To appear in: Proc. Intl. Conf. Comp. Ling., Helsinki, Finland, August 1990

Gapping and Frame Semantics: A fresh look from a cognitive perspective

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1 Introduction

The topic of this paper is one of the pet subjects of transformational syntax—*gapping*. Several examples below will show that gapping is actually affected by a combination of syntactic, semantic and pragmatic factors, thus being far from a purely syntactic phenomenon. By looking at some basic properties of gapping from the point of view of interpretation and cognitive processing, it is possible to arrive at a global principle that can provide an integrated approach for these various influences on gapping. The principle proposed has the added advantage of being not just an arbitrary formal rule but being motivated by cognitive considerations. Thus, the view taken here is compatible with the basic tenets of Cognitive Linguistics.

2 Gapping and Interpretation

2.1 Some examples

Gapping constructions involve two or more coordinated clauses where the verb is missing in all but one clause, such as

(1) Bill is reading a book, John $\emptyset$ a newspaper, and Kathy $\emptyset$ her favorite cartoon.

Here I use '$\emptyset$ ' to indicate the position of the gap, i.e. the position the missing constituent would presumably have taken in the clause if it had been spelled out in full. This notation is merely a convenience and should not be taken to imply that some sort of empty constituent is present. Also, for historical reasons, I will refer to the constituents 'left-over' in the gapping clause as *remnants*, without implying that some sort of deletion has actually taken place.

The more interesting cases of gapping are those where the verb is missing along with other constituents. In these cases the $\emptyset$ -notation is essential to disambiguate the intended reading.

(2) (a) Bill gave John the book and $\emptyset$ $\emptyset$ Kathy the newspaper

(b) ?Bill gave John the book and Kathy $\emptyset$ $\emptyset$ the newspaper

(c) *Bill gave John the book and Kathy $\emptyset$ the newspaper $\emptyset$

This example also shows that, in general, 'grammaticality' or 'acceptability' is defined only relative to an intended interpretation.[1] Thus, whereas sentence/interpretation (2a) is fine, most speakers don't get (2c) and accept (2b) only when given a particular intonation, i.e. topic-focus structure.

The examples above all illustrate *forward gapping*, i.e. the gapping clause follows the non-gapping clause. The converse, *backward gapping*, also occurs, but the question of what determines the direction of gapping will not be addressed here. In fact, all the examples discussed in this paper are forward gapping constructions from English and German where backward gapping is not nearly as varied and flexible as the forward variety.

[1] Langacker (1985) makes the point that acceptability is a judgement about the appropriateness of a pairing between a phonological form and the conceptualization it expresses, rather than some purely formal property of the phonological form *per se*.

The main reason for focusing on forward gapping at this point is that we want to consider gapping phenomena from the point of view of the cognitive processing demands they pose for the speaker/hearer. As will be discussed in section 2.2, it seems safe to make some very basic assumptions about processing in the case of forward gapping, so that its implications can be studied without the burden of wildly speculative premisses from a still largely unknown domain.

Most theories to date have tried to account for gapping on the basis of purely formal aspects of syntax alone (see van Oirsouw (1987) for an overview), with the notable exception of Kuno (1976), who explicitly considers functional and perceptual aspects. Such approaches, mostly in a transformational framework, try to explain gapping as the result of some form of 'deletion under identity.' Hence these accounts are unable to consider questions such as why (2b) becomes possible only when given the appropriate focus structure (stressing *Bill*, *the book*, and *Kathy*, *the newspaper*). In these frameworks focus is considered a matter of pragmatics and simply doesn't figure in a syntax-based account. Section 3.3 will show that the effects of focus on gapping are a natural consequence of the approach taken here.

Similarly, semantic constraints and contextual factors may have an influence on the interpretation of gapping clauses. Compare the sentences in (2) above to those in (3).

(3) Mary got a lot of nice clothes on her sixteenth birthday.

  (a) Her parents gave her an expensive evening gown and her godmother ∅ ∅ a fine pair of shoes.

  (b) ?Her parents gave her an expensive evening gown and ∅ ∅ her godmother a fine pair of shoes.

(2a) and (3a), and (2b) and (3b), respectively, have identical phrase structure, yet the preferred interpretations of the gapping clauses are reversed. Some of the ways in which semantics can influence gapping are discussed in section 3.4.

2.2 Frame Semantics

It is natural that researchers try to confine linguistic phenomena to subtheories (such as syntax), feeling that not doing so would inevitably face them with an overwhelming range of data for which no adequate principles and rules are available.

Cognitive Linguistics proposes that all levels of linguistic processing are embedded in the general human cognitive apparatus and that, therefore, linguistic generalizations can only be derived by studying language as the product of cognition rather than of some autonomous formal system (Langacker, 1985; Lakoff, 1986). If this view is correct then the study of processing constraints and applicable cognitive principles (e.g., of categorization) should provide us with a handle on some of the linguistics phenomena that apparently span a variety levels.

Of course nothing is won if we have to resort to uncertain or unjustified claims about the cognitive domain itself, or have no certainty of its relation to the linguistic problems in question. Fortunately, in the special case of gapping as discussed here, the assumptions we have to make about underlying semantics and processing structures are minimal. I will adopt an informal version of *frame semantics*, along the lines of Fillmore (1982). In this view, the main verb of a clause determines a set of *roles* to be filled by the (meaning of) remaining constituents. Thus, interpreting the first clause of (2a) results in a structure of the form

(4)
$$\begin{bmatrix} \textit{give} & \\ \text{agent}: & \textit{Bill} \\ \text{patient}: & \textit{book} \\ \text{recipient}: & \textit{John} \end{bmatrix}$$

It is a matter of debate how 'deep' the roles or cases making up the frame representation should be. For our purposes it is not crucial whether one prefers several levels of representation, such as grammatical roles vs. semantic roles, or general roles (like *agent*) vs. frame-specific roles (like *giver*). The only assumption here is that interpretation requires a process equivalent to the assignment of constituent meanings to slots in the frame, and that this assignment has to be derived based on whatever linguistic and contextual clues are provided.

In the case of gapping, then, several such frames are obtained by partly retaining slot fillers from previous instances of the same type of frame (i.e. generated by the same verb). Thus a sequence of multiple frames with shared fillers can be linguistically realized in a single, compact construction where multiple fillers are expressed

only once. In the case of example (2a) above, the second, gapping clause refills the 'patient' and 'recipient' slots of the *give* frame, while retaining the 'agent' slot.

In non-gapping sentences a combination of word order, case marking, prepositional markers, selection restrictions, etc. is usually more than sufficient to assign fillers unambiguously to frame slots. In gapping constructions the role assignment problem becomes potentially more difficult since some of this information is lost, although in many cases the loss is marginal. Thus, in example (1) interpretation of the second clause is unproblematic since two constituents have to fill two slots, and the usual rules of constituent order in English unambiguously determine the assignment. In (2), on the other hand, there are three potential role assignments consistent with the constituent order given.

The problem, then, is to identify the syntactic, semantic and pragmatic factors that render certain gapping structures (and their corresponding interpretations) acceptable, while others are ruled out (or at least made less felicitous).

3 A Conjecture

We can now state a tentative principle regarding the relation between the interpretation of gapping constructions and their acceptability.

(5) **Role Assignment Principle:** A gapping construction with a specific interpretation will be acceptable only if it provides sufficient clues for the role assignment implied by that interpretation.

This principle is similar in spirit to the Recoverability Constraint proposed by Hankamer (1973), although it is far more general as it potentially encompasses all kinds of linguistic phenomena that play a role in interpretation, not just syntax.[2]

Note that (5) does not claim that interpretability alone will render a sentence acceptable.[3] To prevent the conjecture from being vacuous two points have to be addressed. First, we have to show that there is a systematic repertoire of linguistic devices available for the interpretation of gapping constructions. Secondly, it must be shown that these devices systematically affect the acceptability of gapping sentences in accordance with the principle.

In many cases gapping constructions will not be strictly 'good' or 'bad', but felicitous to a certain degree, or acceptable to only some fraction of speakers. This is consistent with the principle stated above, since (5) can easily be rephrased in terms of degrees of acceptability:

(6) **Role Assignment Principle (graded version):** A gapping construction with a specific interpretation will tend to become more acceptable as more clues for the intended role assignment are made available.

Note also that this formulation effectively characterizes interpretation of gapping constructions as an *evidential* cognitive phenomenon, i.e. one where multiple sources of evidence contribute to a perception or interpretation in a cumulative manner.

3.1 Syntactic clues

Despite the definite non-syntactic influences on gapping, syntax (together with the rules governing its relation to semantics) is the major source of information for interpretation, even when the syntactic structure is 'incomplete'. Clues such as linear order, case marking, and prepositions are still potentially available for the remnant constituents.

Van Oirsouw (1987) has recently suggested a theory in terms of constituent deletion under identity which probably covers as much ground as is possible in a purely syntax-oriented framework.[4] Interestingly, he was able to state some surprisingly far-reaching generalizations by ignoring all fine points of phrase structure and simply considering the top-level ordering of constituents.

In a similar fashion, it seems that for forward gapping, the following simple rule captures a considerable range of cases. It is a straightforward variant of the Minimal Distance Principle proposed by Kuno (1976).

[2] Hankamer's principle was concerned with the recovery of 'deep structure' after having undergone deletions and movement.

[3] If someone used *apple green* as a noun phrase referring to a green apple we will in general be able to make sense of (i.e., interpret) that description while still recognizing it as ungrammatical.

[4] His generalizations can be rephrased without necessarily assuming deletion transformations.

(7) **Principle of Surface Proximity:** A remnant constituent tends to fill a role whose previous filler is close in surface constituent order. (Fillers of the same role tend to be close.)

Consider the following series of examples which have increasing amounts of material intervening between the two filler constituents.

(8) (a) John gave Peter a bagel and a banana

(b) ?John gave Peter a bagel yesterday, and a banana

(c) ??John gave Peter a bagel yesterday before lunch, and a banana

(d) ???John gave Peter a bagel yesterday before lunch after he had begged him, and a banana

(9) (a) John lent Peter some money, and ∅ ∅ ∅ some clothes

(b) ?John lent his brother some money, and ∅ ∅ his girlfriend ∅

(c) ?John lent me some money, and Paul ∅ ∅ ∅

Again sentences marked '?' require appropriate contrastive intonation to become acceptable (cf. section 3.3).

Note that (7) is not arbitrary; it makes sense from a cognitive point of view. If we assume that roles are sequentially processed and have to be retrieved when refilled, it seems natural that the retrieval tends to become more difficult as the temporal distance from the previous processing event increases.

At a more abstract level, syntagmatic proximity can be viewed as symbolizing conceptual relatedness (Langacker 1985). Hence the frame unit at the conceptual level corresponds (prototypically) to a clause unit at the syntactic level. Gapping constructions relate not just the fillers of the roles in a single frame but also the various fillers of the same role in different frames. Therefore we would expect those fillers to be syntagmatically close to the extent that the two relational aspects can be accommodated simultaneously.

Note that the case of simple constituent coordination can be seen as the optimal solution to multiple frame realization as far as (7) is concerned, and is generally preferred.

(d) John and Paul lent me some money

It represents the case where clause unity has been traded off for for the conceptualized unity of the two fillers of the same slot. (Accordingly we get a reading where John and Paul act as a single 'financial entity' only in (9d), but not in the corresponding gapping construction (9c).)

In (8a), on the other hand, we have a case where both clause unity and filler proximity can be integrated perfectly. Note that the view presented here obliterates the question whether (8a) is the result of constituent coordination or a case of gapping. A formally oriented theory might be troubled by a syntactic construction that can be 'redundantly' accounted for by two different rules or principles. For a cognitively oriented account such a coincidence presents no contradiction.[5]

One might object that (7) makes the wrong predictions when comparing cases with one remnant to those with multiple remnants.

(10) (a) John offered me money and ∅ ∅ ∅ good advice

(b) John offered me money, and Paul ∅ ∅ good advice

Clearly the additional remnant in (10b) increases the distance between the two fillers of the recipient role of *offer*, yet both sentences in (10) seem equally unproblematic. However, note that as soon as more than one remnant is present their role assignments mutually constrain each other, thus effectively making more

[5]Van Oirsouw (1987) has tried to develop a unified rule of deletion in coordinations, covering cases otherwise treated as separate rules, such as gapping, conjunction reduction, right-node raising, VP deletion, etc. One of the motivations for such an attempt is that these rules have a certain amount of overlap, i.e. there are constructions which fall into the scope of more than one rule, yet no single rule covers all cases. This is considered undesirable from a metatheoretical point of view since it apparently introduces ambiguity and redundancy.

A different view may be derived from the notion of *radial categories* as it arises in human categorization behavior (Lakoff, 1986). The sentences to be accounted for are apparently clustered around a small number of constructions (or rules). These constructions, however, are not completely unrelated; rather they are linked to each other by those special cases where more than one rule overlap. Thus the overlap between rules is not undesirable but cognitively advantageous since it allows the complete set of constructions to be perceived as a unified phenomenon.

information available to the interpretation process. (One fundamental constraint that comes into play is that every filler can fill only one role. Furthermore linear order information is now available.)

3.2 Case marking and prepositions

In languages that case-mark their verb arguments we would expect this device to provide very strong (in fact, mandatory) clues for role assignment. This can be verified in German, where noun phrases are case-marked, except for those consisting only of single proper nouns.

(11) (a) Ich sah, wie der Engländer den Franzosen begrüßte und der Deutsche ∅ ∅
I saw how the Englishman-NOM the Frenchman-ACC welcomed and the German-NOM ∅ ∅

(b) ??Ich sah, wie Peter Paul begrüßte und Hans ∅ ∅
I saw how Peter Paul welcomed and Hans ∅ ∅

(c) Ich sah, wie Peter Paul begrüßte und ∅ Hans ∅
I saw how Peter Paul welcomed and ∅ Hans ∅

(11a) and (11b) have identical constituent structure (up to the noun phrase level) and are both non-optimal by proximity considerations. (11a) can be made acceptable with appropriate contrastive intonation, while (11b) remains awkward. Instead, the interpretation corresponding to (11c) is easily obtained, again in accordance with proximity.

In English, where case-marking is generally not available, prepositions can play a similar role.

(12) (a) ?Bill visited Jim yesterday after dinner, and ∅ ∅ John ∅ ∅

(b) Bill talked to Jim yesterday after dinner, and ∅ ∅ to John ∅ ∅

Again, both examples are awkward due to the great distance between successive role fillers, but in (12b) the prepositional marker *to* gives a strong clue for the intended attachment of *John* thus enhancing acceptability.

3.3 Topic-Focus structure

In most of the cases seen so far a typical intonation pattern will naturally accompany the gapping construction, focusing on and contrasting the various fillers of same frame slot. In fact, as the distance between remnants and previous filler constituents increases, the interpretation has to be supported by increasing amounts of stress. Note that such a trade-off between syntactic proximity and focus structure makes sense in view of the evidential character of gapping proposed in (6).

(13) (a) Linda returned the textbook to the library, but not ∅ ∅ ∅ to the one it belongs to.

(b) Linda returned the *textbook* to the library, but not ∅ ∅ the *lecture tape* ∅

(c) *Linda* returned the textbook to the library, but not the *other* students in the class ∅ ∅

(Italics indicate intonation centers.)

This behavior fits well into the general principle of role assignment proposed. In terms of our frame semantics account, focus effectively 'foregrounds' a subset of the roles implying that those are the ones likely to be refilled.

There is evidence that the converse process works as well, i.e. that circumstances which 'background' certain roles provide support for gapping structures where those roles are *not* refilled. It seems that this is at least part of what happens in (3). The preceding sentence sets up *Mary* (i.e. *her*) as a *topic*, relative to which the other roles are foregrounded.

Sgall et al. (1986) have argued for incorporating descriptions of topic-focus structures into linguistic representations (rather than throwing them into the 'pragmatic wastebasket'). Clearly more work on the relation between syntactic configuration, focus and gapping is needed. To get an idea of the possibilities along these lines consider the following: Let us assume, following Sgall et al., that in the absence of special intonation in English declarative sentences elements towards the end of the sentence are increasingly 'focussed.' Then the gapping cases in (8) and (9) might be subsumed by focus structure: Refilled roles tend to occur towards the end of the clause because that is where default focus is located. It would be jumping to conclusion, however, to say that all gapping phenomena can be

accounted for in term of focus structure, given the other cases discussed here.

3.4 Semantic constraints

From the data presented so far we would expect any type of constraint which could potentially guide role assignment to have an impact on gapping. Therefore, semantic compatibility between the verb semantics and its arguments should make a difference in gapping contexts. This is illustrated in the following example pairs.

(14) (a) John likes ice-cream, but not $\emptyset$ $\emptyset$ chocolate

(b) *John likes ice-cream, but not chocolate $\emptyset$ $\emptyset$

(15) (a) ?John likes ice-cream, but not $\emptyset$ $\emptyset$ his little sister

(b) John likes ice-cream, but not his little sister $\emptyset$ $\emptyset$

Note how (15a) is perceived as 'funny' because the verb semantics are not kept exactly identical; rather a different sense (and frame) associated with *like* is invoked in the second clause.[6]

4 Conclusion

The discussion so far leaves a number of important problems. The syntactic constraints on gapping are obviously more complex than the simple rule proposed here, and similarly for the non-syntactic phenomena (semantic constraints, focus) I appealed to.

New questions arise in the framework proposed here, regarding the precise nature of interactions between the processing of the various clues available. It would certainly be nice if some kind of simple ordering or hierarchy between the various factors could be established, although this may not be possible. The fact that gapping seems to be a phenomenon involving so many processes and influences also implies that the interactions between them may be inherently complex and not compactly describable.

Another open question is to what extent other types of 'deletion transformations' (backward gapping, VP deletion, conjunction reduction, right-node raising) lend themselves to a similar analysis, hopefully using compatible principles.

Still, gapping provides a striking case where a number of linguistic processes —traditionally perceived as operating at different levels and largely independently—seem to follow a general principle. More importantly, the principle can be understood as arising from cognitive constraints on sentence processing. Forward gapping is a lucky case in point because the role assignment problem can easily be identified as a major subtask in the interpretation, thus giving us a handle on a cognitive analysis.

[6] The same humoristic effect is more pronounced in sentences such as "First the president cut the salami, then the budget".

Acknowledgements

I would like to thank George Lakoff for introducing me to the view of linguistics that led to this work, and many helpful comments along the way. The author is supported by an IBM Graduate Fellowship.

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