'WH'-IN-SITU IN CONSTITUENT QUESTIONS

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Abstract

All languages have constructions which enable speakers to ask constituent ('wh'-) questions. While cross-linguistically question formation strategies differ, these strategies may share certain features. One such feature is 'wh'-in-situ, the appearance of a question word in a position associated not with syntactic focusing but with a non-question word bearing the same grammatical function. This paper discusses 'wh'-in-situ as it is found in English and Japanese. By fully exploiting the architecture of Lexical-Functional Grammar with its distinct yet parallel projections 'wh'-in-situ is captured by a single non-derivational analysis, providing the basis for future analysis of constituent questions cross-linguistically.

1   Introduction[1]

In terms of the traditional typology of constituent question formation strategies, English is a simple-fronting language and Japanese is a 'wh'-in-situ language.[2]

In a neutral Japanese constituent question, all question words appear in situ.[3] This means that the word order of a neutral declarative sentence and a comparable constituent question will be identical. This is true regardless of whether the constituent question contains a single question word (1b) or multiple question words (2).[4]

(1)   a. Mari-ga   depāto-de   ojōsan-ni   ranpu-o   eranda.
            Mari-NOM   dept.store-LOC   daughter-DAT   lamp-ACC   choose.PAST
            SUBJ   ADJ   OBL_BEN   OBJ   VERB
            'Mari chose a lamp for her daughter at the department store.'
         b. SINGLE CONSTITUENT QUESTION
            Mari-ga   depāto-de   *dare*-ni   ranpu-o   eranda   ka.
            Mari-NOM   dept.store-LOC   who-DAT   lamp-ACC   choose.PAST Q
            SUBJ   ADJ   OBL_BEN   OBJ   VERB
            'Who did Mari chose a lamp for at the department store?'

(2)   MULTIPLE CONSTITUENT QUESTION
         Dare-ga   depāto-de   *dare*-ni   ranpu-o   eranda   ka.
         who-NOM   dept.store-LOC   who-DAT   lamp-ACC   choose.PAST Q
         SUBJ   ADJ   OBL_BEN   OBJ   VERB
         'Who chose a lamp for who at the department store?'

In English when there is a single question word in a constituent question, the question word appears clause-initially regardless of its grammatical function. The result of this syntactic focusing is a different word order from that found in a comparable declarative sentence.

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[1] I would like to thank Mimi Nakajima, Juri Saito and Yasue Toda for their insights and patience. This work is supported by funding from The Arts and Humanities Research Council.
[2] A distinction is often made between two sub-types of in-situ language usually exemplified by Mandarin Chinese and Japanese. It has been argued that Subjacency effects can be detected in one (Japanese), but not in the other (Mandarin Chinese.) See, for example, Watanabe (2001).
[3] The issue of the syntactic operation of scrambling is set aside here as it occurs in addition to constituent question formation and does not appear to be in itself a question formation strategy.
[4] Examples of 'wh'-in-situ appear in italics throughout.

(3)   a. Anna   offered Lily   oranges.
              SUBJ   VERB   OBL$_{GOAL}$ OBJ
      b. SINGLE CONSTITUENT QUESTION
          What   does Anna   offer   Lily?
          OBJ   AUX   SUBJ   VERB   OBL$_{GOAL}$

Only English multiple constituent questions contain examples of 'wh'-in-situ.[5]

(4)   MULTIPLE CONSTITUENT QUESTION
        What   does Anna   offer   *who*?
        OBJ   AUX   SUBJ   VERB   OBL$_{GOAL}$

The key issues which an analysis of 'wh'-in-situ cross-linguistically must address are to an extent dependent on the theoretical framework adopted. For those working within a derivational framework, the question is how the notion of movement can satisfactorily explain constituent question formation which seemingly does not involve displacement. For researchers using the non-derivational framework of Lexical-Functional Grammar (LFG), the main points to consider are the apparent lack of both functional uncertainty and focusing of question words in cases of 'wh'-in-situ.

In LFG, a statement of equivalence between the discourse function FOCUS and an argument or adjunct function is associated with the dislocated position occupied by a question word in a simple-fronting language such as English. The inside-out version of this functional uncertainty has been used to analyse the 'wh'-in-situ language Mandarin Chinese (Huang, 1993). However, the defining characteristic of a 'wh'-in-situ question word/phrase is the fact that it is quite clear which grammatical function it bears. I therefore contend that while functional uncertainty is appropriate for assignment of FOCUS when it has an identifiable c-structure correlate, that is when it is grammaticalized, a unified cross-linguistic analysis of 'wh'-in-situ should not be based on this notion.

Viewed purely in syntactic terms, there is no evidence of focusing in cases of 'wh'-in-situ. This is puzzling given that the constituent question formation strategy employed in simple-fronting languages involves (syntactic) focusing of one question word, while in multiple-fronting languages such as Russian all question words are (syntactically) focused. However, relevant Japanese and English data confirm that all question words are indeed focused. Though 'wh'-in-situ question phrases are not syntactically focused, they are subject to prosodic focusing. When structural levels other than syntax are considered, it is therefore possible to define 'wh'-in-situ more accurately.

One issue which is important to any analysis of constituent questions irrespective of the theoretical framework adopted though is a semantics for interrogatives.

2   Semantics for constituent questions

I adopt the semantics for interrogatives which Ginzburg & Sag (2000) propose in their HPSG analysis of English questions.

Ginzburg & Sag (2000) treat questions as 'open propositions', formally characterized as propositional abstracts.[6] A propositional abstract, 'constructed from' a proposition, is a semantic object in its own right according to Ginzburg & Sag (2000). This is because the semantic universe assumed is one in

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[5] The issue of so-called 'echo' questions which include a single in-situ question word such as *Anna offered Lily what?* is beyond the scope of this work.
[6] This is not a new idea. Ginzburg & Sag (2000) trace it back to Jespersen (1924) and Cohen (1929).

which abstracts have an ontological status comparable with that of 'ordinary' individuals. Abstraction is therefore a semantic operation along the lines of substitution, the 'output' of which is a member of the ontology as basic as any other semantic object.

Ginzburg & Sag (2000) claim that a question word makes a very specific, two-fold contribution to the meaning of a constituent question. First, it enables an abstraction to occur over the parameter which a question word associates with the argument role that it fills. Each parameter has an index value linking it to an argument in the body of the abstraction. In this sense, a question word functions as a place-holder.

(5)   'What does Anna offer Lily?'
         $\lambda\{x\}$.offer (anna, x, lily)

Second, a question word introduces certain restrictions on the role-filler which can bear a particular argument role instead of a place-holder. For example, *who* requires the substitution of a human entity for a place-holder, while *what* requires the substitution of a non-human entity for a place-holder. The preliminary semantic representation in (5) must therefore be revised.

(6)   'What does Anna offer Lily?'
         $\lambda\{x\}$.offer (anna, (x, non-human(x)), lily)

A parameter is a member of a set of restriction-bearing elements that links an abstracted argument to an argument position within the proposition from which a propositional abstract is 'constructed'. The parameter set corresponds to the set of entities that gets abstracted away, that is the set of parameters in a parametric object. The scope of a parameter set is a proposition so, in the case of a question, the parametric object involved (the body of the abstraction) is a proposition containing place-holders linked to each parameter. A parameter set will have multiple members if the question is a multiple constituent question. This means that question words do not take scope over each other.

(7)   'Who offers what to who?'
         $$\lambda\begin{Bmatrix} x \\ y \\ z \end{Bmatrix}.\text{offer}((x, \text{human}(x)), (y, \text{non-human}(y)), (z, \text{human}(z)))$$

In summary, according to this analysis a question is a propositional abstract $\lambda\{\ldots\}.P$. Each question word introduces a parameter which is a member of the parameter set $\{\ldots\}$. P represents the proposition which is the body of the abstraction. A question word associates a parameter with the argument role it occupies in P.
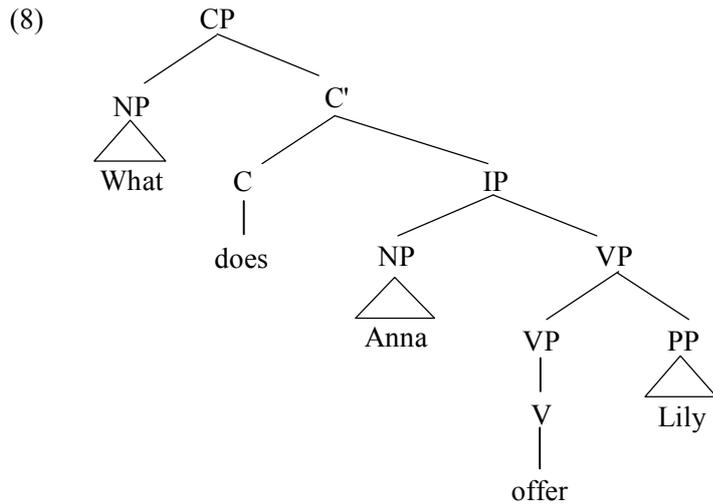
Ginzburg & Sag's (2000) propositional abstract theory is the semantic basis for this LFG analysis of constituent question formation involving 'wh'-in-situ in English and Japanese.
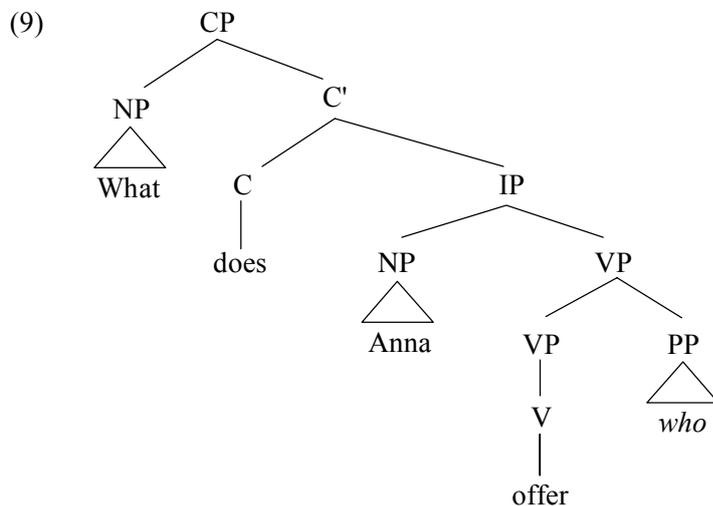
3 'Wh'-in-situ in English and Japanese

3.1 English constituent question formation

3.1.1 Syntax

Constituent questions are characterised by the presence of one and only one question word in clause-initial ('fronted') position. This question word is syntactically focused.

(8)

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                    CP
            ┌────────┴────────┐
           NP                 C'
           △          ┌───────┴───────┐
         What         C               IP
                      │        ┌───────┴───────┐
                    does      NP               VP
                              △          ┌─────┴─────┐
                            Anna        VP          PP
                                        │           △
                                        V          Lily
                                        │
                                      offer
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When there is more than one question word, only one is syntactically focused. All other question words appear in situ.

(9)

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                    CP
            ┌────────┴────────┐
           NP                 C'
           △          ┌───────┴───────┐
         What         C               IP
                      │        ┌───────┴───────┐
                    does      NP               VP
                              △          ┌─────┴─────┐
                            Anna        VP          PP
                                        │           △
                                        V          who
                                        │
                                      offer
```

The syntactically focused question word is the only obligatory question word in a regular English constituent question in the sense that if there is only one question word, it will appear clause-initially.

In a sentence with more than one clause, the syntactically focused question word's position is key to indicating the scope of interrogativity involved. The interrogativity extends only as far as the end of the clause which begins with a question word.

(10)   a.   [Charlie knows [WHAT Anna offered Lily]].
          b.   [Charlie knows [WHO offered *what* to *who*]].
          c.   [WHAT does Charlie know [Anna offered Lily]]?
   d.   [WHO does Charlie know [offered *what* to *who*]]?

The linearly first question word's position therefore delimits the scope of interrogativity involved in a constituent question.

3.1.2   Prosody

English is a stress-accent, stress-timed language. Stress is a property of individual syllables within words. The location of these prominent syllables is marked in the lexicon. Post-lexically, accentuation is used to highlight a word in a discourse. Pitch accents are points of intonational prominence and so are prosodic properties of utterances. As a pitch accent is linked to one primary-stressed syllable, post-lexical pitch accent is derived from lexical stress in English. In quantitative terms, an accented syllable is the locus of a sharp change in pitch (a sudden fundamental frequency excursion), and generally appears to be longer and louder than a stressed syllable.

It is reasonable to assume that the focus of a single-clause constituent question is the clause-initial question word. However, Culicover & Rochemont (1983: 140) note that in constituent questions, "the location of primary stress … does not coincide with the focused constituent". A fronted question word is therefore syntactically but not prosodically focused. For example, in (11) it is *Lily* and not the question word *what* that is accentually prominent.[7] This is consistent with the default prominence pattern known as broad focus, in which the meaning of the whole clause is focused rather than specific words within it.

(11)   What does Anna offer **Lily**?
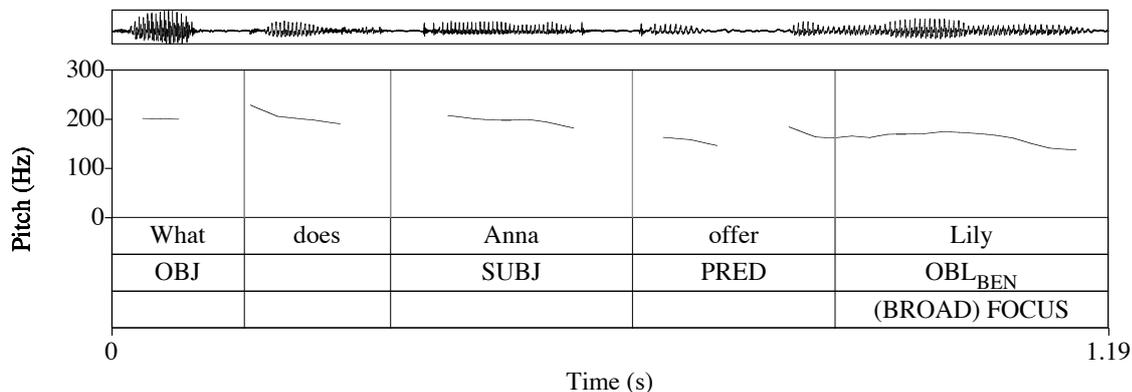
The prosody of a syntactically focused question word contrasts with that of in-situ English question words. As stated by Ladd (1996: 170-171), an in-situ question word will to some degree be accentually prominent.

(12)   a. Who orders **what when**?
          b. What does **who** order **when**?
          c. When does **who** order **what**?

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[7] Prosodically focused words appear in bold.

Therefore, when both syntactic and prosodic focusing are considered, it is true to say that all question words in English constituent questions are focused. In-situ question words differ only in terms of the level at which focusing is manifested – they are prosodically rather than syntactically focused.

3.1.3   Discourse Information

Following discussion of the prosody and syntax of English constituent question formation, Culicover and Rochemont (1983: 160) conclude, "it is impossible to correlate all instances of focus with stress". When one approaches FOCUS as discourse information which may be realized at the level of syntax or prosody in a language, this stands to reason. It is clear that 'fronting' is focusing too, just at the level of syntax. Either level is capable of expressing FOCUS status.

Culicover and Rochemont (1983: 160) continue, "focus is represented as a unified phenomenon only at the level of F(ocus)-structure". This is consistent with the notion of all discourse information (including FOCUS) being realized at one level in LFG: information (i-)structure. While at i-structure question words have the same (FOCUS) status, data show that in an English multiple constituent question FOCUS realization is not confined to one structural level.

3.1.4   Data Summary

In English constituent questions, all question words are focused at some level. One question word must be syntactically focused ('fronted'), while any other question words which bear a grammatical function in the same clause must be prosodically focused (have accentual prominence). The position of the linearly first question word serves to delimit the scope of interrogativity involved.

3.2   Japanese constituent question formation

3.2.1   Syntax

Japanese is a non-configurational language with a rich morphology and relatively free word order. As (1) and (2) show, no syntactic focusing of question words occurs as part of the regular constituent question formation strategy. There is no difference therefore in the word order of neutral declarative sentences and constituent questions.

3.2.2   Prosody

Interrogativity in Japanese is indicated by the addition of a question particle such as *ka* and/or rising intonation at the end of a sentence. While a sentence-final question particle is optional in spoken Japanese (Hinds, 1986), the final rise is present even when the question particle is not. For example, Hirotani (2003: 121), citing Maekawa's (1997) experimental data, notes that "His sentences did not have a [question particle] attached to the verb, but the rise of [fundamental frequency] was also observed at the end of the verb, a common characteristic of Japanese questions".[8]

In spoken Japanese, there is prosodic rather than syntactic focusing of question words (Deguchi & Kitagawa, 2002; Ishihara, 2000, 2002, 2004; Maekawa, 1991). Prominence is marked prosodically by manipulation of pitch range, pitch range being the vertical fundamental frequency space within which a speaker realises individual tones.

Any question word receives accentual prominence, characterised by an expansion of pitch range. Subsequent to this pitch range expansion, there is a period of pitch range compression which affects the accents of all words following the question word. A sharp rise in intonation indicates the end of pitch range manipulation (PRM). The entire period of PRM coincides with the scope of any question word bearing a grammatical function in the same clause.

Compare the pitch range values of the declarative sentence (13a) with those of the single constituent question (13b). Focus information and details of PRM are presented in separate tiers for (13b). Pitch range expansion is labelled *e*, pitch range compression is labelled *c*, and the PRM period's boundaries are marked *%*.

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[8] Though long-distance 'wh'-dependencies in constituent questions are not the subject of this paper, it should be noted that subordinate-clause-final question particles are not optional in Japanese. An analysis of this particular use of question particles may therefore differ in some respects from that proposed for single-clause constituent questions, but it is anticipated that the fundamental LFG approach to 'wh'-in-situ outlined will not be undermined. Thanks to Peter Sells for raising the issue of question particles in Japanese subordinate clauses.

(13)   a. Gorō-ga   depāto-de   Mari-ni   yasui ranpu-o   eranda.

              Gorō-NOM   dept.store-LOC Mari-DAT cheap lamp-ACC choose.PAST

              SUBJ   ADJ   OBL$_{BEN}$ OBJ   VERB

   'Gorō chose a cheap lamp for Mari at the department store.'

Goroo–ga	depaato–de	Mari–ni	yasui	ranpu–o	eranda
Goroo–NOM	dept.store–LOC	Mari–DAT	cheap	lamp–ACC	choose.PAST
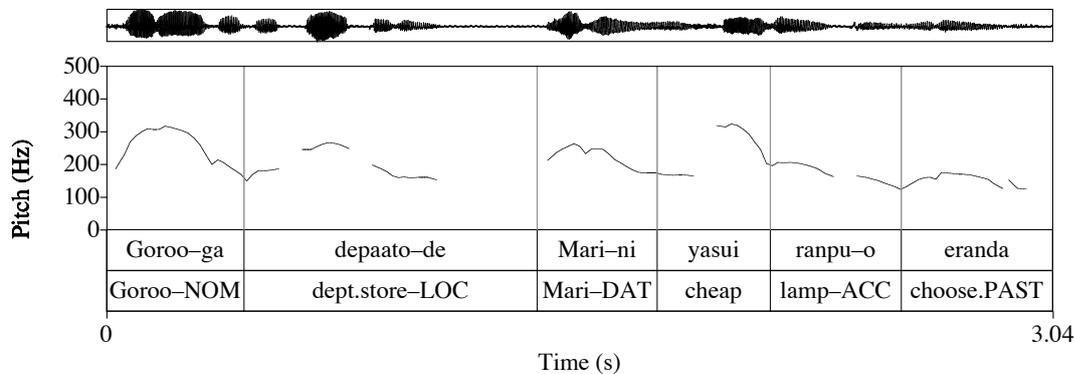
(13)   b. SINGLE CONSTITUENT QUESTION

              Gorō-ga   depāto-de   *dare*-ni   yasui ranpu-o   eranda   ka.

              Gorō-NOM dept.store-LOC who-DAT   cheap lamp-ACC choose.PAST Q

              SUBJ   ADJ   OBL$_{BEN}$ OBJ   VERB

              'Who did Gorō chose a cheap lamp for at the department store?'

Goroo–ga	depaato–de	dare–ni	yasui	ranpu–o	eranda	ka
Goroo–NOM	dept.store–LOC	who–DAT	cheap	lamp–ACC	choose.PAST	Q–PART
		FOCUS				
		%e	c	c	c	%
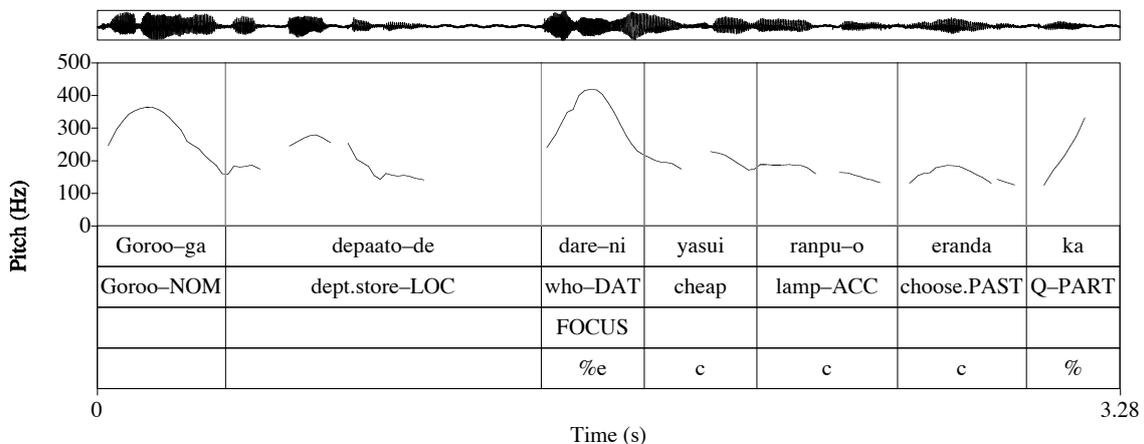
The question word *dare* in (13b) is subject to pitch range expansion: its pitch range (202Hz) is greater than that of the equivalent non-interrogative OBL$_{BEN}$ *Mari* (93Hz) in (13a). The object phrase which follows the question word *dare* in (13b), *yasui ranpu-o*, is subject to pitch range compression. In (13a) the pitch range for this phrase is 199Hz, while in (13b) it is 85Hz.[9] Pitch range manipulation in (13b) ends with the final sharp rise in intonation affecting the question particle *ka*. The period of PRM is therefore bookended by the pitch range expansion affecting the question word and the final sharp rise

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[9] The case for pitch range compression is less clear-cut with respect to the verbal predicate *eranda*. The relevant pitch range in (13a) is 52Hz, while in (13b) it is 56Hz. However, this is expected given that pitch range compression appears to affect all sentence-final predicates in Japanese declaratives (Venditti, 1997) while verbal predicates in questions are subject to a local rise (Poser, 1984; Pierrehumbert & Beckman, 1988). Both Poser (1984) and Pierrehumbert & Beckman (1988) claim the latter is due to the presence of a sharp rise in intonation at the end of a question in Japanese. Therefore, the pitch range for a verbal predicate in a question may not necessarily be smaller than the pitch range for a verbal predicate in a comparable declarative.

in intonation. This means that the question word represents one PRM boundary and the final sharp rise in intonation the other.

In a multiple constituent question, at least one prosodically focussed question word appears within the period of pitch range compression that follows the first question word to bear a grammatical function in the same clause. Compare the pitch range values for the declarative sentence (14a) with those for the multiple constituent question (14b).

(14) a. Mari–ga depāto-de Gorō-ni ranpu-o eranda.
     Mari-NOM dept.store-LOC Gorō-DAT lamp-ACC choose.PAST
     SUBJ   ADJ   OBL$_{BEN}$ OBJ   VERB
      'Mari chose a lamp for Gorō at the department store.'
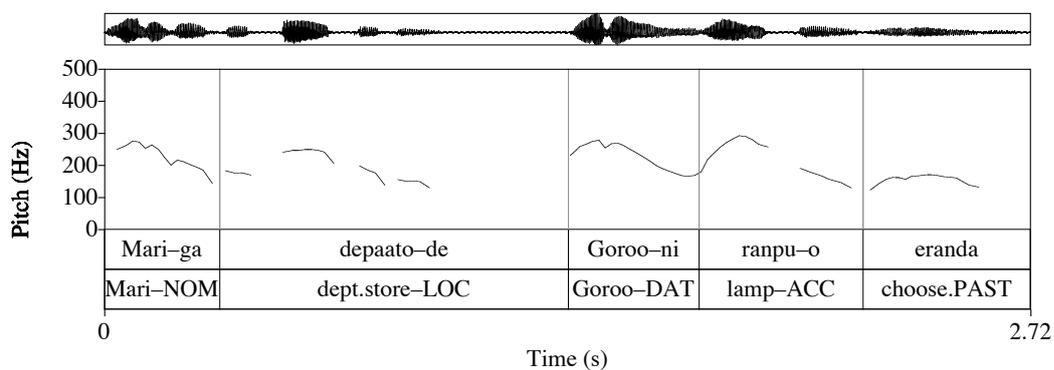
	Mari–ga	depaato–de	Goroo–ni	ranpu–o	eranda
	Mari–NOM	dept.store–LOC	Goroo–DAT	lamp–ACC	choose.PAST

0   2.72

Time (s)

(14) b. MULTIPLE CONSTITUENT QUESTION
     Dare-ga depāto-de *dare*-ni ranpu-o eranda ka.
     who-NOM dept.store-LOC who-DAT lamp-ACC choose.PAST Q
     SUBJ   ADJ   OBL$_{BEN}$ OBJ   VERB
      'Who chose a lamp for who at the department store?'

	Dare–ga	depaato–de	dare–ni	ranpu–o	eranda	ka
	who–NOM	dept.store–LOC	who–DAT	lamp–ACC	choose.PAST	Q–PART
	FOCUS		FOCUS			
	%e	c	e	c	c	%

0   2.96

Time (s)
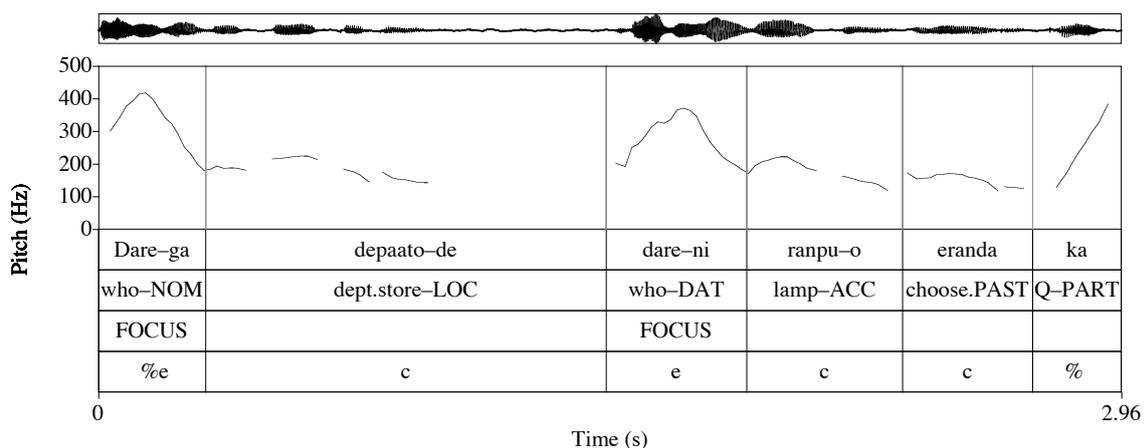
The SUBJ *dare* and the OBL$_{BEN}$ *dare* in (14b) exhibit pitch range expansion – their respective pitch range values (240Hz and 197Hz) are greater than those of the SUBJ and the OBL$_{BEN}$ in (14a) (121Hz and 113Hz respectively). Once more, the period of PRM ends with a final sharp rise in intonation.

Note that (14b) shows pitch range compression on either side of the OBL_{BEN} question word *dare*. In (14b) the relevant pitch range values are 81Hz (*depāto-de*) and 125Hz (*ranpu-o*) compared with 116Hz (*depāto-de*) and 159Hz (*ranpu-o*) in (14a). Rather than OBL_{BEN} *dare* starting a new period of PRM, it appears to be the case that any other question words are embedded within the period of pitch range compression that follows the linearly first question word. In both multiple constituent questions such as (14b) and single constituent questions there is a single PRM boundary at the left edge signified by the final sharp rise in intonation. Furthermore, the total period of PRM which begins with the linearly first question word coincides with the scope of all the question words that bear a grammatical function in the same clause. The parallels between the PRM in a single constituent question and the PRM in a multiple constituent question are clear. Therefore, I propose that only one question word represents a left-edge PRM boundary in a multiple constituent question (the linearly first question word) and only one period of PRM exists.

As in English, the linearly first question word evidently plays a part in delimiting the scope of interrogativity involved in a Japanese constituent question. However, in Japanese scope is not signalled at the level of syntax, but rather at the level of prosody by a period of PRM which begins with the linearly first question word.

3.2.3   Discourse Information

Data show that all question words are prosodically focused in Japanese. The only difference between Japanese and English constituent questions therefore is that one question word in English must be syntactically focused. When all question focus information is unified, neutral English and Japanese constituent questions are identical at the level of i-structure.

3.2.4   Data Summary

As in English all question words have been shown to be focused in Japanese constituent questions, meaning that the i-structures of these sentences will be identical in terms of question focus in both languages. The two languages differ though with respect to the level at which this focusing takes place. In Japanese, focusing of question words is purely prosodic.

Another feature which Japanese shares with English is that the linearly first question word is key to delimiting the scope of interrogativity. This is because it marks the beginning of the period of PRM which coincides with the scope of all question words that bear a grammatical function in the same clause.

4   LFG Analysis of 'wh'-in-situ

Given the semantics for interrogatives and data discussed previously, there are a number of key points that must be included in an LFG analysis of constituent question formation strategies which involve 'wh'-in-situ.

- All question words introduce parameters.
- All question words are focused, either prosodically or syntactically.
- Focus and scope may be indicated at c-structure and/or p-structure level.
- Key to interrogative scope cross-linguistically is the linearly first question word.

4.1   Characterizing Question Words

Question words are pronouns and as such have value 'PRO' for the attribute PRED. As they are parameter-introducing elements, all question words are positively specified for a semantic attribute PARAM. A parameter is co-indexed with the question word that introduces it. This links the parameter to the grammatical function which the question word bears in the proposition's f-structure, consistent with the notion of place-holder. Therefore, each question word has an attribute INDEX with a different value.

As a question word also introduces further semantic restrictions beyond those imposed by the argument to which it is linked, each question word will also have an appropriate semantic attribute. For example, the semantic attribute HUMAN will have a positive value when the question word is *who* and a negative value when the question word is *what*. Other question words will have different semantic attributes depending on the specific restrictions they contribute.

Finally, all question words must be focused. I propose a separate FOCUS TYPE whose value is 'question' for these words, as it is not clear that question words meet the criteria of other types of focus such as contrastive or presentational focus.[10]

A typical question word entry is given in (15). Its f-structure in (16) follows straightforwardly.

(15)   who N^0 $(\uparrow PRED) = $ 'PRO'   (16)
                        $(\uparrow PARAM) = +$
                        $(\uparrow INDEX) = x$
                        $(\uparrow HUMAN) = +$
                        $((\uparrow_i FOCUS) \; TYPE) = $ question

who $\begin{bmatrix} PRED & \text{'PRO'} \\ PARAM & + \\ INDEX & x \\ HUMAN & + \end{bmatrix}$

Focusing of question words is achieved by a mapping from c- and/or a ToBI-style p-structure (O'Connor, 2004) to i-structure.[11] With respect to the mapping from p- to i-structure, pitch range expansion appears to be a prosodic correlate of FOCUS in both English and Japanese.[12]

> "Focus realization in English is fundamentally similar to that in Mandarin [and also Japanese], i.e., the pitch range of the focused item is expanded, the pitch range of the post-focus items, if any, is compressed and lowered, and the pitch range of the pre-focus items, if any, remains neutral."
>
> (Xu & Xu, 2005: 193)

This is not to say that pitch range expansion is the sole component of prosodic focusing in English or any other language, only that pitch range expansion has been identified as the prosodic correlate of FOCUS in a number of languages. This means that for both English and Japanese, a mapping from p- to i-structure can be provided which formalizes this characterization of prosodic focusing as crucially involving pitch range expansion (*e*) affecting an unspecified tone (*t*).

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[10] This proposal is discussed further in Mycock (in prep.).

[11] See Beckman & Ayers Elam (1997), Beckman & Hirschberg (1994) and Beckman *et al* (2005) for information on the ToBI system for transcribing the intonation and prosodic structure of English. For details of the variant developed for transcribing Japanese (J_ToBI), see Venditti (1997, 2005).

[12] This may also be true cross-linguistically. See Pierrehumbert & Beckman (1988: 99).

(17) PROSODIC FOCUSING

$$t$$
$$\downarrow = e$$
$$\downarrow \in \{FOCUS\}$$

A unified analysis of 'wh'-in-situ in English and Japanese as prosodic focusing of a question word is therefore possible.

(18) 'WH'-IN-SITU (prosodic focusing of a question word)

$$t$$
$$\downarrow = e$$
$$\downarrow \in \{FOCUS\}$$
$$(\downarrow PARAM) = +$$

There is also syntactic focusing in English, characterised at f-structure as functional uncertainty. This constitutes a mapping from c- to i-structure in English, given that FOCUS at f-structure is FOCUS at i-structure too. (19) is the familiar rule of focus fronting in English, which applies to constituent question formation.

(19)

$$CP \quad \rightarrow \quad \begin{matrix} XP \\ (\uparrow FOCUS) = \downarrow \end{matrix} \quad , \quad \begin{matrix} C' \\ \uparrow = \downarrow \end{matrix}$$

To deal fully with Japanese Focus Prosody, the basic p- to i-structure mapping given in (17) must be expanded in order to allow for different possible configurations. Specifically, it is necessary to permit multiple instances of prosodic focusing as well as the intervention between prosodically focused items of non-prosodically focused material which will be subject to pitch range compression.

(20)

$$\ldots \quad \begin{matrix} t \\ \downarrow = \%e \\ \downarrow \in \{FOCUS\} \end{matrix} \quad \left(\begin{pmatrix} t \\ \downarrow = c \end{pmatrix}^* \begin{pmatrix} t \\ \downarrow = e \\ \downarrow \in \{FOCUS\} \end{pmatrix}^* \right)^* \quad \begin{matrix} t \\ \downarrow = c \end{matrix} \quad \begin{matrix} t \\ \downarrow = \% \end{matrix} \quad \ldots$$

Japanese Focus Prosody as expressed in (20) applies to spoken constituent questions as well as to declarative sentences containing focused items.

4.2 Question Word FOCUS-Q_1

One question word – the linearly first question word – has a special status cross-linguistically. Remember that in English scope is related to the c-structure position of the syntactically focused, linearly first question word. In Japanese, all question words with the same scope are embedded within the period of pitch range compression which follows the linearly first question word. While all question words have FOCUS TYPE value 'question' at i-structure, the linearly first question word appears to be slightly different. This particular question word will be referred to as FOCUS-Q_1.[13]

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[13] The '1' in FOCUS-Q_1 is in no way intended to indicate 'main' or 'primary'; it is only used to reflect the special status of this particular question word.

(21) FOCUS-Q_1 Rule
    The linearly first parameter-introducing word alone has the FOCUS TYPE value Q_1 at i-structure. FOCUS-Q_1 is obligatory in all constituent questions.

This FOCUS-Q_1 Rule ensures that if there is only one question word in a constituent question, it will have FOCUS-Q_1 status. In a multiple constituent question, all other parameter-introducing words which bear a grammatical function in the same f-structure will have the $_i$FOCUS TYPE value 'question'. This means that while FOCUS-Q_1 status is restricted to one and only one parameter, FOCUS TYPE 'question' parameters are members of a set at i-structure.

4.3   Interrogative Scope

Though FOCUS-Q_1 is key to indicating interrogative scope in a constituent question, it is only one component of the scope marking involved. It has been shown that scope is indicated at different levels in English and Japanese. In English scope is indicated at c-structure, while in spoken Japanese this occurs at p-structure for single-clause constituent questions. I propose that specific configurations at these levels, which crucially refer to FOCUS-Q_1, make a contribution to meaning. This is not a new proposal, at least with respect to c-structure. Rosén (1996) and Dalrymple (2001: 417) both identify constructions in which meaning contributions are associated with phrase structure configurations rather than lexical items. I propose that the specific configurations associated with constituent question formation contribute the meaning constructor **[interrog scope]**.

(22)   **[interrog scope]** $= \lambda P \lambda Q(P)$, where P is a proposition and Q is the set of parameters

According to Ginzburg & Sag's (2000) semantics for interrogatives, parameters introduced by question words form a set whose scope is a proposition. **[interrog scope]** determines exactly which proposition a particular parameter set takes scope over.

In English, the configuration which contributes **[interrog scope]** is a c-structure configuration. It is now possible to produce a mapping which constitutes a rule of English constituent question formation (ECQF) by augmenting the basic rule of focus fronting in (19) with **[interrog scope]**. (23) involves a c- to s-structure mapping which represents the contribution of **[interrog scope]** by the c-structure configuration involved in ECQF, as well as a c- to i-structure mapping which represents syntactic focusing of a single question word (FOCUS-Q_1).

(23) ECQF RULE

$$
CP \quad \rightarrow \quad
\begin{array}{c}
XP \\
(\uparrow \text{FOCUS}) = \downarrow \\
(\downarrow \text{PARAM}) = +
\end{array}
\quad , \quad
\begin{array}{c}
C' \\
\uparrow = \downarrow \\
\textbf{[interrog scope]}
\end{array}
$$

All other question words in an English multiple constituent question will be prosodically focused according to the p- to i-structure mapping provided in (18). Simple fronting is therefore characterised as a constituent question formation strategy which requires that FOCUS-Q_1 be syntactically focused and all other question words be prosodically focused.

In spoken Japanese, the configuration which contributes the meaning constructor **[interrog scope]** is a p-structure configuration.[14] The basic rule of Japanese Focus Prosody provided in (20) can thus be revised to provide a rule of Japanese Constituent Question Formation (JCQF).

(24)   JCQF Rule

Iff	t	…	t	then	t
	$\downarrow$ = %e		%		%
	$\downarrow \in$ {FOCUS}				$\uparrow = \downarrow$
	($\downarrow$PARAM) = +				**[interrog scope]**

This rule constitutes a mapping not only from p- to i-structure, but also from p- to s-structure. **[interrog scope]** is contributed by the right-edge boundary of any period of PRM involving at least one question word. The pitch range expansion which FOCUS-Q_1 must be subject to represents the left-edge boundary of this period of PRM. In this way, FOCUS-Q_1 is essential to interrogative scope marking in Japanese. The 'wh'-in-situ constituent question formation strategy can therefore be defined as requiring that all question words be focused at the level of p-structure.

Fundamentally, (23) and (24) are the same rule. They crucially rely on the notions of FOCUS-Q_1 and **[interrog scope]** to characterize constituent question formation in both languages. Where they differ is with respect to the level at which FOCUS-Q_1 and **[interrog scope]** can be identified. That is, English and Japanese constituent question formation strategies exploit different means involving distinct structural levels to achieve the same ends. A parallel architecture such as LFG's, which treats different structural levels as equal rather than assuming the primacy of syntactic structure, is well suited to capturing this type of cross-linguistic generalization.

4.4   Example Analyses: Single-Clause Multiple Constituent Questions

In this section example analyses of two single-clause multiple constituent questions are provided, one English and one Japanese.

Each structural level is represented separately, the mappings between the levels being those described in the previous section. As PRM alone is of direct concern to this analysis, the only p-structure information presented concerns pitch range. As such, the p-structures provided should be regarded as partial representations of the envisaged ToBI-style p-structures. PRM is represented in a separate tier intended to 'overlay' the standard Tone tier found in a ToBI-style transcription. This is motivated by the fact that a Pitch Range tier will deal with the actual realization of tones which are characterized as phonological tone events (pitch contours) in the Tone tier.[15]

In the partial i-structures provided, only FOCUS TYPE 'question' information is presented. Beyond this discourse information, which alone has a direct bearing on neutral constituent question formation according to the proposed analysis, features of i-structure are not of immediate concern and so are set aside.[16]

---

[14] This explains why question particles are obligatory in written Japanese. Without the prosodic form of a string, another level of structure is required to contribute **[interrog scope]** to s-structure instead.
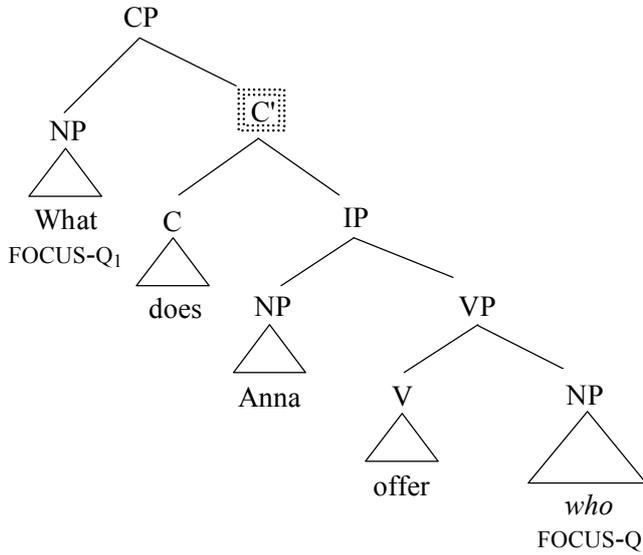
[15] PRM is incorporated in the ToBI transcription system for Pan-Mandarin outlined in Peng *et al* (2005).

[16] For more on i-structure in LFG see, for example, Butt & King (1996, 1997, 1998), Choi (1999) and O'Connor (2004).
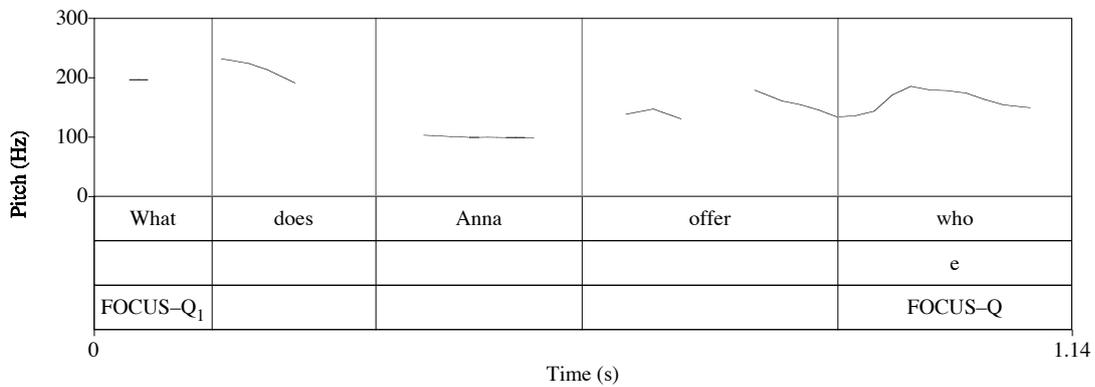
4.4.1   English

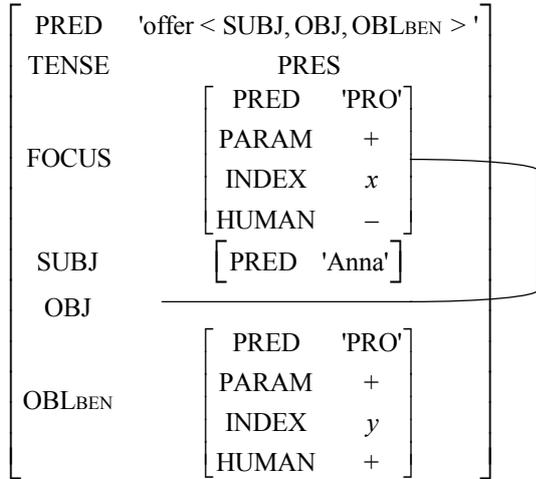(25)   'What does Anna offer *who*?'

c-structure

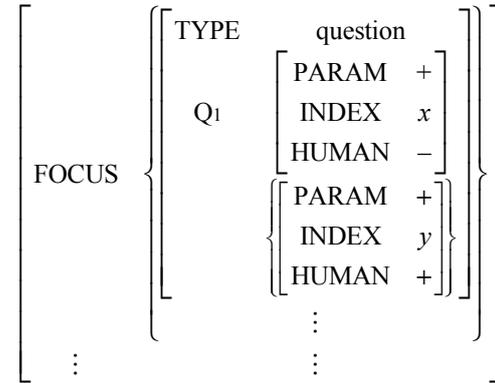marks the c-structure configuration which contributes the meaning constructor **[interrog scope]**

partial p-structure – pitch range manipulation

f-structure

$$
\begin{bmatrix}
\text{PRED} & \text{'offer} < \text{SUBJ}, \text{OBJ}, \text{OBL}_{\text{BEN}} > \text{'} \\
\text{TENSE} & \text{PRES} \\
\text{FOCUS} & \begin{bmatrix} \text{PRED} & \text{'PRO'} \\ \text{PARAM} & + \\ \text{INDEX} & x \\ \text{HUMAN} & - \end{bmatrix} \\
\text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'Anna'} \end{bmatrix} \\
\text{OBJ} & \\
\text{OBL}_{\text{BEN}} & \begin{bmatrix} \text{PRED} & \text{'PRO'} \\ \text{PARAM} & + \\ \text{INDEX} & y \\ \text{HUMAN} & + \end{bmatrix}
\end{bmatrix}
$$

partial i-structure

$$
\begin{bmatrix}
\text{FOCUS} & \left\{ \begin{bmatrix} \text{TYPE} & \text{question} \\ \text{Q}_1 & \begin{bmatrix} \text{PARAM} & + \\ \text{INDEX} & x \\ \text{HUMAN} & - \end{bmatrix} \\ & \left\{ \begin{bmatrix} \text{PARAM} & + \\ \text{INDEX} & y \\ \text{HUMAN} & + \end{bmatrix} \right\} \\ & \vdots \end{bmatrix} \right\} \\
\vdots & \vdots
\end{bmatrix}
$$

s-structure

An s-structure for the proposition part of this propositional abstract can be straightforwardly provided.

$$\text{offer } (\text{Anna}, (x, \text{non-human}(x)), (y, \text{human}(y)))$$

This representation does not include the parameters introduced by question words though and is therefore incomplete. The s-structure must be revised to include Q, where $Q = \left\{ \begin{matrix} x \\ y \end{matrix} \right\}$ which is the set of parameters introduced by the two question words.

$$\text{offer } (\text{Anna}, (x, \text{non-human}(x)), (y, \text{human}(y))) \wedge Q$$

Beyond the semantic contributions of question words, constituent question formation involves the meaning constructor **[interrog scope]**. In the case of English, this meaning constructor is contributed by c-structure. **[interrog scope]** combines the meaning of a proposition with that of the parameter set Q, thus determining over which particular proposition the parameter set takes scope.
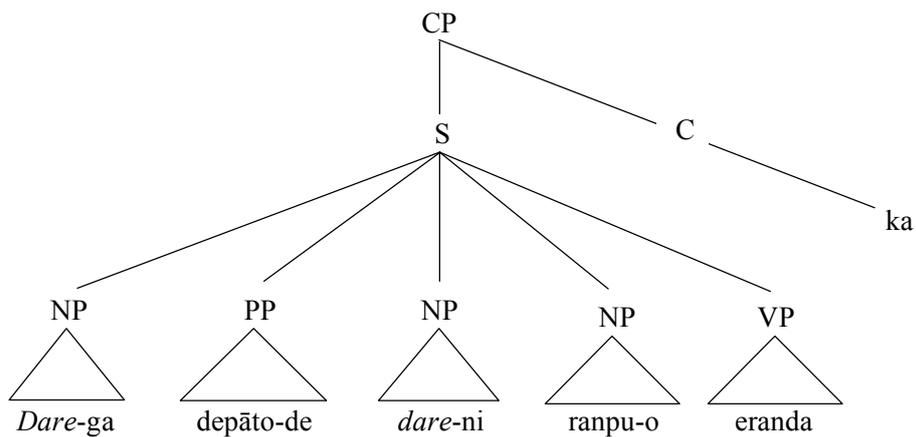
$$\text{offer } (\text{Anna}, (x, \text{non-human}(x)), (y, \text{human}(y))) \wedge Q \qquad \textbf{[interrog scope]} \; \lambda P \lambda Q(P)$$
$$\overline{}$$
$$\lambda \left\{ \begin{matrix} x \\ y \end{matrix} \right\} . \text{offer } (\text{Anna}, (x, \text{non-human}(x)), (y, \text{human}(y)))$$

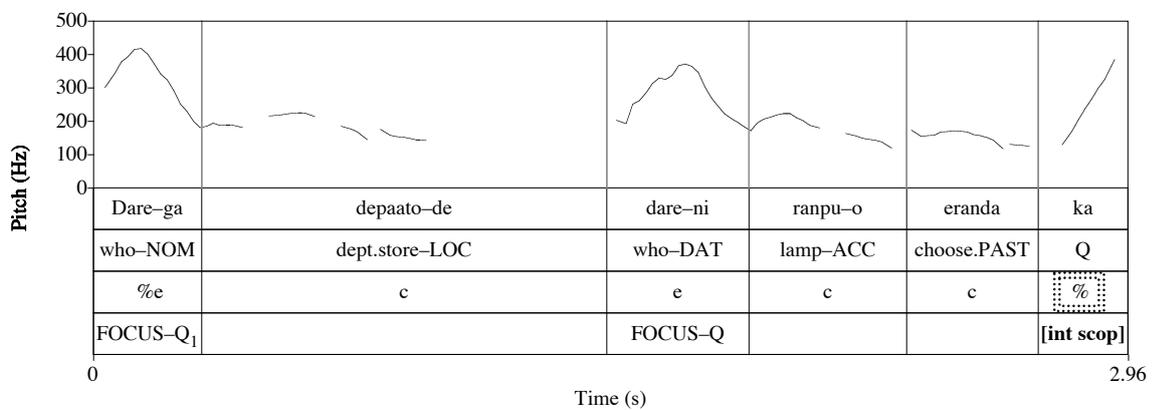## 4.4.2 Japanese [17]

(26) *Dare*-ga   depāto-de   *dare*-ni   ranpu-o   eranda   ka.
      who-NOM   dept.store-LOC   who-DAT   lamp-ACC   choose.PAST   Q
      'Who chose a lamp for who at the department store?'

c-structure

```
                            CP
                           /  \
                          S     C
                                 \
                                  ka
        _____|_____
       /        |        |        |       \
      NP        PP       NP       NP       VP
      /\        /\       /\       /\       /\
  Dare-ga   depāto-de  dare-ni  ranpu-o  eranda
```

partial p-structure – pitch range manipulation

Dare–ga	depaato–de	dare–ni	ranpu–o	eranda	ka
who–NOM	dept.store–LOC	who–DAT	lamp–ACC	choose.PAST	Q
%e	c	e	c	c	%
FOCUS–Q$_1$		FOCUS–Q			[int scop]

Pitch (Hz): scale 0, 100, 200, 300, 400, 500. Time (s): 0 to 2.96

⬚ marks the p-structure configuration which contributes the meaning constructor **[interrog scope]**

---

[17] Japanese is one of the languages for which an LFG computational grammar is being developed as part of the Parallel Grammar (ParGram) Project. For information about proposed c- and f-structures, see http://www.fujixerox.co.jp/research/eng/category/ii/document/01details.html#examples

f-structure

$$
\begin{bmatrix}
\text{PRED} & \text{'choose <SUBJ, OBJ, OBL}_{\text{BEN}}\text{>'} \\
\text{TENSE} & \text{PAST} \\
\text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'PRO'} \\ \text{PARAM} & + \\ \text{INDEX} & x \\ \text{HUMAN} & + \end{bmatrix} \\
\text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'lamp'} \end{bmatrix} \\
\text{OBL}_{\text{BEN}} & \begin{bmatrix} \text{PRED} & \text{'PRO'} \\ \text{PARAM} & + \\ \text{INDEX} & y \\ \text{HUMAN} & + \end{bmatrix} \\
\text{ADJ} & \left\{ \begin{bmatrix} \text{PRED} & \text{'at the dept store'} \end{bmatrix} \right\}
\end{bmatrix}
$$

partial i-structure

$$
\begin{bmatrix}
\text{FOCUS} & \left\{ \begin{bmatrix} \text{TYPE} & \text{question} \\ Q_1 & \begin{bmatrix} \text{PARAM} & + \\ \text{INDEX} & x \\ \text{HUMAN} & + \end{bmatrix} \\ \left\{ \begin{bmatrix} \text{PARAM} & + \\ \text{INDEX} & y \\ \text{HUMAN} & + \end{bmatrix} \right\} \\ \vdots \end{bmatrix} \right\} \\
\vdots & \vdots
\end{bmatrix}
$$

s-structure

Based purely on the semantic contribution of lexical items, (26) can be represented as:

$$\text{(at-the-dept-store (choose } ((x, \text{human}(x)), \text{lamp}, (y, \text{human}(y))))) \wedge Q$$

where $Q = \left\{ \begin{matrix} x \\ y \end{matrix} \right\}$ which is the set of parameters introduced by the two question words.

However, in spoken Japanese it is not only lexical items which make a contribution to meaning. The meaning constructor **[interrog scope]** is contributed by p-structure in the case of a single-clause constituent question. **[interrog scope]** combines the meaning of a proposition with that of the parameter set Q, thus determining over which particular proposition the parameter set takes scope.

$$\text{(at-the-dept-store (choose } ((x, \text{human}(x)), \text{lamp}, (y, \text{human}(y))))) \wedge Q \qquad \textbf{[interrog scope]} \; \lambda P \lambda Q(P)$$

$$\lambda \left\{ \begin{matrix} x \\ y \end{matrix} \right\} . \text{(at-the-dept-store (choose } ((x, \text{human}(x)), \text{lamp}, (y, \text{human}(y)))))$$

5   Conclusion

Data from Japanese, a 'wh'-in-situ language, and English, a simple-fronting language, show that all question words are focused, though this focusing may be syntactic or prosodic. Prosodic focusing is the feature that characterises 'wh'-in-situ in both languages, highlighting the important role that prosody may play.

Japanese and English data further show the linearly first question word in a clause to be key to scope. Scope is expressed in formal terms as the introduction of a meaning constructor **[interrog scope]** by a specific configuration including the linearly first question word (FOCUS-Q_1) at a particular structural

level. In English, **[interrog scope]** is contributed by a c-structure configuration, while in Japanese the relevant configuration is a p-structure one. According to Ginzburg & Sag's (2000) approach to the semantics of interrogatives, questions are propositional abstracts. **[interrog scope]** combines the meanings of a proposition and the parameter set to give the meaning of a question.

The parallel architecture of LFG enables generalizations about prosody and its contribution to other structural levels of language to be made. In this way, LFG provides important insights into the cross-linguistic features of and systematic differences between constituent question formation strategies. LFG's architecture with its distinct yet parallel projections enables 'wh'-in-situ, and indeed constituent question formation in general, to be captured by a single non-derivational analysis for two languages typically regarded as typologically distinct in terms of their constituent question formation strategies. This augurs well for the development of a unified LFG account of the full typological sorts of question formation.

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