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Effects of Semantic, Conceptual, and Structural Properties on the Production of Complex Noun Phrases

Amy DiBattista & Neal J. Pearlmutter (Northeastern University)

INTRODUCTION

Semantic Integration (Solomon & Pearlmutter, 2004)
Degree of conceptual relatedness between to-be-planned utterance elements

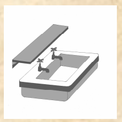
Semantically related (related in meaning) *the **ketchup** and the **mustard*** vs. Semantically integrated *the **bracelet** made of **silver***

Pearlmutter & Solomon (2007)
Exchange-error elicitation experiments
Picture stimuli varied in Integration and Description Preference (determined by prior norming).

Test phase: Picture appeared.
Linking word appeared below, with a 2000 ms SOA.
Ss described pictures using noun labels and link.

Picture → Message → Relationships between words → Ordered slots

Integrated
Preferred *the spot on the apple*
Unpreferred *the apple with the spot*
Flexible *the spot and the apple*



Unintegrated
Preferred *the shelf above the sink*
Unpreferred *the sink below the shelf*
Flexible *the shelf and the sink*

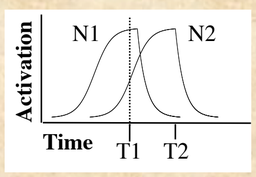
Error rates and production latencies analyzed.

PHRASE VS. WORD ERRORS

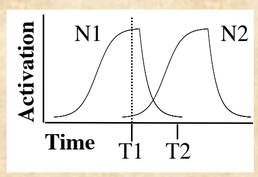
Pearlmutter & Solomon's error rates:
Integration affects exchange error rates.
- Errors more likely for **Integrated** than for **Unintegrated**.

Integration affects timing of planning of utterance elements (cf. Gillespie, Pearlmutter, & Shattuck-Hufnagel, 2010):

Integrated
Constituents planned close in time.



Unintegrated
Constituents planned far apart in time.



Pearlmutter & Solomon's exchange errors: Phrase or word exchanges?

Intended response
the spot on the apple

→ **Phrase exchange**
the apple** on **the spot

→ **Word exchange**
*the **apple** on the **spot***

Stimuli that elicit differentiable phrase and word errors needed:
Colorized versions of Pearlmutter & Solomon's picture stimuli

ON

Response Type	Response
Expected response	the green spot on the blue apple
Phrase exchange	the blue apple on the green spot
Noun exchange	the green apple on the blue spot
Adjective exchange	the blue spot on the green apple

INCREMENTAL VS. COMPETITIVE GRAMMATICAL ENCODING

Pearlmutter & Solomon's production latencies examined incremental vs. competitive processing in grammatical encoding.

Two utterance types, based on number of word orders that convey message:

Unconstrained Order
Flexible cases
Two possible word orders → *the shelf and the sink*, *the sink and the shelf*

Constrained Order
Preferred and Unpreferred cases
One possible word order each → *the shelf above the sink*, **the sink above the shelf*; *the sink below the shelf*, **the shelf below the sink*

At any one point in utterance planning, processing can be **incremental** or **competitive** (V. Ferreira, 1996)

Incremental First available noun placed in first noun slot.
Determines the rest of the utterance's structure.
Speeds Flexible relative to Preferred and Unpreferred.

Competitive Multiple orders compete for selection.
Slows Flexible relative to Preferred and Unpreferred.

Pearlmutter & Solomon's production latencies suggest incremental processing:
Flexible ≤ Preferred < Unpreferred.

Pearlmutter & Solomon's responses were NP–PP or NP–NP.
NPs were simple Det–N constructions.

Incrementality in more complex noun phrases?

EXPERIMENTS 1 & 2

Does semantic integration affect full noun phrase or individual lexical item planning?

Are complex noun phrases planned incrementally or competitively?

Stimuli

36 pictures featuring an object and attribute, or two common related objects
Varied in integration level and description preference:

18 integrated pictures
Preferred *the green spot on the blue apple*
Unpreferred *the blue apple with the green spot*
Flexible *the green spot and the blue apple*

18 unintegrated pictures
Preferred *the red shelf above the green sink*
Unpreferred *the green sink below the red shelf*
Flexible *the red shelf and the green sink*

Procedure

Two familiarization phases
Grayscale version of each picture presented with noun labels below it.
Ss instructed to focus on/learn labeled parts of pictures.

Test phase

Experiment 1 Colored version of each picture appeared.
Linking word appeared below, with a 2000 ms SOA.
Ss described pictures using noun labels, color words, and link.

Experiment 2 As Experiment 1, but grayscale picture appeared first.
Grayscale picture replaced by colored version after SOA.

RESULTS

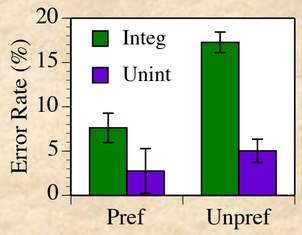
Error Rates

Majority of errors were phrase exchanges: Fully planned NPs exchanged.

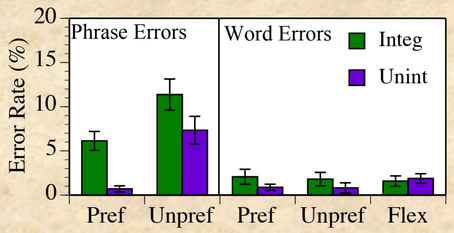
Analyzable amount of word errors elicited in Experiment 2 only:
Greater separation between planning of noun and planning of adjective

Weighted linear regressions on empirical-logit transformed percentages
- Fixed effects: Integration, Preference, and their interaction
- Random factors: Subjects or Items

Experiment 1 Phrase Errors



Experiment 2 Phrase and Word Errors

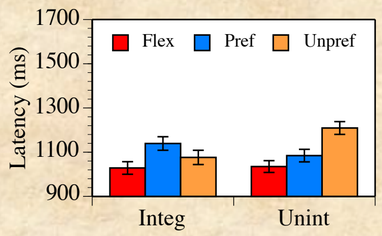


Integ > **Unint** for phrase and word errors
Integration affects ordering of full phrases and individual lexical items.

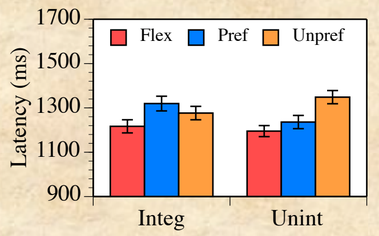
Production Latencies

Correct responses only; latencies ≤ 200 ms and ≥ 3000 ms excluded.

Experiment 1



Experiment 2



Integrated: **Flex < Pref**; **Flex ≤ Unpref**; **Unpref ≤ Pref**
Unintegrated: **Flex ≤ Pref < Unpref**
Incremental processing in Integrated and Unintegrated cases

Unexpected pattern: In both experiments, **Pref ≥ Unprf** in Integrated
- Preferred conditions were similar to Flexible in Pearlmutter & Solomon.
- Possible effect of color on preference conditions

CONCLUSIONS

Semantic integration influences planning of full phrases and individual lexical items.

Strong support for incremental processing in complex noun phrases
-Flexibility eased production; not compatible with competitive model.

Additional content words did not introduce competition.
- No evidence for competition when planning Det–Adj–N NPs
- Incrementality maintained in Experiment 2, even with some separation between planning of adjective and planning of noun.

REFERENCES & ACKNOWLEDGMENTS

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