Sentence processing and constituent order

Hawkins (1994, 2004): Constituent order is motivated by sentence processing.

(1) a. I gave the book to Peter.

b. I gave Peter the book.

(2) a. I gave the valuable book that was extremely difficult to find to Mary.

b. I gave Mary the valuable book that was extremely difficult to find.

(3) a. I [gave [the valuable book that was extremely difficult to find] to Mary].

VP

b. I [gave [Mary] [the valuable book that was extremely difficult to find]].

Processing principles

Constituent recognition domain

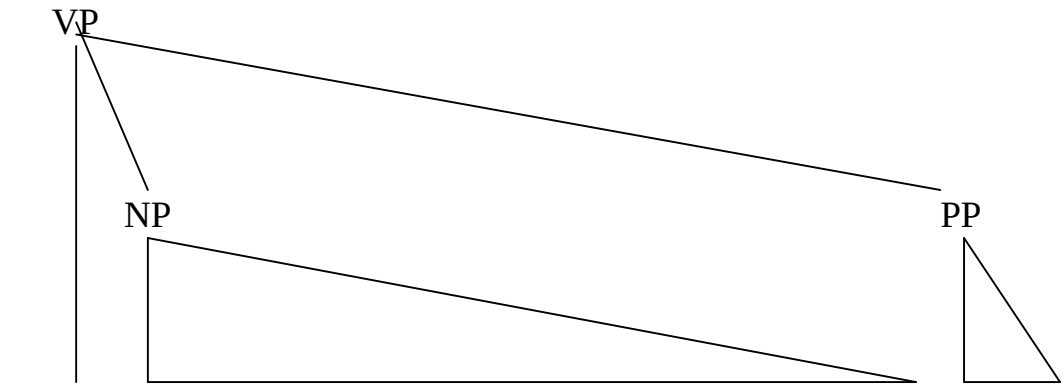
The CRD consists of the words that must be processed (and kept in working memory) to access all immediate constituents of a phrase once the parser has recognized the mother node of the phrase.

Mother node constructing category

The MNCC is a word (or affix) in the parse string that allows the parser to recognize the mother node of a phrase.

Early Immediate Constituents

The human parser prefers linear orders that have a short recognition domain.



I [gave [the valuable book that was extremely difficult to find] to Mary].

Recognition domain

I [gave [Mary] [the valuable book that was extremely difficult to find]].

Recognition domain

Ordering of PPs

(1) a. I looked through his binoculars into the blue but slightly overcast sky.

b. I looked into the blue but slightly overcast sky through his binoculars.

(2) a. I [looked [through his binoculars] [into the blue but slightly overcast sky]].

IC-to-word ratio: 3/5 = 60%

(3) b. I looked [into the blue but slightly overcast sky] [through his binoculars]]

IC-to-word ratio: 3/9 = 33%

Verb-particle construction

(1) a. Joe looked the number that Mary had forgotten up.

b. Joe looked up the number that Mary had forgotten.

(2) Joe [looked [the number that Mary had forgotten] up].

IC-to-word ratio: 3/8 = 38%

(3) Joe [looked up [the number that Mary had forgotten].

IC-to-word ratio: 2/3 = 67%

(4) a. Joe [looked up [the number]].

b. Joe [looked [the number] up].

c. Joe [looked [the number of the ticket] up].

d. Joe [looked [the number that Mary had forgotten] up].

Extraposition of SUBJ-clauses

(1) a. That Bill was frightened of spiders surprised Mary.

b. It surprised Mary that Bill was frightened of spiders.

(2) [[That Bill was frightened of spiders] [surprised Mary]]].
└──────────────────────────────┘S └──┘ VP

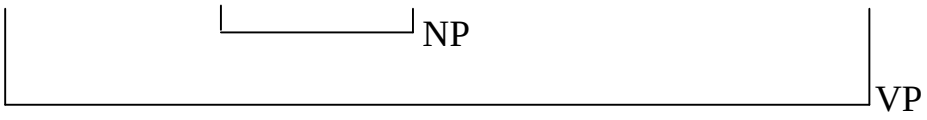
(2) [It [surprised [Mary] that Bill was frightened of spiders]]].
└──┘S └──────────┘VP

Extraposition of German relative clauses

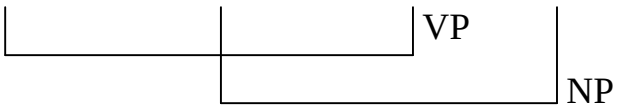
(1) a. Ich habe der Frau das Buch, das sie gestern bestellt hat, gegeben.

b. Ich habe der Frau das Buch gegeben, das sie gestern bestellt hat.

(2) Ich [habe der Frau [das Buch, das sie gestern bestellt hat], gegeben].



(3) Ich [habe der Frau [das Buch] gegeben], [das sie gestern bestellt hat].



Sentence processing and grammaticalization

The relationship between processing and grammaticalization

Linguistic structures that are easy to process are frequently used, which in turn may lead to their conventionalization (i.e. grammaticalization).

Prepositions vs. postpositions

Head-initial

(1) a. played **with** the red ball. preposition √

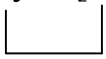
b. played the red ball with. postposition

Head-final

(2) a. the red ball **with** played postposition √

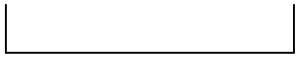
b. with the red ball played preposition

(3) a. [played [with the red ball]]



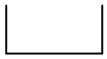
IC-to-word-ratio: 2/2=100%

b. [played [the red ball with]]



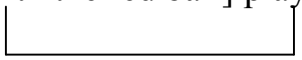
IC-to-word-ratio: 2/4=50%

c. [[the red ball with] played]



IC-to-word-ratio: 2/2=100%

d. [[with the red ball] played]



IC-to-word-ratio: 2/4=50%

Complement clauses

Head-initial

(1) a. saw [**that** Bill left the office]. √

b. saw [Bill left the office **that**]

Head-final

(2) a. [Bill left the office **that]** saw √

b. [**that** Bill left the office] saw] √

The accessibility hierarchy

(1) a. The thing [that fell into the water]. SUBJ

b. The thing [that Peter threw into the water] OBJ

c. The thing [that Peter played with] ADV

SUBJ > OBJ > ADV > GEN

(2) The thing [that __ fell into the water]. SUBJ

(3) The thing [that Peter threw __ into the water] OBJ

(4) The thing [that Peter played with __] ADV