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## Gapping with shared operators\* James D. McCawley, University of Chicago

In the following type of example, which to my knowledge has not previously been noted, a conjoined sentence that has undergone Gapping has a determiner in the first conjunct that is shared by the corresponding NPs in the subsequent conjuncts, e.g. (1a) can be paraphrased as 'Too many Irish setters are named Kelly, too many German shepherds are named Fritz, and too many huskies are named Nanook':

- (1) a. Too many Irish setters are named Kelly, German shepherds Fritz, and huskies Nanook. (William Safire column, 22 Dec 85)
  - b. The Temple of Dagon, for example, whose exterior is seen in act one and interior in act three, rivals a movie set. (Chicago Reader opera review, 10 Nov 89)
  - c. Your daughter is 16 and son, 17-1/2. (Chicago Sun-Times interview with Rajiv Gandhi, 4 May 88)
  - d. <u>The duck is dry and mussels tough</u>, but Bocuse D'Or rehearsal goes well for chef Bumbaris. (Chicago Tribune food section caption, 17 Jan 91)
  - e. ... the educated Chilean's Spanish is much more correct and fluent than that of the
    other South Americans, whose language is stiff and vocabulary scanty because they
    have first learnt some Indian language in childhood. (Jespersen, Language, 205)

Oapping is normally is optional, but in these sentences Gapping usually must take place for the sharing of the determiner to be acceptable:  $\frac{1}{2} \left( \frac{1}{2} \right) = \frac{1}{2} \left( \frac{1}{2} \right) \left( \frac{1}{2$ 

- (2) a. \*Too many Irish setters are named Kelly, German shepherds are named Fritz, and huskies are named Nanook.
  - b. ??The Temple of Dagon, whose exterior is seen in act one and interior is seen in act three, rivals a movie set.
  - c. \*Your daughter is 16 and son is 17-1/2.
  - d. \*The duck is dry and mussels are tough.
  - e. \*...the other South Americans, whose language is stiff and vocabulary is scanty ...

The examples in (3) are the only attestations that I have come across in which a determiner is shared across conjoined clauses but there is no Gapping; the Shakespeare example, with its past tense in the second conjunct, sounds quite odd if recast in modern English (4a); however, a version with a gapped auxiliary verb is greatly improved (4b):

- (3) a. Whilst <u>any trump did sound or drum struck up</u>, his sword did ne'er leave striking in the field. ( *Henry VI*, part 1, l.iv.80)
  - b. ... I began to wonder how many paintings will never be seen, songs will never be heard, and books will never be read because of wars yet to come. (Funky Winkerbean, 19 May 91)
- (4) a. ??While any trumpet blew or drum beat, ...
  - b. While any trumpet was blowing or drum beating,  $\dots$

The following are some further characteristics of such combinations. (i) The shared determiner can be a definite article, as in (1d), but cannot be an indefinite article:  $\frac{1}{2}$ 

- (5) a. \*A soup was too salty and pie too sweet, but otherwise the food was outstanding.b. \*An Irish setter should be called Kelly and German shepherd Fritz.
- (ii) The shared determiner has to be initial in all the conjuncts:

- (6) a. How many states have a veterinary school or cities a zoo?
  - a'. \*In how many states is there a veterinary school or cities a zoo?
  - b. How many good students did he give Fs to and bad students As?
  - b'. ??To how many good students did he give Fs and bad students As?
  - c. How many cathedrals are there in Hartford or opera houses in Detroit?
  - c'. \*In Hartford, how many cathedrals are there, or/and in Detroit, opera houses?
  - d. Too many bars serve overcooked shrimps, restaurants exorbitantly priced soups, and cafeter is overseasoned stews.
  - d'. \*In too many bars shrimps are overcooked, restaurants exorbitantly priced, and cafeterias overseasoned.
  - e. Too many films are reviewed by Ebert and concerts by von Rhein.
  - e'. \*Ebert reviews too many films and von Rhein concerts.

The restriction appears to require that the shared determiner be conjunct-initial rather than clause-initial, in view of examples like (7) in which the surface conjuncts are less than full clauses: <sup>2</sup>

- (7) a. He didn't give [any As to good students or Fs to bad students].
  - b. There aren't [very many students here working on Oscan or faculty members teaching courses on Tocharian].

A zero P appears to be as good as a non-zero one for making a determiner non-initial and thus unacceptable:  $^{3}$ 

(8) \*Which day did you clean out your closet and week paint your kitchen?

However, it is not enough for the shared determiner to be merely initial in the word order of the various conjuncts, since it cannot be contained within a larger determiner:

- (9) ??Martha Washington, whose husband's honesty was legendary and father's courage justly famous, was herself a remarkable person..
- (iii) The shared constituent has to actually occupy the determiner position, i.e. paraphrases in which its counterpart is an adjective or the object of a P are unacceptable:
- (10) a. Italy's red wines are outstanding and white wines excellent.
  - a'.\*Italian red wines are outstanding and white wines excellent.
  - a". \*Red wines from Italy are outstanding and white wines excellent.
  - b. \*The daughter of Rajiv Gandhi is 16 and son 17-1/2.
- (iv) With a shared determiner, Gapping is possible even in some combinations that do not normally allow Gapping, e.g. conjoined nonrestrictive relatives do not allow the relativized expression as one of the retained constituents in the output of Gapping:
- (11) a. \*The temple of Dagon, whose exterior is seen in act I and whose interior in act III, ... (cf. (1b))
  - b. Martha Washington, whose husband's honesty was legendary and courage justly famous, was herself a remarkable person.
  - b'. Martha Washington, whose husband's honesty was legendary and whose father's courage was/\*Ø justly famous, was herself a remarkable person.
- (v) There are cases in which the preferred conjunction in the gapped version with shared determiner is or but the preferred conjunction in a corresponding unreduced sentence is

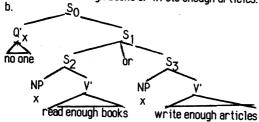
and:

- (12) a. Not enough linguists study Russian, literary scholars French, or/??and engineers Japanese.
  - a'. Not enough linguists study Russian, not enough literary scholars French, and/\*or not enough engineers Japanese.
  - b. How many cathedrals are there in Hartford or/and opera houses in Detroit? (= (2c))
  - b'. How many cathedrals are there in Hartford and/\*or how many opera houses are there in Detroit?
  - c. No one's duck was moist enough or/and mussels tender enough.
  - c'. No one's duck was moist enough and/\*or no one's mussels tender enough.

Note further that the meanings of the gapped sentences here do not match those of their non-gapped counterparts. For example, the meaning of (12c': and) corresponds not to that of (12c: and) but rather of (12c: or): (12c: and) says that no one achieved both the goal of getting the duck moist enough and the mussels tender enough, leaving open the possibility that some of the contestants may have achieved one of the two goals, whereas (12c: or) and (12c': and) say that no one achieved either of the two goals.

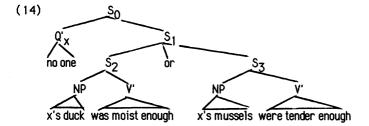
Before considering (12) in detail, let us consider an example in which, as in (12c'), there is likewise an or in the scope of a negation, though here in combination not with Gapping but with Conjunction Reduction:

(13) a. No one read enough books or wrote enough articles.



Let us assume that the  $\mathit{or}$ 's of (12–13) are semantically  $\mathit{or}$ 's and not (as is argued in e.g. Seuren 1974) a form that  $\mathit{and}$  takes in certain combinations with negation. The logical form of (13a) then has the  $\mathit{or}$  in the scope of  $\mathit{no}$   $\mathit{one}$ , and if one sets up a deep structure (13b) conforming to that logical form, one can derive (13a) straightforwardly — Conjunction Reduction applies with  $S_1$  as its domain, and Q'-Lowering, the transformation that moves quantified expressions into their hosts from the external position posited in such structures as (13b), can then apply with  $S_0$  as its domain, moving  $\mathit{no}$   $\mathit{one}$  into the position occupied by  $\mathit{x}$  in [s  $\mathit{x}$  [v read enough books or wrote enough articles]].

If we in general represent quantified expressions in deep structure as outside their host Ss, (12c: or) will then have the deep structure (14). The character of the problem posed by (12c) then changes somewhat. Gapping is applicable to S $_1$ , and whatever the rule is that allows determiners to be shared across conjuncts will also have S $_1$  as its domain. The application of Q'L then becomes anomalous: it will apply to a domain (S $_0$ ) containing a coordinate structure but will move the quantified expression into only one conjunct of that coordinate structure, thus violating Ross's (1967) Coordinate Structure Constraint. Interestingly, Q'L can apply in that way even if one **does not** eliminate repetitions of the shared determiner — (15a) is acceptable, as contrasted with (15b), in which there is no Gapping:



- (15) a. No one's duck was moist enough or <u>his</u> mussels tender enough. b. \*No one's duck was moist enough or/and his mussels were tender enough.
- In (15b), *no one* can only have the first conjunct as its scope and *his* then violates the coherence conditions on variables, since the variable that it corresponds to is then outside the scope of the quantifier that binds it.

Another case in which an element in a sentence like (1) has the coordinate structure in its scope but appears in only one conjunct is that of examples like (16):

(16) the temple of Dagon, whose interior is not seen in act I or exterior in act III, ...

Here an analysis that posits a *not* in each conjunct of (16) and deletes the second one by Gapping not only is semantically implausible (in virtue of the *or*) but also conflicts with the fact (noted in Ross 1970) that Gapping does not delete negative elements (17):

(17) a. Many linguists can't read German, and many musicians can't read French.

a'. \*Many linguists can't read German, and/or many musicians French.

The analysis of (12a) is somewhat less clear than that of (12c): whereas (12c) had a single variable that turned up in both conjuncts, in (12a) we need to set up the logical structure in such a way as to allow the bound variable(s) to range over linguists in the first conjunct, literary scholars in the second, and engineers in the third. This requires either a polyadic quantifier (binding three variables, each with its own domain of values, one of the variables appearing in each conjunct) or an analysis as in (18), in which a single variable is involved in a respectively construction:

(18) (not enough, [x is a linguist, x is a literary scholar, or x is an engineer])
(x studies Russian, x studies French, or x studies Japanese, respectively)

Such a structure (or a polyadic counterpart of it) differs from the logical form of (12a': and) in an important way: whereas (12a': and) reports three separate judgements of "not enough", (18) reports what is apparently a single judgement of "not enough" in which the linguists, literary scholars, and engineers are pooled. In the case of (12a: or) and (12a': and), the difference is too subtle to allow one to judge whether they do in fact differ that way. However, it ought to be possible to find cases in which an analog to (12a': and) sounds normal but an analog to (12a: or) sounds odd because of the oddity of pooling things of types that would not normally be lumped together. Some possible examples of this type are given in (19):

- (19) a. Not enough universities have been requiring language courses and not enough students have been taking them.
  - a'. ??Not enough universities have been requiring language courses or students taking them.

- b. Next time, let's hire somebody who doesn't give so many women Fs and so many dyslexics  $\mbox{\sc As.}$
- $\textbf{b}^{\text{!`}}.$  ?Next time, let's hire somebody who doesn't give so many women Fs and dyslexics As.
- b". Next time, let's hire somebody who doesn't give so many good students Fs and bad students As.

In (19a), two different kinds of faults are being attributed to the universities and to the students are, and in (19b), giving women Fs and giving dyslexics As don't count as two instances of the same thing in the way that giving good students Fs and giving bad students As count as two instances of giving grossly inappropriate grades.

There are in fact a number of types of element that can appear in the first conjunct of

a S but have the whole coordinate structure in their scope:

(20) a. John may love avocados and Mary hate them.

b. John hasn't cleaned the bathroom or Mary the kitchen.

c. John happened to be in the bathroom and Mary in the basement when the phone rang.

d. For all we know, John may be in New York and Mary in Los Angeles.

- e. The Yankees have often finished first and the White Sox last.
- f. New instruments like the electron microscope or new laws like Maxwell's <u>may</u> develop in one specialty and their assimilation create crisis in another. (Kuhn, *Structure of Scientific Revolutions*, 181)
- g. I tried it in both positions, one of which <u>must have</u> been the locked position and the other one the unlocked position, but it wouldn't work either way.

Note that in (20g) *must* cannot be interpreted as having the first conjunct as its scope (with a deleted second occurrence of it taking the second conjunct as scope), since the speaker makes clear that he doesn't know which position was the locked position and thus could not say of either position that it must have been the locked one.

The elements of the first conjunct that have the whole coordinate structure in their scope include not only auxiliary verbs such as *have, may*, and *must*, but also other Raising-to-subject verbs such as *happen*, and S-modifying adverbials such as *often*. These sentences look like gapped sentences, but if the shared verbs and adverbs appear only once in the deep structures, then they can't involve Oapping, because there are no multiple occurrences of the verbs and adverbs to delete all but one of, e.g. in deep structure (20a) will have only one occurrence of *may*.

However, even if these sentences are not instances of Gapping, their resemblance to gapped sentences is more than just a matter of their gross shape, since the parts of the conjuncts are required to contrast the same way as in gapped sentences, e.g. the subjects cannot normally be coreferential and must have the same semantic role (using that term somewhat loosely) in relation to the predicate phrases:

- (21) a. John lives in New York and he wants to move to California.
  - a'. \*John may live in New York and he want to move to California.

a". \*John; drinks beer and he; wine.

- b. John is in New York and Mary is under the impression that he is in London.
- b'. \*John may be in New York and Mary be under the impression that he is in London. b". \*John may be in New York and Mary under the impression that he is in London.
- b". \*John is in New York and Mary under the impression that he is in London.

Hudson (1976) has proposed an analysis under which sentences as in (20) could in fact be regarded as instances of Gapping. Specifically, he treates Gapping-sentences as derived from a structure in which conjuncts are grouped as in a *respectively* construction,

via a 'Conjunct-postposing' transformation that moves conjuncts out of the conjoined pieces into positions at the end of the coordinate structure, e.g. (22b) would be derived from a structure that would otherwise underlie (22a):

- (22) a. John and Bill invited Mary and Jane respectively.
  - b. John invited Mary, and Bill Jane.

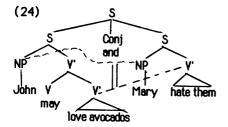
Under Hudson's proposal, may would be combined with [ John and Mary love avocadoes and hate them ( respectively)], Raising could apply, yielding [ John and Mary may [ love avocadoes and hate them ( respectively)]], and Conjunct-postposing could then apply to the latter structure, yielding (20a) without any need for a step that moves may into only one conjunct of a coordinate structure.

Hudson's 'Conjunct-postposing' rule has some very unappealing features: it requires what can be massive shifts of constituents to the right end of the affected domain, it has to impose a grouping of the postposed elements into units that would normally be thought of as conjuncts, it has to replace the separate occurrences of the conjunction in the input by a single occurrence of it in the output, and it has to apply in such a way as to keep track of the order of the elements in the various conjoined parts, points that becomes more obvious if one considers examples that have more than two conjuncts:

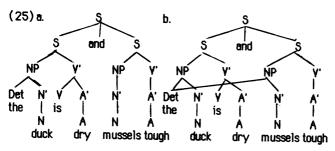
- (23) a. Tom, Lucy, Edna, and Fred ordered spareribs, roast duck, steamed lobster, and sauerbraten respectively.
  - b. Tom ordered spareribs, Lucy roast duck, Edna steamed lobster, and Fred sauerbraten.

However, his proposal has one important characteristic that has been sorely lacking in other treatments of coordination, namely that it posits structures that make explicit the organization of the conjuncts into sets of contrasting units that are relevant to both the *respectively* construction and the Gapping construction. The problem with Hudson's deep structures for these constructions is that it leaves inexplicit another dimension of structure that is also relevant to the syntax of coordinate structures, namely the organization of the various pieces into conjunct Ss. I thus conjecture that a full analysis of coordination will require structures that specify not only the organization of a conjoined S into its conjuncts but also the relevant contrast relations across the conjuncts. The deep structure of (23a) and (23b) would still be a conjunction of Ss, but supplemented with a relation indicating the cross-conjunct contrast relations. Gapping and *respectively* constructions could still be regarded, as by Hudson, as closely related, but would now differ with regard to which of these dimensions of structural organization was given overt realization.

I have no firm conclusion as to the surface constituent structure of sentences as in (20). The most obvious possibility is that of a coordinate S in which the 'shared' element appears only in the first conjunct. However, if that possibility is combined with the revision of Hudson's analysis that I just suggested, the surface structure will also contain information from which one can identify the underlying conjoined complement, namely the pair of contrast relations between the two subjects and the two V's (24). Here the broken lines indicate the contrast relations and the double line their link to a single coordinate structure. Other possibilities that one might seriously consider include a structure in which may is represented as simultaneously belonging to both clauses, i.e. a one in which may has two mothers, one in each conjunct, as in the treatment of Right-Node-Raising advanced in McCawley 1982, though appearing in a position in the word order that corresponds only to its role in the first conjunct.



The surface structure of shared determiners, as in (1), is likewise far from clear. The most obvious possibility is a structure in which the shared item is a constituent only of the first conjunct, and another possibility is one in which it is simultaneously a daughter of nodes in each of the conjuncts:



In either case, though, a constituent of the first conjunct has syntactic and semantic effects in all of the subsequent conjuncts, and for it to have those effects, Gapping must apply.

I will close by offering two rationales for allowing Raising and perhaps other transformations to skip over gapped conjuncts and localize their effects in the first conjunct. First, the symmetric status of the conjuncts is generally taken as the reason why there is across-the-board application of transformations to coordinate structures, as in the GPSG view of coordinate structures as having multiple heads and thus features such as slash-features that are to be transmited to the head of a construction being transmitted to all the heads (Gazdar et al. 1985: chapter 8). However, Gapping, unlike Conjunction-reduction and Right-node-raising, introduces an asymmetry into a coordinate structure and leaves the first conjunct, as the only complete conjunct, uniquely qualified to stand for the whole coordinate structure. And second, the interaction noted here between shared determiners and Gapping is an instance of the phenomenon described in Borkin (1975), in which any sort of "reduction" of an embedded S serves to weaken its clause boundaries and thus facilitate the application of rules that are normally inhibited by clause boundaries; specifically, Gapping, by eliminating from the second and subsequent conjuncts material that contributes to the conjunct's status as a S, opens up possibilities for material in the first conjunct to behave as if it is a clausemate of material in the subsequent conjuncts.

Okay, but what about examples as in (20) in which, as I have argued, there really isn't any Gapping, although the sentence looks like one whose derivation would involve Gapping? The best that I can suggest here is that the contrast relation that I have posited is an asymmetric relation, taking the first conjunct as reference point and identifying other conjuncts as contrasting with it, and that that is enough to allow Raising to apply asymmetrically, localizing its effects in the first conjunct.

## NOTES

- \*I am grateful to Emmon Bach, Paul Deane, George Lakoff, and Ivan Sag for valuable comments on the oral presentation of this paper at BLS 19, and to audiences at Eötvős Loránd University (Budapest), Janus Pannonius University (Pécs), and the University of Chicago for enlightening discussion at presentations of this material at those institutions.
- 1. In the following example, there is a shared determiner, but it is impossible to tell whether Gapping has applied, since the element that Gapping would delete (a form of *be*) is deleted anyway by an option that "absolute" constructions in English allow:

"Cordelia was nineteen, short but deliciously rounded, her features delicate and lips always slightly parted below a lustrous mass of brown hair" (Poul Anderson, *Boat of & Million Years*, 43)

2. The following may also be an example of this type; my uncertainty is as to whether the coordinate structure of relevance here is the underlying conjoined object of *make* or a conjoined non-constituent reflecting the application of Raising-to-object:

It makes one's blood boil, yet heart tremble, to think that we Englishmen and our American descendants, with their boastful cry of liberty, have been and are so guilty. (Charles Darwin, *Voyage of the Beagle*, quoted by S. J. Gould)

- 3. See McCawley 1988a for arguments that 'adverbial NPs' are prepositional phrases with a zero P, e.g. *He left last Tuesday* is like *He left on Tuesday*, except that where the latter has the overt P *on*, the former has a zero P.
- 4. Here I leave up in the air what exactly underlies a *respectively* construction. Examples like the following have caused me to entertain serious doubts about my previous claim (e.g., 1988b: 536-40) that that construction is derived by a generalized version of Conjunction Reduction that applies to a conjoined input whose conjuncts contrast at two or more places:

The typeseters have put in and omitted spaces virtually at random. About 90% of the corrections I've made consist in <u>respectively</u> removing and restoring spaces.

Since the antecedent of *respectively* here is in a separate S, it can't be derived by applying a version of CR to a domain containing the conjuncts of the antecedent.

- 5. One particularly attractive way of accomplishing this is through Wierzbicka's (1972) proposal that conjoined Ss be accompanied in deep structure by a specification of the semantic or pragmatic condition that licenses the conjoining, e.g. as where one can specify a general proposition of which the conjuncts are special cases and 'contrasting elements' correspond to the same part of the 'general proposition'.
- 6. Ivan Sag has reminded me of the class of German sentences discussed in Kathol (1992), in which a subject in the middle of a first conjunct is shared by subsequent conjuncts:

In den Wald ist <u>der Jäger</u> gegangen und hat einen Hasen gefangen. 'The hunter went into the forest and caught a hare'

Such sentences differ from those under discussion here in that the shared constituent is a whole NP rather than one of the various kinds of "operators" discussed here, and it occurs not at the beginning but in the middle of its conjunct; I have not yet formed a clear opinion as to how much of an analysis of German "shared subject" sentences can also apply to the sentences under discussion here. Kathol develops an analysis involving conjoined YPs, with the subject moved into the first conjunct when something else occupies the position before the finite Y.

7. Emmon Bach has reminded me that in constructions with subject-auxiliary inversion, a

single auxiliary verb can appear with a conjoined complement:

Will John clean the bathroom and Mary wash the windows?

Such sentences pose an important problem for the approach to the syntax of auxiliary verbs developed in McCawley 1988b and other works, if they are to be given a deep structure in which a single occurrence of the auxiliary verb has a conjoined complement: since the deep structure would then be of the form [ $_S$ Q[ $_S$ [S and S] will]], [[S and S] will] cannot undergo normal Raising to subject, since the complement of will is not of [NP V'] form. A possible way out of this problem would be to say that Raising simply does not apply, and since Inversion will then apply with the top S as domain, the anomaly of will as making up a whole Y' is eliminated. My most easily articulated worry about that answer is that it does not account for why such sentences require contrasting subjects the way that Gapping–Ss do:

\*Will John; clean the bathroom and he; wash the windows?

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