

# **Disambiguation of Closure Ambiguities in Written Production**

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## Introduction

### Issue 1 - Disambiguation

#### Do producers adjust their utterances to avoid ambiguous output?

Two theoretical approaches to lexical processing in speech production:

Interactive: spreading activation within a network (Dell, 1986)

Non-interactive: two-stage, feed-forward process, the output of which is scrutinized by a **monitor**, which

- oversees the fully formed products of the production system

- initiates self repair

- is identified with the comprehension system (Levelt, 1989; 1992)

If the monitor is identified with the comprehension system, it should detect ambiguity and adjust output to minimize it.

Studying whether producers insert cues in order to reduce or eliminate temporary syntactic ambiguity can provide evidence about the existence and nature of the monitoring process.

Previous research in speech production has provided conflicting results as to whether speakers insert disambiguating cues that facilitate comprehension (Ferreira & Dell, 1998; Sevald & Trueswell, 1997).

We studied the written production of closure ambiguities:

Late Closure While Lorna ate *the cake* the cookies were in the oven.

Early Closure While Lorna ate *the cake* was in the oven.

Hill and Murray (1998) showed that insertion of commas eliminates the closure ambiguity, similar to the effect of prosody in speech (Kjelgaard & Speer, 1999; Schafer et al, 1999).

#### Are commas inserted more often in ambiguous cases relative to unambiguous counterparts?

## **Issue 2 - Norming**

### **How often do people produce the ambiguous version of this structure?**

The closure ambiguity is often used in sentence comprehension studies (e.g., Mitchell, 1989; Ferreira & Henderson, 1990).

The underlying assumption is that comprehenders deal with this structure in its ambiguous form, without the comma, on a regular basis (Frazier & Rayner, 1982).

Previous frequency counts showed no occurrences of this structure without a comma in the absence of other disambiguating cues (Juliano & Tanenhaus, 1994). These norms were collected from a limited corpus of edited text.

### **How common is the ambiguous version of this structure in spontaneous written production?**

## Completion Survey Method

140 Northeastern undergraduates completed sentence initial fragments.

Instructions were to write whatever ending they wanted, provided it formed a complete sentence.

12 items *While Lorna...*  
subordinating conjunction followed by a proper name

as	when	once	because	although	though
if	while	since	after	in case	even though

12 fillers *Yesterday Denise...*  
adverb followed by a proper name

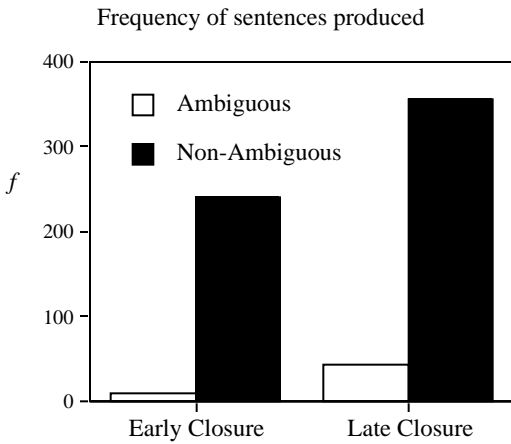
Each participant completed one of two random orderings of items and fillers.

Coded for the presence of three disambiguating cues in all sentences with the structure  
*While Lorna V NP...*

Cue	YES	NO
comma	present	absent
verb transitivity	transitive ( <i>made</i> ) intransitive ( <i>slept</i> )	optionally transitive ( <i>ate, left</i> )
unambiguous case marked pronoun	nominative ( <i>I</i> ) accusative ( <i>me</i> )	all other NPs

## Results - Norming

645 sentences produced (43%) were of the relevant structure.



A comma was inserted 78% of the time

Late closure sentences were produced more often than early closure sentences (60:40)

A total of 50 (8%) ambiguous sentences (with none of the 3 cues present) were produced.

### Examples of Ambiguous Sentences Produced in Completion Survey

#### **Early Closure** (N = 8)

After Janet leaves the party will begin.

While Heather was eating the phone rang.

Since Stephen left things are different.

#### **Late Closure** (N = 42)

After Janet left the party she ran into some old friends.

Once Deanna finished her meal she did her homework.

While Heather drove the car I played with the radio.

No interaction between closure and ambiguity.

## Conclusions

- Commas are used in most cases; they do not seem to be optional in this structure.
- The frequency of the ambiguous version of this structure in written production is very low.

## Results - Disambiguation

We tested whether comma usage is more frequent in cases where the other cues are absent relative to cases in which at least one other cue is present

		other cues	
		NO	YES
comma	NO	a	c
	YES	b	d

$$\frac{b}{a + b} > \frac{c}{c + d} ?$$

		other cues	
		NO	YES
comma	NO	22.4%	21.6%
	YES	77.6%	78.4%
		N=223	N=422

**non-significant chi-square**

Same pattern was observed separately for late and early closure cases.

### Conclusions

- Comma usage does not change as a function of presence of other cues.
- Evidence from written production of the closure ambiguity does not support the existence of a monitor which is closely linked to the comprehension system.

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