

# Is Language Logical, a Study of Disjunction Scope Parameters

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## Introduction

In language, **negated disjunctions** (Not A OR B) can be given **two readings**.

- a) the negation takes the scope over the disjunction (negation wide scope reading)
- b) Disjunction wide scope reading

(1) I don't like apples or pears.

Possible readings :

a)  $\neg_{liking} (Apples \vee Pears)$   
 $\Leftrightarrow (\neg_{liking} Apples) \wedge (\neg_{liking} Pears)$

b)  $\neg_{liking} Apples \vee Pears$   
 $\Leftrightarrow (\neg_{liking} Apples) \vee (\neg_{liking} Pears)$

- Reading a) true only if both propositions are false. Reading b) true when one or both propositions are true. Truth values of a) more restrictive than those of b). Following the semantic subset principles : **reading a) is acquired first** by children regardless of reading in adult language. (Crain 2012))
- **Reading b)** only available reading when **the disjunction is a positive polarity item (PPI)**, ex. Japanese, Mandarin Chinese. Children acquire the PPI-hood of the disjunction and then access reading b). (Crain 2012, Goro et al. 2004)
- Otherwise, reading a) is favored, ex. English. (Crain 2012)

In French, both readings accessible. The PPI-hood of the disjunction can not solely be accountable for the wide scope of the disjunction. (Lungu et al. (unpublished))

Han et al. 2004 highlighted a link between scope and focus. The positive polarity of the disjunction related to focus in Hungarian (Szabolcsi 2002)

## Hypothesis :

Focus on the disjunction causes it to scope out of the negation in contexts where the negation would normally take a wide scope.

## Pre-Experiment :

A pre-experiment was conducted to allow us to posit that the test items used in the main experiment would be given a negation wide scope reading by competent adult French speakers.

**Design** (adapted from Goro et al. 2004) :

*Phase one* : Eating contest

9 stories. In each story, 1 toy dinosaur is presented with 3 items to eat, a chocolate candy and two pieces of fruit.

3 story types :

- Yellow medal story, chocolate + one fruit eaten
- Red medal story, chocolate eaten
- Green medal story, chocolate + both fruits eaten (filler story type)

*Phase two* : the participant award a medal to the toy based on the unfolding of the story.

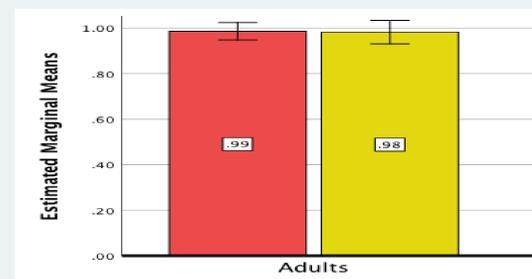
*Phase three* : introduction of the Truth value judgment tasks with 3 puppets, 3 different tasks per story. 9 test sentences such as (2). 18 filler sentences.

(2) Le dinosaure a mangé le chocolat mais n'a pas mangé la pomme ou l'orange.  
*The dinosaur ate the chocolate but did not eat the apple or the orange.*

**Participants** : 15 monolingual adult French speakers.

**Results** (pre-experiment) :

Proportion of negation wide scope readings per story type, red links and yellow right.



**Discussion** :

The pre-experiment shows that adult French speakers favor a negation wide scope reading on the test items.

## Main experiment

**Design**

Same design as the pre-experiment. Participants were divided into two conditions. One group received a version of the test sentences spoken out in neutral prosody. The other group a version containing a prosodic stress on the disjunction.

**Participants** :

Neutral prosody condition n = 21, mean age = 5;1, age range 4;3-6;3.

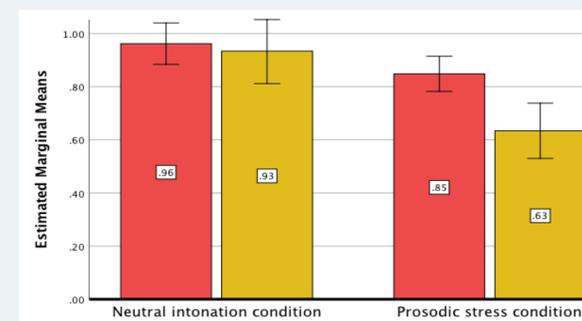
Prosodic stress condition : n = 29, mean age = 5;3, age range 4;0-6;0

**Predictions** :

If our hypothesis reveals true, participants in the prosodic stress condition should give answers consistent with a disjunction wide scope reading while the neutral prosody group should not.

**Results** :

Proportion of negation wide scope readings per story type (red or yellow). Neutral condition left, prosodic stress right



Significant **main effect on condition** ( $F(1, 47) = 15.193, p < .0001, \eta^2 = .968$ ), due to higher proportion of negation wide scope responses in the Neutral Intonation condition ( $M = .948$ ) compared to the Prosodic Stress condition ( $M = .741$ ).

Significant **story type\*condition interaction** was significant ( $F(1, 47) = 5.079, p = .029, \eta^2 = .098$ ).

## Discussion :

**Main effect on condition** ;

→ children were sensitive to the difference between the neutral stress and focal stress on the disjunctive.

→ This result is consistent with our hypothesis that focus can cause the disjunction to scope out of the negation.

According to Glanzberg (2009) focussing the disjunctive partitions the sentence in terms of information structure in such a way that the negation no longer forms part of the assertion but is rather presupposed.

As illustrated in (3), focal stress to the disjunctive creates a presupposition that the dinosaur did not eat some contextually salient entity. Then the focal sentence asserts that this entity was the apple or the pear which causes the disjunction to take a wide scope.

(3) The dino didn't eat the apple OR the pear.

*Assertion*: The dino didn't eat the apple or the dino didn't eat the pear.

*Presupposition*: The dino didn't eat some contextually salient entity.

**Story type\*condition interaction** :

Truth values of Not A or B (Disjunction wide scope): One proposition false (**Yellow medal story**) : TRUE Both propositions false (**Red medal story**) : TRUE logically true BUT reading blocked because of an implicature, and what Reinhart (2006) called reference set computation:

Children under Age 6 don't carry out such computations (Reinhart 2006) and opt for the logical reading : In the red medal context that is an answer compatible with a disjunction narrow scope reading even if they did assign a wide scope to the disjunction in the prosodic stress condition.

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