On WH-Indexing

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0. Baker (1970) proposed that in order to account for the range of readings available for questions like (1) it was necessary to index WH-interrogative pronouns as being associated with a particular occurrence of the abstract Q morpheme which he presumed to head all question clauses.

(1) Who remembers where Clyde shot who?

Kuno & Robinson (1972) have argued that a number of independent constraints on the binding of WH pronouns conspire to limit the association of any given WH to (the Q of) exactly one clause; hence they conclude that Baker’s indexing mechanism is superfluous. They suggest that the possibility of multiple replies to such questions as (1) results from pragmatic considerations such as conversational expectations concerning the informativeness of replies to questions.

In this paper I show that languages (e.g. Turkish, Japanese) which lack WH-movement in questions differ systematically from languages like English which have question movement in that they allow one or more well-formed reply to multiple WH questions like (1). In movement languages like English, a reply can specify a value for any WH which is either unmoved or moved in the root clause:

(2) Joe remembers where Clyde shot Bill, and
Sue remembers where Clyde shot Sam.

is a well-formed reply to (1). An unmoved WH in a nonroot Q clause can optionally remain unspecified; (3) is also a well-formed reply to (1):

(3) Joe remembers where Clyde shot who.

But a WH which is moved in a nonroot Q clause may not be specified in the reply; (4) and (5) are not well-formed replies to (1):

(4) [*] Joe remembers who Clyde shot in the alley, and
I remember who Clyde shot in the street.

(5) [*] Joe remembers that Clyde shot Betty in the alley,
and I remember that Clyde shot Sue in the street.

[I use the star within brackets to indicate that the sentence, while grammatical, is not a well-formed reply to (1).]

Nonmovement languages like Turkish and Japanese allow replies like (4).

I argue that this fact can be accounted for under the assumption that WH pronouns are indexed for association with a particular Q clause, since since the movement of a
WH pronoun in an embedded Q clause unambiguously associates it with that clause in a movement language, removing one possible well-formed reply (under the assumption that only WH pronouns associated with the root Q clause are intended by the speaker as variables to be assigned values in the reply).

I further argue that two of Kuno & Robinson's restrictions on WH-movement (the constraint that WH's indexed to the same clause must be clause-mates at the time of movement and the constraint on WH-crossing) cannot be maintained, since clear counterexamples to both principles are relatively easy to find. It appears that there are some constraints something like those proposed, but they are not as general as Kuno & Robinson claim, and in particular they are not general enough to eliminate the necessity for WH indexing.

1. Baker's Indexing Proposal

The original motivation for WH-indexing was Baker's (1970) observation that questions (1) and (6) allow different replies. In the situation where several shootings have taken place, with a different person shot in each location, (1) allows responses (2) and (3), while (6) allows responses (7) and (8):

- (1) Who remembers where Clyde shot who?
- (2) Joe remembers where Clyde shot Bill, and Sue remembers where Clyde shot Sam.
- (3) Joe remembers where Clyde shot who.
- (6) Who remember who Clyde shot where?
- (7) Joe remembers who Clyde shot in the alley, and Sue remembers who Clyde shot in the street.
- (8) Joe remembers who Clyde shot where.

Replies (3) and (8) can of course be reduced to

- (9) Joe does.

But neither (7) nor (8) is a well-formed reply to (1), nor is (2) or (3) a well-formed reply to (6).

To account for these differences, Baker proposed that each WH was indexed to a particular Q clause, and that a WH could move only to the front of the clause for which it was indexed. Then, assuming that only WH's indexed to the root Q clause are variables for which values are requested in the direct question, the possible replies are seen to correspond to the possible underlying representations of questions like (1) and (6). The WH pronoun which moves in the lower Q clause must be indexed to the lower clause, and consequently (WH pronouns under this proposal being indexed to exactly one Q) is not interpretable as indexed to the root Q, hence not interpretable as a request for information. This accounts for the fact that (2)-(3) and (7)-(8) are well-formed replies to questions (1) and (6).
Possible underlying representations for (1):

(10) \[ S_{ik} \]

Who \( i \) remembers \( S_j \)

where \( j \) Clyde shot who \( k \)

(11) \[ S_j \]

Who \( i \) remembers \( S_{jk} \)

where \( j \) Clyde shot who \( k \)

Possible underlying representations for (6):

(12) \[ S_{ij} \]

Who \( i \) remembers \( S_k \)

who \( k \) Clyde shot where \( j \)

(13) \[ S_i \]

Who \( i \) remembers \( S_{jk} \)

who \( k \) Clyde shot where \( j \)

[Strictly speaking, these are not deepest representations, as I have taken the liberty of moving the WH's to their surface positions.]

Unfortunately, Baker's proposal fails to account for all of the restrictions on well-formed replies. It accounts for the inadmissibility of (2) as a reply to (6), and of (7) as a reply to (1); but it does not account for why (3) is inadmissible as a reply to (6), and (8) as a reply to (1). These possibilities are allowed by Baker's analysis, since the representation ultimately underlying the sense of (1) to which (3) is a reply is identical to the representation underlying the sense of (6) to which (8) is a reply.

Furthermore the replies (3) and (8) have identical underlying representations, and indeed they are semantically equivalent, in the sense that if Joe can tell you where Clyde shot who, he can surely tell you who Clyde shot where. He needs exactly the same knowledge to answer either question, namely a list of pairs of people with places. If there is a difference, it seems to be a matter of the speaker's presupposition about the way Joe organizes his knowledge, i.e. essentially a matter of foregrounding one of the members of each pair. In any case it is clear that the range of possible replies to WH questions cannot be entirely determined by the range of indexing possibilities. In some cases at least the form of the reply is determined by the form of the question (or by whatever factor it is that determines the form of the question, i.e. whatever semantic
or functional factor causes a speaker to use (1) as opposed to (6), or vice versa.

One might then propose that the permissible replies to WH questions are determined entirely by the surface form of the question, and not by the Indexing of WH's to particular Q clauses in the underlying representation at all. The facts of (1)-(3) and (6)-(8) would be accounted for if it were simply required that WH's in replies to WH questions occupy the same position as the corresponding WH in the question. Then no indexing would be required and all of the constraints on replies would be accounted for by the same principle.

This, however, is not entirely true either: the fact still remains that a WH which moves in a downstairs Q clause can never be replaced in the reply by a specification:

(14)[*] Joe remembers that Clyde shot Betty in the alley, and I remember that Clyde shot Sue in the street.

(15) [*] Joe remembers that Clyde shot Betty where, and I remember that Clyde shot Sue where.

Things like (15) are monstrously ungrammatical, and (14) is not a possible reply to either (1) or (6). So the basic fact still remains for which the indexing mechanism was devised: a WH which moves in a nonroot Q clause is unambiguously marked as not a variable to be specified in the reply.

Furthermore it appears that the parallelism constraint which blocks e.g. (8) as an answer to (1) can be overridden by other functional considerations: if the question is

(16) Who remembers which books Charley bought where?

the need to contrast which books with some other constituent can lead to the construction of a reply in which the contrasted constituents occupy clause-final position in their respective clauses, and the other WH is fronted:

(17) I remember where he bought which books, but I can't remember where he bought which records.

No such considerations can make (2) a well-formed reply to (6), however, or (7) a well-formed reply to (1). It seems likely, then, that (3) and (8) are blocked as possible replies to (6) and (1) respectively by some principle separate from the principle that a WH moved in a downstairs Q clause is unambiguously indexed in the downstairs clause.

2. Another Attempt to Eliminate Indexing

Kuno & Robinson (1972) discuss a number of constraints on multiple WH questions, and argue that as a result of these constraints, it is impossible for a WH to be ambiguously indexed; i.e. they claim that not only are WH's bound to particular Q clauses, but that in fact every WH
is bound to the smallest Q clause containing it, so that there is no need for the indexing mechanism. In this section I will examine the two crucial constraints, and show that they cannot be maintained in general, with the result that it will no longer follow that WH pronouns are unambiguously indexed to the smallest dominating Q clause.

2.1 The Clause-Mate Constraint on Multiple WH

On the basis of numerous observations, Kuno & Robinson propose the following constraint on multiple WH words:

Multiple WH words bound by the same Q must be clause mates at the time of application of question movement.

Among the clearer contrasts that they exhibit in support of this constraint are the following:

(18) a *I don't know who expects (that) who will marry Mary.
    b I don't know who expects who to marry Mary.

(19) a *Who showed who is a spy is a secret.
    b Who showed who to be a spy is a secret.

(20) a *Tell me to whom it seemed that what was idiotic.
    b Tell me what seemed to whom to be idiotic.

(21) a *Who is a better linguist than who is is a difficult question to answer.
    b Who is a better linguist than who is a difficult question to answer.

In each case the (a) sentence has WH's which must be indexed to the same Q clause, because there is exactly one Q clause; and the two WH's in each case are non-clause mates. These sentences are ungrammatical. In the (b) examples, the only difference is that the WH's are clause mates, and the sentences are grammatical.

These judgments appear to be correct, and it is clear that there are some interesting constraints on the syntactic relation between WH words indexed to the same Q; on the other hand, consideration of other facts reveals that the clause-mate constraint on multiple WH cannot be maintained in general, and that the contrasts in (18)-(20) must be due to more specific constraints. I will suggest in what follows what the nature of some of these constraints might be, but I will not be able to explain them. It is not the purpose of this section to present a satisfactory account of the constraints on WH-pairing, but merely to show that the clause-mate constraint must be rejected.

Consider first examples like the following, where the downstairs WH is a nonsubject:

(22) Tell me who claimed that Sue was kissing who.
(23) Who thinks we should send this stuff where?
(24) What I can't remember is which recipe requires that I buy which spice.
In these examples the two WH words are non-clause mates and bound to the same Q, yet the sentences are totally unobjectionable. Kuno & Robinson give examples similar to (22) which seem somewhat worse, e.g.

(25) *Tell me who remembers that we saw who in Harvard Sq.
(26) *Tell me who knows that Mary is fond of who.

I have no idea why it should be, but it seems that when the downstairs WH is in a factive complement the sentence is much worse. If claim or believe is substituted for the object-embedding verb in these sentences, they become grammatical. This observation accounts for many of Kuno & Robinson's examples; though others remain baffling, it does seem that in general WH words bound to the same Q can be non-clause mates, if the lower one is a nonsubject.

In other cases, they report judgments which must be questioned. I have found no speakers who reject a sentence like their example

(27) Tell me who predicted that something terrible would happen to who.

(which they star). And the following example, which is like their example except that I have corrected the tense in the lower clause, is not only perfect but better than the raised version (29) which obeys the clause-mate constraint:

(28) I cannot reveal to you who thought who was a spy.
(29) I cannot reveal to you who thought who to be a spy.

Here the downstairs WH is a subject. I have no idea why (28) is so much better than (19)a; but one thing that is clear is that by no test is the second who in (28) a clause-mate of the first.

Finally, there is one strikingly systematic class of counterexamples to the clause-mate constraint: if all of the NP's in the sentence are WH, they may freely be in different clauses, even though there is only one Q:

(30) Who thinks who should buy what?
(31) Who thinks who should go where?
(32) Who thinks who should send which books to whom?

It seems clear that there can be no general constraint to the effect that WH bound to the same Q must be clause mates. In fact examples can be constructed which involve considerable syntactic complexity between the WH's; for example the lower one can be inside an island which does not contain the upper one, as in the following situation. Suppose it is known that certain enemy agents have concocted a fiendish scheme to knock off some of our senators. The plot is that each agent has acquired trained bats that will attack and kill a specific senator, and none other. Now
(33) In order to foil this plot, we must find out which agent has bats that are trained to kill which senator.

2.2 The Crossing Constraint

Again on the basis of numerous observations, Kuno & Robinson propose the following WH Crossing Constraint:

No WH may move so as to cross over another WH, except that when and where can cross over nonsubjects.

This constraint seems to hold in a large class of cases, but with widely varying degrees of stringency. For example, the cases of crossing over a nonsubject, as

(34) Tell me to whom you gave what.
(35) Who did you give what to?

are not nearly so bad as cases involving crossing over a subject:

(36) *What did who do?
(37) *Where did who ask you to leave the garbage?

There are some instances, however, where the constraint appears not to be obeyed at all, and these are precisely the cases which should be most impossible if a WH could only be bound to the nearest dominating Q. Kuno & Robinson give some examples of Q clauses out of which extraction is possible:

(38) This book, I don't know who wrote.
(39) This is something that I don't know what I should do about.

Another well-known example is

(40) These are the crimes which the FBI doesn't know how to solve.

Extraction from Q clauses is generally impossible; but just in those cases where it is possible, we find that extraction by Question movement is just as possible as extraction by any other rule:

(41)a This book, Bill says he doesn't know who wrote.
   b Which book did Bill say he didn't know who wrote?
   c Tell me which book Bill said he couldn't remember who wrote.

(42)a That's what Bill said he didn't know what he should do about.
   b What did Bill say he didn't know what he should do about?
   c I wonder what Bill was saying he didn't know what he should do about.
(43)a There are some crimes which the FBI knows how to solve.
   b What crimes does the FBI know how to solve?
   c Which crimes the FBI knows how to solve is a state secret.

The fact is that extraction by any rule is a bit awkward in the first two cases; but the point is that it is no worse when effected by Question movement than it is when effected by any other rule. Examples (41)-(43)b&c clearly show that a WH can move out of an embedded Q clause to the front of a higher Q clause, and consequently, if there is indexing at all, must be indexed to the higher Q.

2.3 If all of the constraints proposed by Kuno & Robinson could be maintained, it would be impossible for any WH to be indexed to a Q clause other than the smallest immediately dominating one. This is so because one of the WH’s indexed to a given Q clause must move to the front of that clause; if they are all within a lower Q clause, as in (44), none can escape, according to the WH crossing and Double Dislocation constraints, and if one is outside the lower Q clause, the structure is ill-formed according to the Clause-mate constraint. This situation is represented in (45).

(44) \[ S_{ij} \]
    \[ S_k \]
    \[ \ldots WH_i \ldots WH_j \ldots WH_k \]

(45) \[ S_{ij} \]
    \[ WH_i \]
    \[ S_k \]
    \[ \ldots WH_j \ldots WH_k \]

I have shown in this section, however, that neither of the two most crucial constraints can be maintained. Consequently the argument that unambiguous binding of WH to the nearest dominating Q follows from independently established principles does not go through.

3. Multiple WH Questions in Non-Movement Languages

It was noted in section 1 that the indexing analysis accounts for the ill-formedness of any reply which specifies a value for a WH which has moved in an embedded Q clause by virtue of the fact that such movement betrays that the WH in question is indexed to the lower Q and not to the root. A prediction which is made by this analysis, and not by any other that I know of, is that in a language which lacks WH movement in questions no WH will get a chance to betray its allegiance to the lower Q clause, and the corresponding reply will not be eliminated. Hence questions corresponding
semantically to (1) and (6) will be superficially indistinguishable, and will allow replies like (2) and like (7).

Turkish is a language which lacks WH movement in questions. There are ill-understood restrictions on the ordering of WH words, among each other and with respect to other constituents of the clause, but there is no movement of WH words to the front (or rear) of a Q clause. The facts are as follows:

(46) **Charley’nin kimi nerede vurduğununu kim hatırlıyor?**
    Charley who where shot who remembers

(47) **Charley’nin neredede kimi vurduğununu kim hatırlıyor?**
    Charley who who remembers

The order of who and where in the embedded clause is more or less optional; there is a slight preference for the order exhibited in (46), but it can be overridden under the appropriate discourse circumstances. Both versions are ambiguous three ways, as indicated by the fact that they allow three different well-formed replies:

(48) **Ben hatırlıyorum.**
    I remember.

(49) **Charley’nin Hasan nerede vurduğununu ben hatırlıyorum, ve Charley’nin Mehmedi nerede vurduğununu Ayşe hatırlıyor.**
    'I remember where Charley shot Hasan, and Ayşe remembers where Charley shot Mehmet.'

(50) **Charley’nin bahçede kimi vurduğununu ben hatırlıyorum, ve Charley’nin ormanda kimi vurduğununu Ayşe hatırlıyor.**
    'I remember who Charley shot in the garden, and Ayşe remembers who Charley shot in the forest.'

The facts are exactly as predicted under the indexing analysis.

The indexing theory makes a further prediction, based on the fact that any Q clause which contains one or more WH words must have at least one WH word indexed to it: thus we have no examples like

(51) *Who remembers whether Charley shot who?

where both WH are indexed in the root clause, and no WH is indexed to the embedded Q clause. I don’t know why this is, but the same restriction holds in Turkish. An unambiguous way of asking a whether question is illustrated in (52); the verb stem of the Q clause is reduplicated, with the adverbial suffix -Ip ‘and’ affixed to the first instance and the negative suffix -mA followed by any further inflectional affixes attached to the second:

(52) **Hasanın Ayşeyi öprü öpmediğini sordu.**
    Hasan Ayşe kiss-and not-kiss he asked
    'He asked whether Hasan kissed Ayşe'
Turkish, like English, does not allow WH words inside such whether-clauses:

(53) *Hasanın kimi öpüp öpmediğini kim hatıralıyor?
    Hasan who whether kissed who remembers?
    'Who remembers whether Hasan kissed who?'

So if we consider a multiple WH question like

(46) Charley'nin kimi nerede vurduğuını kim hatırlıyor?
    'Who remembers where Charley shot who/
    who Charley shot where?'

even though no WH has undergone WH movement in the embedded Q clause, we know that one of them must be indexed to that clause; it is just impossible to tell which one. Consequently, under the indexing analysis, although the question allows replies in which either of the WH words in the embedded clause is specified, it should still be impossible to interpret both of them as indexed to the root clause, since then no WH would remain to be indexed to the lower clause. Thus it is predicted that a sentence which leaves no WH in the lower clause will not be a well-formed reply to (46), and this is in fact the case:

(54) [*] Hasanın Orhancı bahçede vurduğuunu ben hatırlıyorum, ve Hasanın Mehmedi ormanda vurduğuunu
    Ayşe hatırlıyor.
    'I remember that Hasan shot Orhan in the garden, and Ayşe remembers that Hasan shot Mehmet in
    the forest.'

(54) is a perfectly grammatical sentence, but it is exactly as odd as a reply to (46) as (14) is as a reply to (1).

The facts, then, are exactly as expected under the assumptions of the indexing analysis. In any multiple WH question involving nested Q clauses, at least one of the WH words must remain unspecified in the reply, because at least one must be indexed to the lower Q clause; if, furthermore, any WH betrays its allegiance to a lower Q clause by undergoing WH movement in that clause, that particular WH must remain unspecified in the reply. Any other WH is free to be interpreted as indexed to the root Q clause, and hence is eligible for specification in a well-formed reply.

Under the proposal advanced by Kuno & Robinson, on the other hand, according to which all WH in the downstairs Q clause are indexed to that clause, there is no explanation for these particular restrictions on well-formed replies. There would be no reason to expect that at least one of the WH contained in the lower Q clause must remain unspecified, nor that there would be the observed difference between languages with WH movement in question clauses and languages lacking such movement. According to their hypothesis, sentences (1) and (6) do not differ in underlying represen-
tation, both having both downstairs WH words bound to the lower Q clause. The fact that (1) allows a reply like (2), they say, is due to the fact that the state of affairs in the real world may be such that no answer of the form (3) (which corresponds to the underlying representation of the question) is possible, i.e. there may be no single person who possesses all of the necessary knowledge. If the knowledge is in fact distributed as indicated in (2), then the replier has no choice but to offer (2) as a reply to (1).

But if it is simply the state of distribution of knowledge in the real world that determines what the reply to a question like (1) will be, we would also expect to find (7) as a possible reply to (1) -- for (7) represents a possible distribution of knowledge different from that represented by (2), i.e. a person could conceivably be able to truthfully say (7) under circumstances where he could not truthfully say (2). And yet, even if that is the situation in the world, it is impossible to use (7) as a reply to (1).

The conclusion is inescapable that the syntactic form of the question in some way determines the range of possible replies; and the observed limitations on well-formed replies seem to be essentially those predicted under the indexing analysis. I.e. the range of possible responses is, contrary to the suggestion of Kuno & Robinson, determined by the underlying representation of the question, to the extent that it can be recovered from surface syntactic characteristics. Purely surface factors, as discussed in section 1, may have some effect as well on the form of a proper reply.

4. Conclusion

It is clear that the argument of Kuno & Robinson that WH-Q binding is necessarily unambiguous as a result of independent constraints must be rejected. Kuno, in a comment after the presentation of this paper, suggested that one might give up the Clause Mate Constraint and yet maintain that WH words are unambiguously bound to the nearest dominating Q; such a proposal would have the automatic consequence that no whether clause could contain a WH, since if a Q clause contains a WH that is bound to that Q, it (or one of them if there are more than one) must move to the front of the Q clause, thereby presumably blocking whether-formation. Thus the ungrammaticality of both

(55) *Who did you find out whether John kissed?
(56) *Who remembers whether John kissed who?

would be accounted for.

The problem with this, as with the other constraints discussed in section 2, is that it cannot be maintained in general. Kuno & Robinson's example

(57) Which books are you not sure whether or not you should read?
is a counterexample to it, as are my examples (41)-(43)bc in section 2.2. It is not clear what makes (57) different, probably its semantic relatedness with the infinitival Q clause, which in general allows extraction (by question movement as well as any other rule):

(58) Which books are you not sure whether to read?

But in any case such examples clearly show that a WH can be bound to a Q clause properly containing its nearest dominating Q clause, and that the explanation for the ungrammaticality of (55)-(56) must be due to a more specific, or at least different, constraint.

This proposal furthermore does not have the virtue which could be claimed for the earlier one, that it follows from independently established principles. It would have to be stipulated; and since not only is there no evidence to support it, but also a small but clear class of counterexamples to it, there seems to be no reason to accept it.

It is clear that there are complex and interesting constraints on the occurrence, binding, and movement of WH words in Q clauses. I believe it is also clear, however, that there is at present no viable account of those constraints which would have as a consequence the elimination of the possibility of indexing a WH to a higher Q clause.

Against this, the evidence from the restrictions on well-formed replies to multiple WH questions discussed in sections 1 and 3 is considerable in favor of the WH-indexing analysis, or some equivalent device which allows for representation of the intention of the speaker to designate certain WH words as requests for information, i.e. as part of the direct question, and for this intention, to the (imperfect) extent that it is reflected in surface structure, to determine the range of acceptable replies.

FOOTNOTES

* This work was supported in part by a grant from the Mathematical Social Science Board for the Advanced Research Workshop on Constraints on Grammars, conducted in Amherst, Mass., July-August 1974. I would like to thank Susumu Kuno for helpful discussion and criticism; also the members of the (spring 1974) Formalism Seminar at Harvard: Janet Breckenridge, David Perlmutter, John Whitman, Sandy Chung, and Scott Soames. I have also profited from discussions with Jessie Pinkham and Jaklin Kornfilt.

1. Baker in fact assumes that the WH is indexed to the abstract Q morpheme which he presumes to occupy leftmost position in the Q clause. It is not necessary, however, to accept the existence of such a Q morpheme as part of the indexing proposal; all that is necessary is to allow each
WH to be associated with a particular Q clause. One formal way of representing this would be to subscript the index of the WH word to the S-node dominating the clause with which it is to be associated. Since Baker's arguments for the existence of the Q morpheme are not particularly convincing, it is important to note the independence of the two issues.

2. Some speakers have a mild distaste for needlessly crossing one WH over another, so that if they intend only the matrix WH to be specified, i.e. both \( WH_1 \) and \( WH_n \) are indexed downstairs, the version (6) is the one they use. For these speakers (1) is unambiguous and has only the reading represented in (10), and (3) is (mildly) ungrammatical.

This mild crossing constraint is much weaker than the constraint on well-formed replies discussed in the text. Such speakers find (1) mildly distasteful as a question requesting that both \( WH_1 \) and \( WH_n \) be specified, but they categorically reject (8) as a reply to (1), even though it has a form in which the crossing constraint is not violated.

3. It is essential in judging these examples to construct a context in which the set of expected responses is rather small. The asker of the question must have in mind some finite set of candidates for each WH to be specified, so that in effect he is asking his addressee to specify which of a finite set of possible circumstances, all visualized by him, actually obtains. This is only one of a number of baffling pragmatic limitations on the use of multiple WH questions, to say anything coherent about which would require knowing a lot more than I do. In any case all of the multiple WH questions discussed in this paper require such a presupposition; failure to construct one will make them all sound pretty strange.

4. Examples (42) and (39) are also counterexamples to the Double Dislocation Constraint, which says that if a constituent in a clause is dislocated by any rule operating over a variable (it can be shown that deletions over a variable are "dislocations" for the purposes of this constraint) no other constituent of that clause can be dislocated.

This constraint is extremely general, and the fact that the constructions exhibited here allow a violation of it require explanation. It seems that the infinitival constructions know how to and know what to allow extraction readily, whereas virtually all finite Q constructions resist it. Examples like (42) are the rare exception, and in fact they are appreciably worse than the infinitival ones. It is possible that examples like (42) and (39) sound as good as they do because of the existence of a paraphrase with infinitival know what to.
5. Exactly parallel facts are found in Japanese. Multiple WH questions seem to be a bit strange in Japanese, a judgment reported by some of my Turkish informants as well; but allowing for this strangeness, the possibilities for well-formed replies are exactly the same as in Turkish.

(i) Dare ga, doko de dare o Charley ga butta ka
    who where who Charley hit Q-particle
    oboete iru ka?
    remember Q-particle

    'Who remembers where Charley hit who?'
    'Who remembers who Charley hit where?'

(ii) Tom ga, dare o Charley ga kooen de butta ka oboete iru;
     Tom who Charley park in hit remembers
     Bill ga dare o Charley ga undoozyoo de butta ka
     Bill who Charley playground in hit
     oboete iru.
     remembers

    'Tom remembers who Charley hit in the park, (and)
    Bill remembers who Charley hit in the playground.'

(iii) Tom ga, doko de Charley ga Mary o butta ka oboete iru;
     Tom where Charley Mary hit remembers
     Bill ga doko de Charley ga Jane o butta ka oboete iru.
     Bill where Charley Jane hit remembers

    'Tom remembers where Charley hit Mary, (and)
    Bill remembers where Charley hit Jane.'

(iv) [*] Tom ga, Charley ga Mary o kooen de butta koto o
     Tom Charley Mary park in hit that
     oboete iru; Bill ga, Charley ga Jane o undoozyoo
     remembers Bill Charley Jane playground
     de butta koto o oboete iru.
     in hit that remembers

    'Tom remembers that Charley hit Mary in the park,
    and Bill remembers that Charley hit Jane in the
    playground.'

Sentence (i), which corresponds to the English sentences (1) and (6), allows answers (ii) and (iii), but not answers like (iv).
Kuno (personal communication) has pointed out to me that even if the general constraint against non-clausemate NIS bound to the same O cannot be maintained, there might be particular constraints which could render the indexing hypothesis untenable. For example, he points out that whereas the indexing hypothesis requires that both WHO's in

(i) Who remembers whom? Charley shot who?

be indexed to the root O in one reading, the following example shows that the complement of a verb like remember cannot ordinarily contain a WHO indexed to the matrix clause:

(ii) *Who remembers that Charley shot who?

To maintain the claim that the downstairs who can be indexed to the matrix clause: in (i), it will be necessary to find an explanation for why the complement in (ii) cannot contain a WHO indexed upstairs, while the complement in (i) apparently can. If the correct constraint is that the complement of remember can never contain a WHO indexed outside that complement, then the indexing hypothesis has to be abandoned.

The constraint involved cannot be quite that simple, however. Infinitival O-complements to remember clearly do allow WHO indexed upstairs:

(iii) Which knots do you remember how to tie?
And whether-clauses of the kind discussed in section 2.2 do too:

(iv) I've forgotten which reports she said she couldn't remember whether (or not) she should file.

Finally, compare the following:

(v) *Which copies do you remember who requested?
(vi) *Which copies do you remember that Mr. Foley requested?
(vii) *Which copies did she tell you who requested?
(viii) Which copies did she tell you that Mr. Foley requested?

(iv) is a bit awkward, but (compare (vii) exactly as awkward as you would expect, given that it involves extraction from that kind of O clause. (v) , on the other hand, is much worse, even though there is no general extraction constraint on that-complements. I believe that the explanation for these facts is that the that-complement to remember is a factive complement, which, as noted in section 2.11, prevents binding of a WHO from a higher clause; the O complements to remember are nonfactive, and therefore may contain WHO words indexed to a higher O.
REFERENCES
