentence-Picture Verification Task

Clark and Chase (1972)



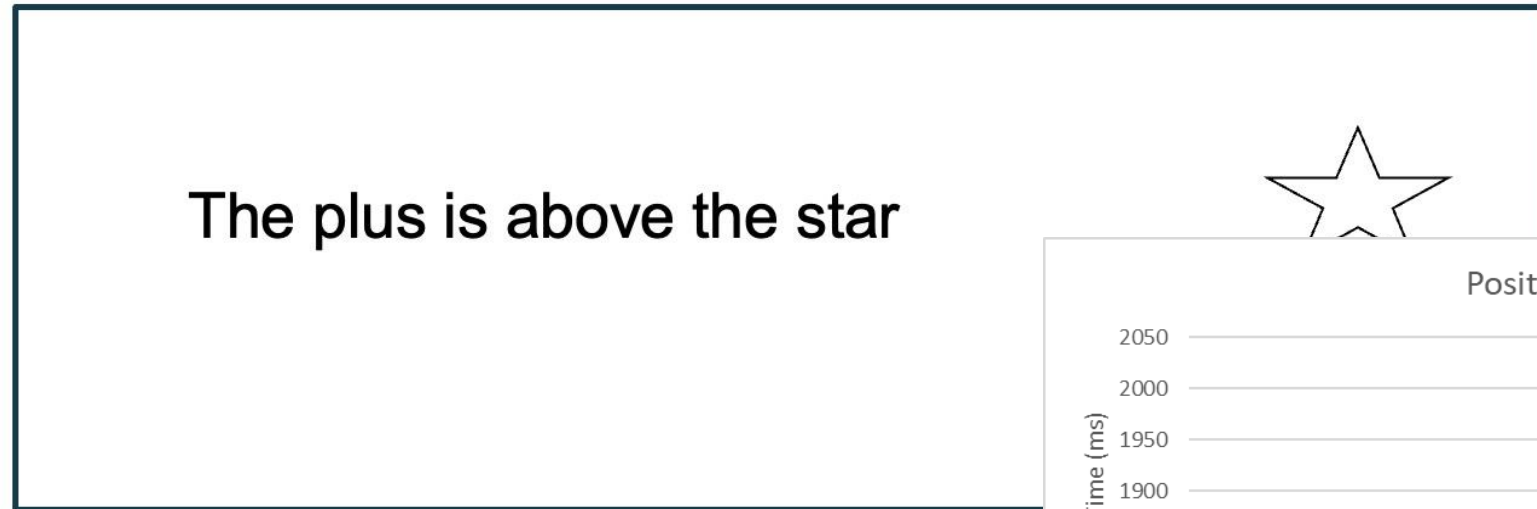
**True Affirmative (TA)**

# Finding 2: The Presence of the Positive Argument

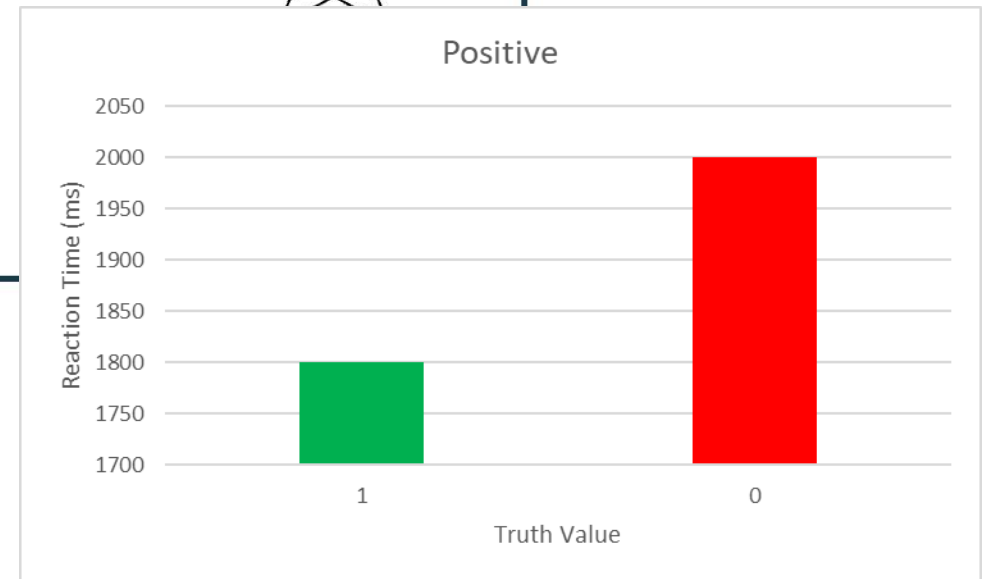
## Sentence-Picture Verification Task

Clark and Chase (1972)

The plus is above the star



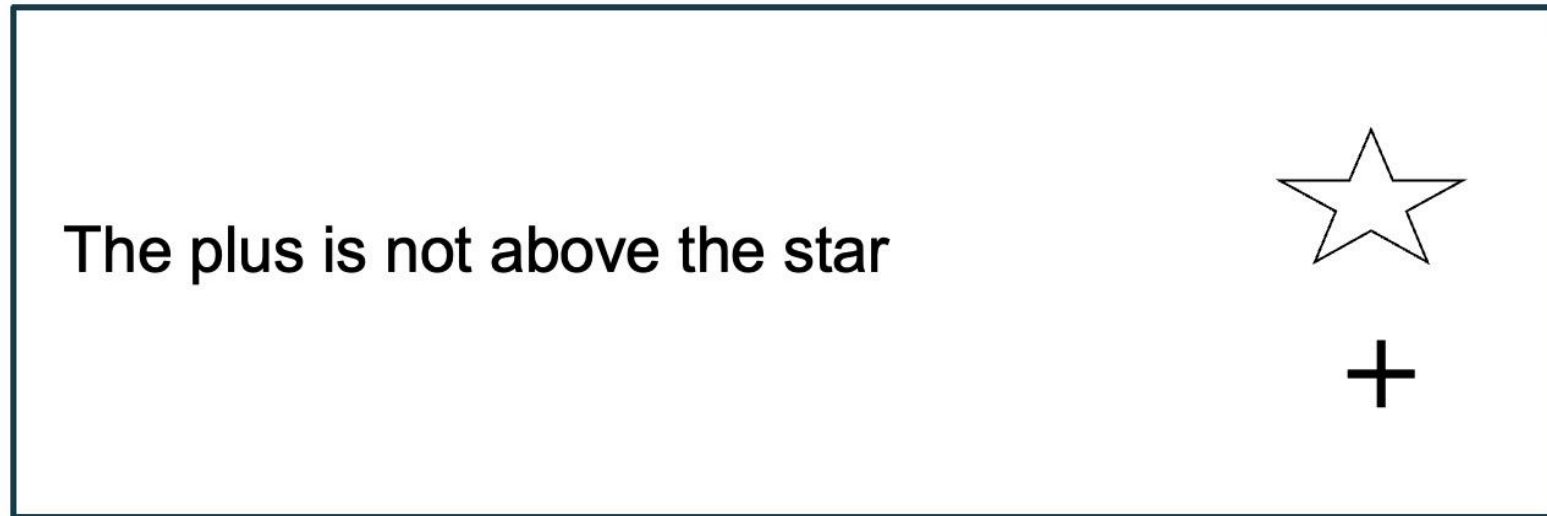
**False Affirmative (FA)**



# Finding 2: The Presence of the Positive Argument

## Sentence-Picture Verification Task

Clark and Chase (1972)

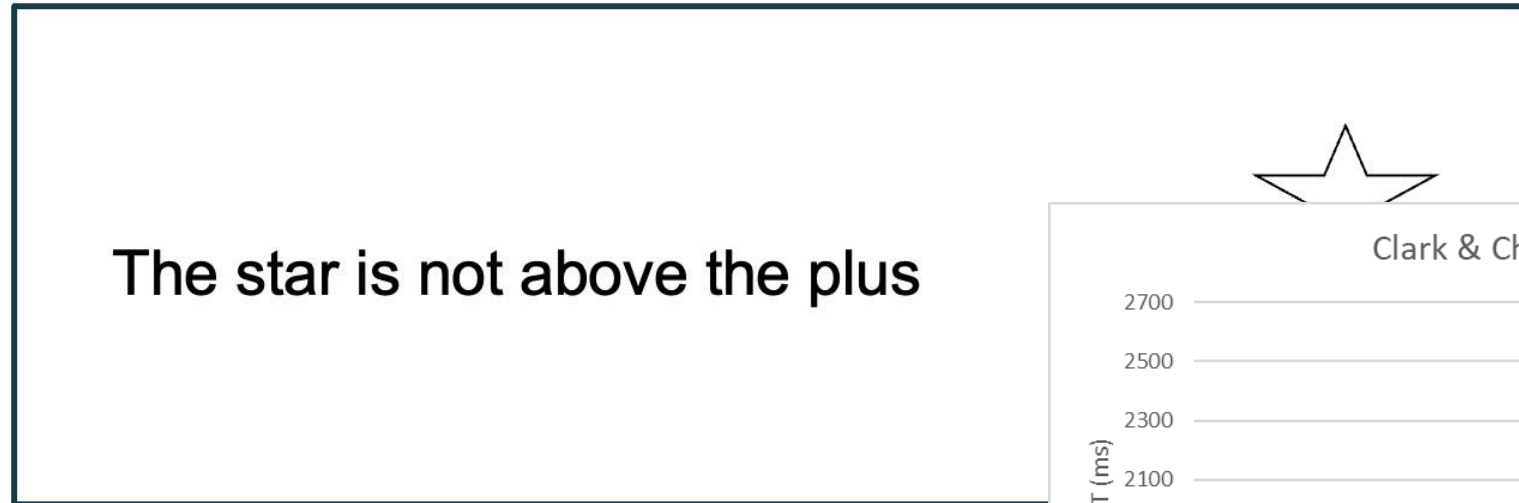


**True Negative (TN)**

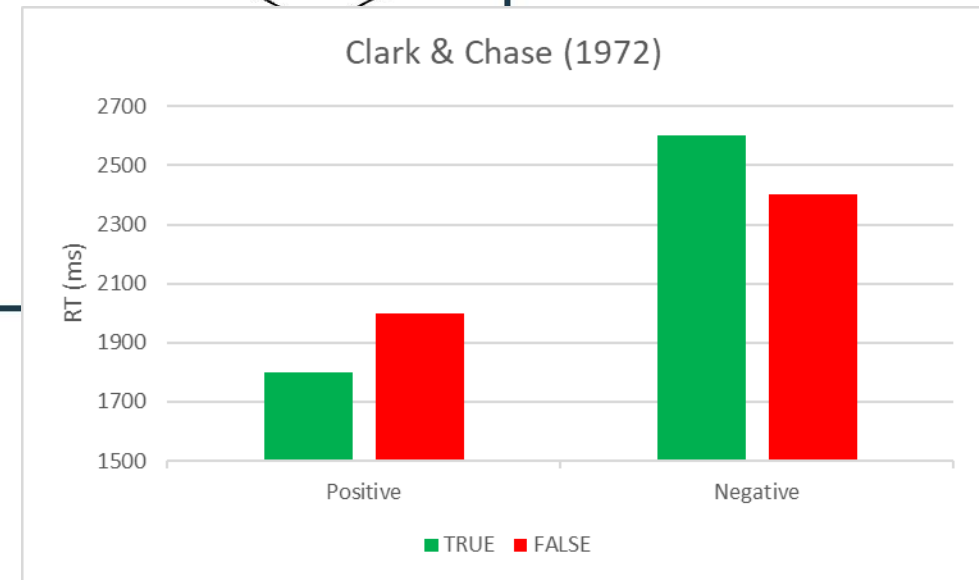
# Finding 2: The Presence of the Positive Argument

## Sentence-Picture Verification Task

Clark and Chase (1972)



**False Negative (FN)**



# Finding 2: The Presence of the Positive Argument

## Sentence Verification Task

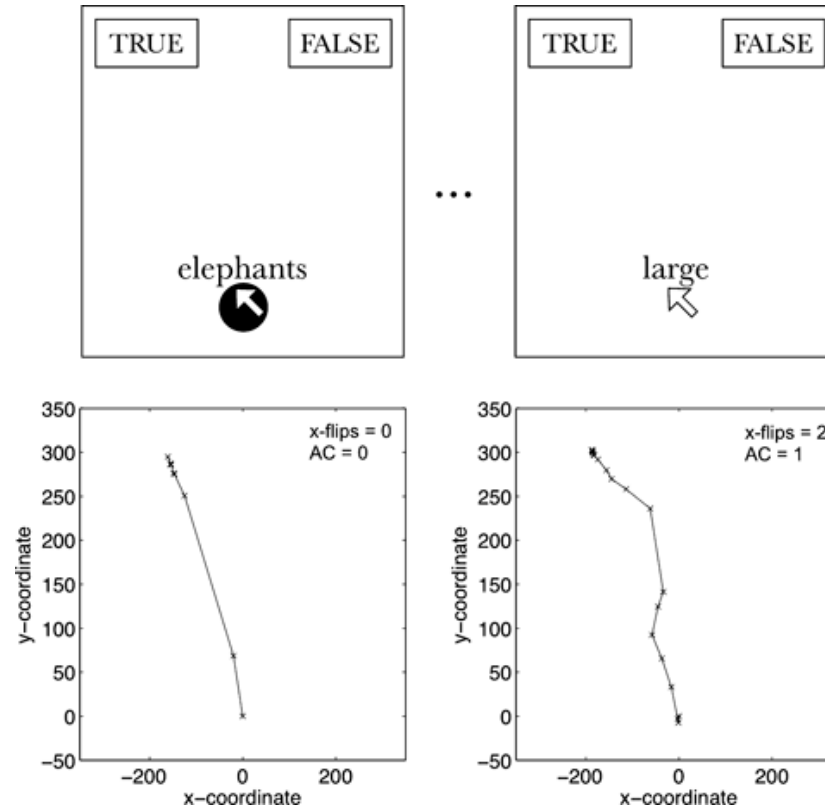
Dale and Duran (2011) using mouse-tracking

TA: Elephants are large.

FA: Elephants are small.

TN: Elephants are not small.

FN: Elephants are not large.

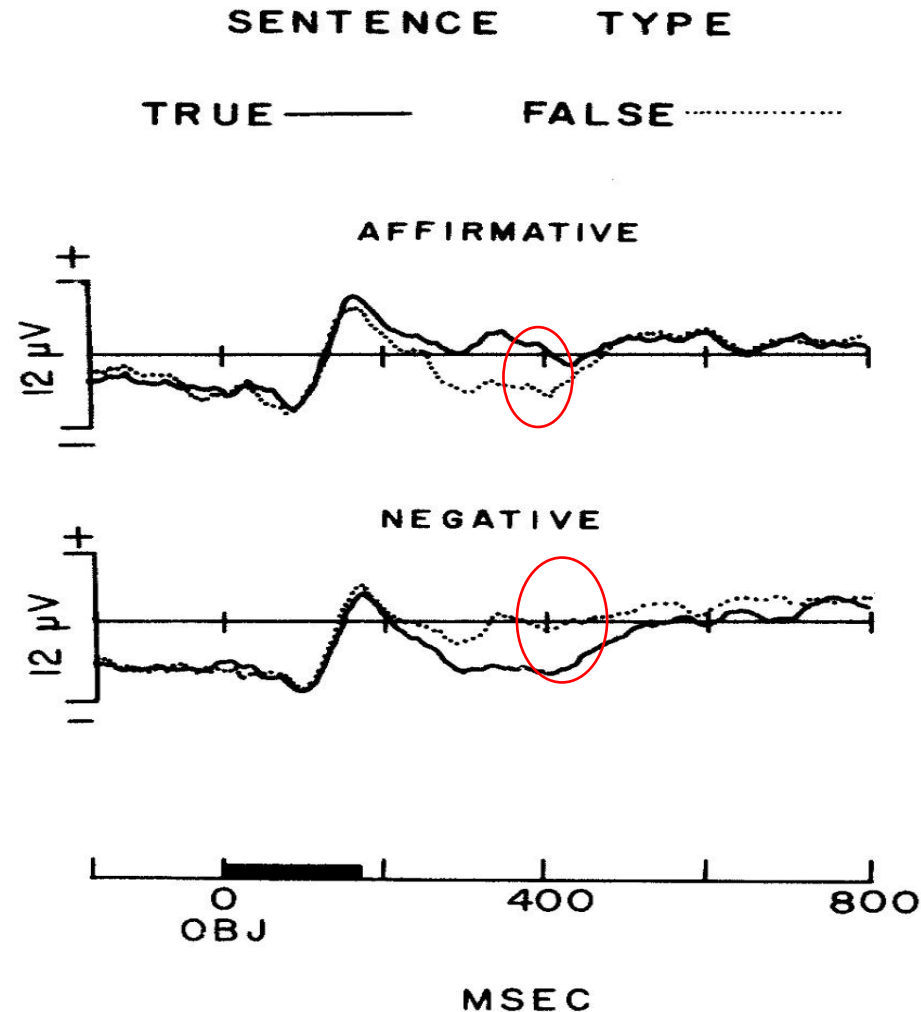


- Negative sentences involved more directional flips between T and F.
- The deviation of flips was larger in negatives.
- There were less flips in TA than FA, while less flips in FN than TN.

# Finding 2: The Presence of the Positive Argument

## ERP Study

Fischler et al. (1983)



N400 effect:

➤ Affirmatives: FA > TA.

➤ Negatives: FN < TN.

TA: A robin is a bird.

FA: A robin is a tree.

TN: A robin is not a tree.

FN: A robin is not a bird.

# Current Accounts of Negation processing

Q1: why are negative sentences harder to process than affirmative sentences?

Q2: why is the representation of the positive argument often involved?

## **Composite approach:**

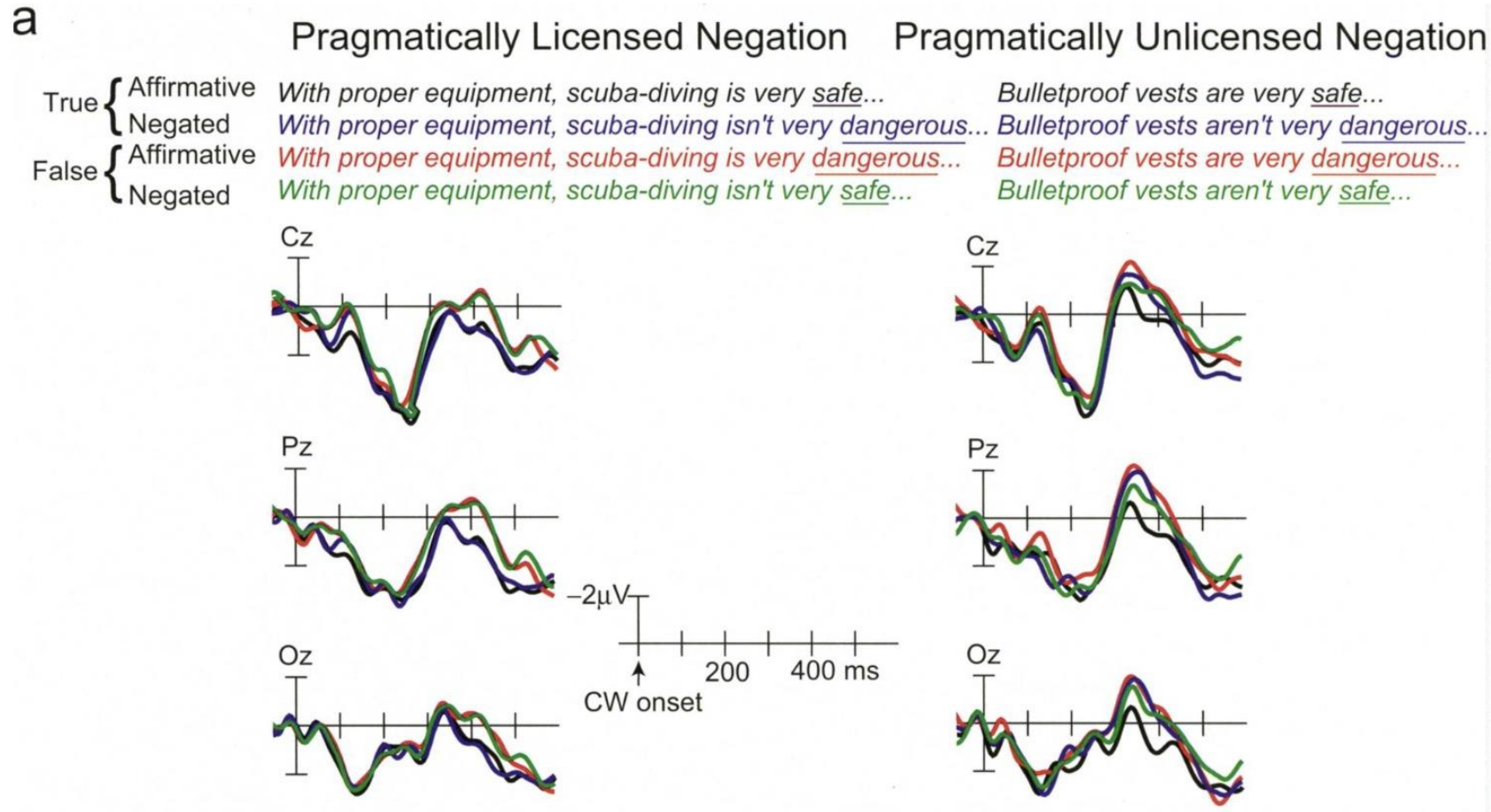
prejacent represented separately by comprehension processes.

Clark & Chase (1972); Carpenter & Just (1975); Hasson & Glucksberg (2006); Kaup et al. (2006; 2007), etc.

-First represent the argument of negation, then 'negate' it.

# Promising! But...

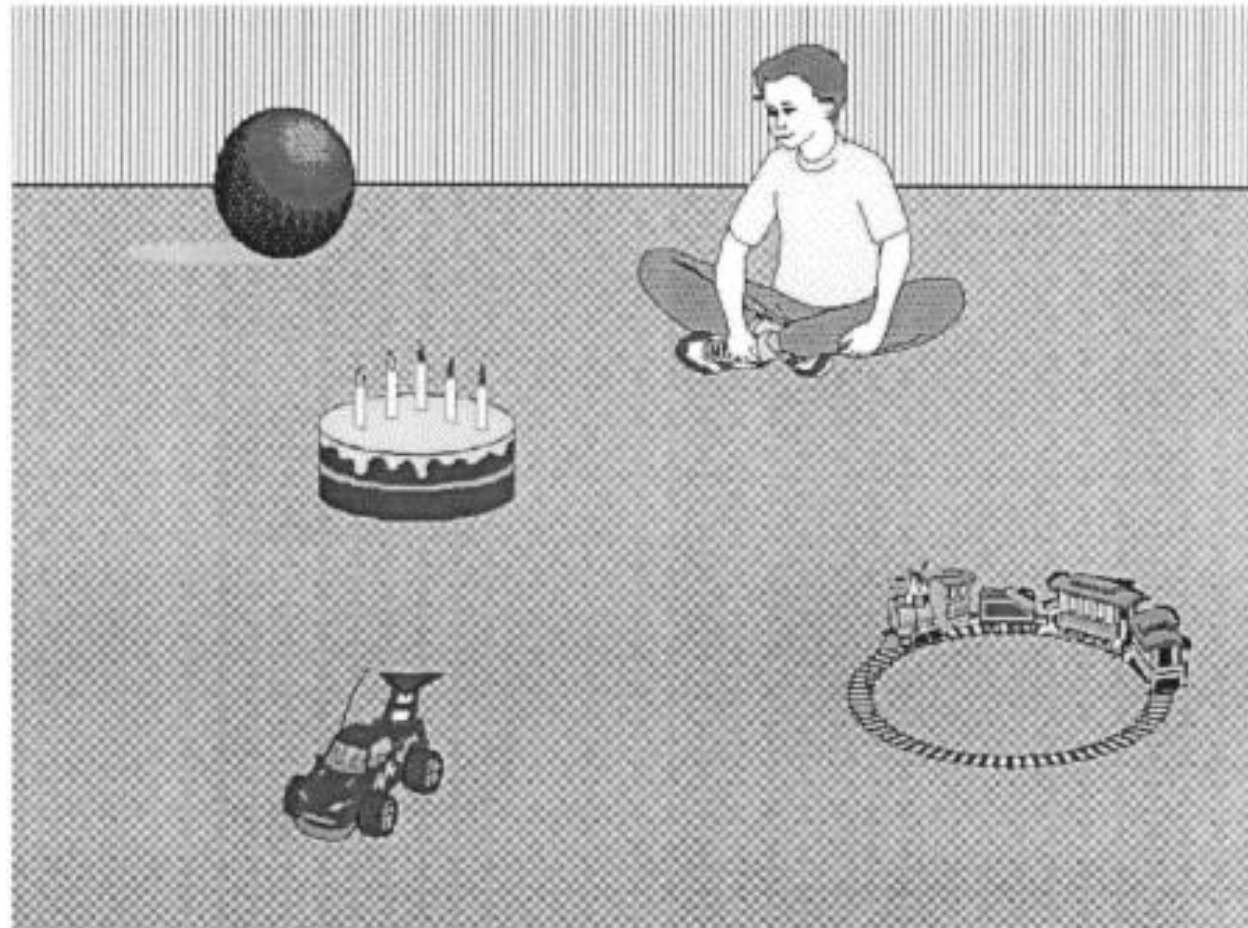
Nieuwland and Kuperberg (2008)



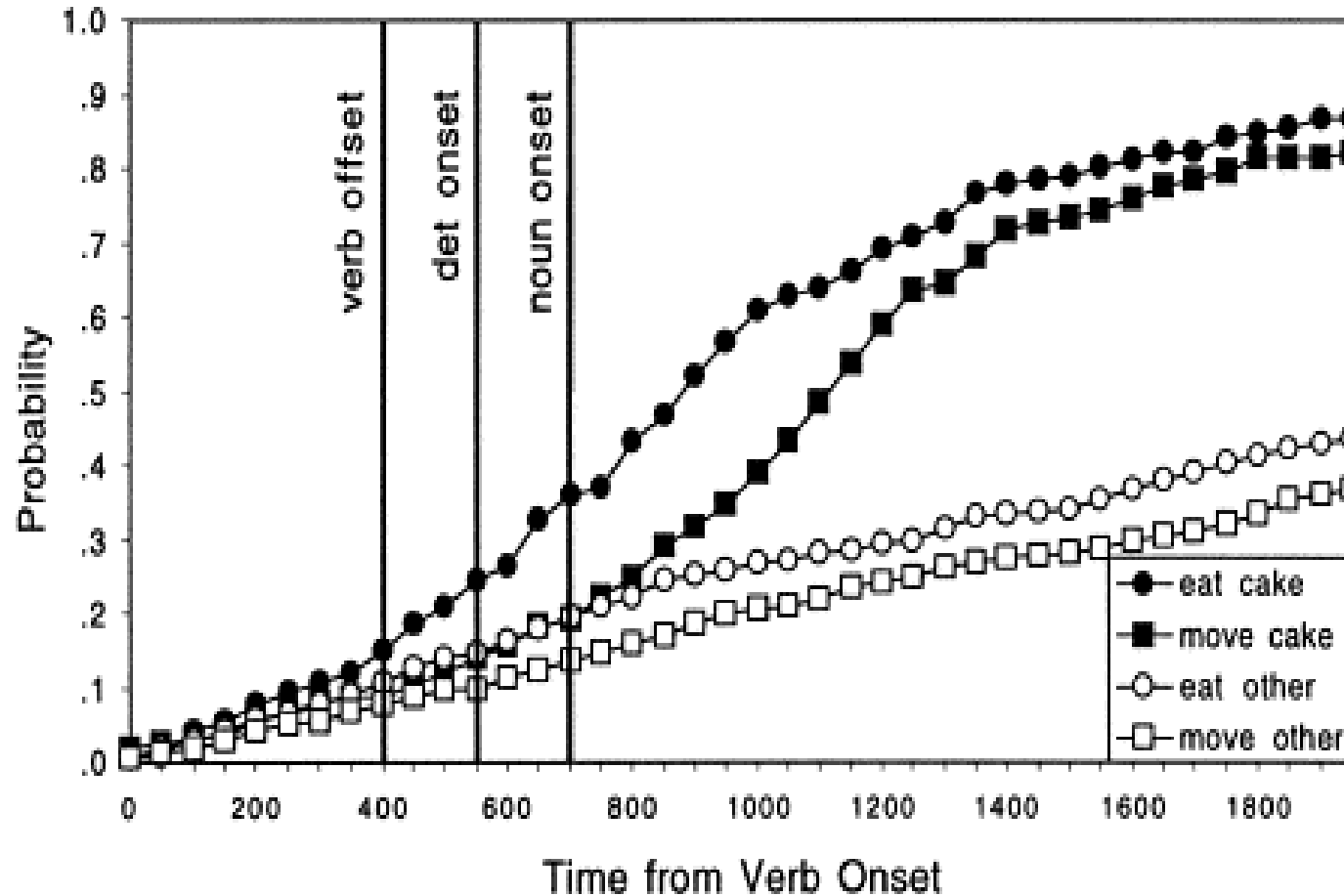
With felicitous context, TN didn't give rise to a greater N400 effect!

# Altmann & Kamide (1999) – ‘Look and Listen’

The boy will eat/move the cake.



# Altmann & Kamide (1999) – ‘Look and Listen’



Eye-gaze bias shows that participants anticipate target (cake) more after ‘eat’ compared to ‘move’.

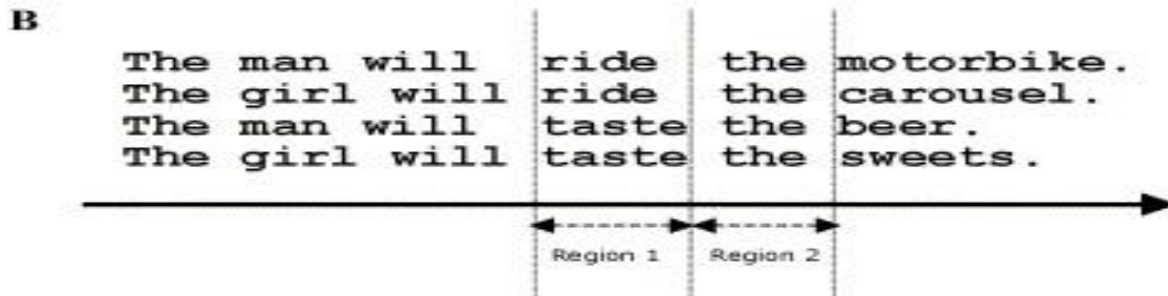
# Kamide et al (2003) – Not just linguistic context.



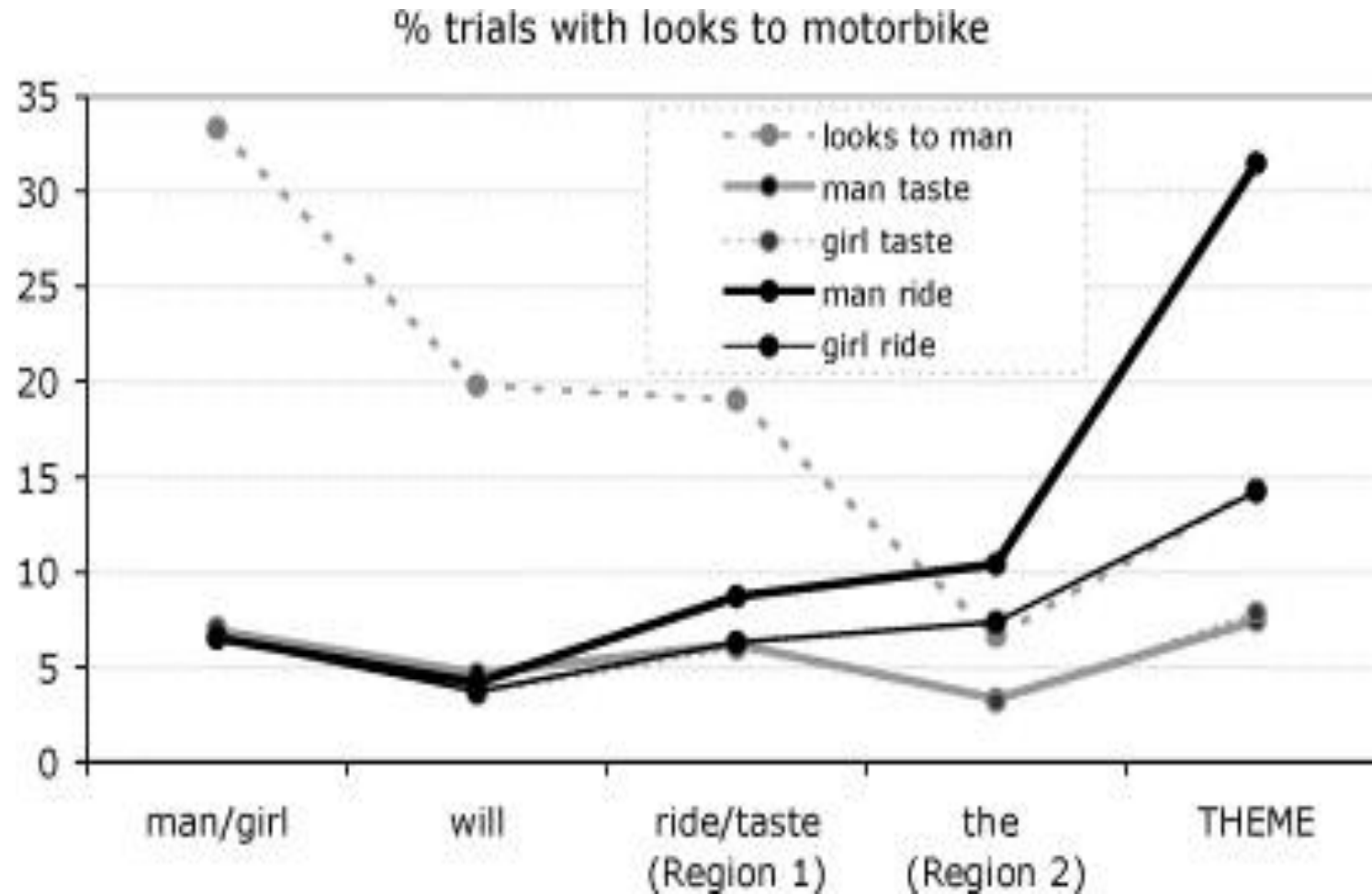
# Kamide et al (2003) – Not just linguistic context.



- Participants cannot predict target based on linguistic context alone.
  - ‘World knowledge’ required.



# Kamide et al (2003) – Not just linguistic context.



# Contextual Account

‘Contextualist’ approaches seek to account for cost/delay in terms of the need for a context for negation (Wason 1965; Horn 1978; etc.).

However,

Negation is not alone in requiring special contextual support.

-what is it about the contextual demands of negative sentences that make them particularly difficult to process especially presented out of blue?

The positive argument of negation is often, although not always, represented during early stages of negation processing.

-the lack of an explanation from the contextual account...

Thank you :)

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