

## Project Description

### 1. Objectives and Expected Significance of the Project

Methodologically, research in formal syntactic theories has the tradition of distilling the data by eliminating such factors as contextual information, processing difficulty, prosodic variability and frequency statistics. Behind this approach is the notion of autonomy of syntax, a modular model in which the syntactic component of grammar can be studied as an independent module. It is undeniable that this methodology has proved to be successful in elucidating core properties of syntax that cannot be attributed to any cognitive faculty other than the syntactic module of our language faculty. On the other hand, it is rarely made explicit what factors are tangential and why they can be regarded so. The delicacy and complexity of this issue is better illustrated with a specific example. In his influential work, Nishigauchi (1990) argued, based on the following Wh-island example from Japanese, that Subjacency is operative at LF: (The indicated interpretive judgment is from the original source. -COMP<sub>WH</sub> = wh-scope marker, -COMP<sub>WHETHER</sub> = *whether*, -Q = yes/no question marker)

- (1) Satoo-kun-wa [<sub>CP</sub> Suzuki-kun-ga **nani-o** tabeta-*ka*] oboete-imasu-**ka**?  
Mr. Sato-TOP Mr. Suzuki-NOM what-ACC ate-COMP<sub>WH</sub>/-COMP<sub>WHETHER</sub> remember-Q/-COMP<sub>WH</sub>  
'Does Mr. Sato remember [ what Mr. Suzuki ate ]?'  
**but not** 'What does Mr. Sato remember [ *whether* Mr. Suzuki ate ]?' (Nishigauchi (1990: 30))

He admits, however, that the judgment is by no means straightforward, and that some speakers indeed find the matrix question reading acceptable. Watanabe (1992) also acknowledges the delicacy of the judgment on sentences like (1), mentioning that there is "a subtlety in the judgment" (p.257) and the "degree of unacceptability varies among different speakers" (p.262). He nonetheless proceeds to his analysis with the disclaimer that it reflects only "the judgment of the relevant speakers" (p.262), which is basically the same judgment as Nishigauchi's. Such an approach, however, is not universally embraced. Takahashi (1993), for instance, reports that a sentence similar to (1) is "ambiguous with respect to the scope of the Wh-phrase *nani-o*" (p.657), and simply assumes that Subjacency does not constrain LF Wh-movement. One of the recurring observations in connection to the fragility of LF Subjacency effects is the role of prosody/intonation. Nishigauchi (1990), for instance, reports that Subjacency effects can be obliterated when the Wh-phrase is pronounced with "a marked intonation, with a very heavy stress" (p.33). While prosody is regarded as a peripheral phenomenon by Nishigauchi (1990) and many others, it is given a central role in Deguchi and Kitagawa (2002) and Ishihara (2002). They observed first that Wh-questions in Tokyo Japanese, which will be referred to simply as Japanese hereafter, are generally accompanied by **Focus Prosody** (henceforth **FPD**). FPD consists of an emphatic accent on the focused Wh-phrase followed by post-focus reduction of all accents up to some COMP.<sup>1</sup> They further claim that the [+WH] CP at which FPD ends coincides with the scope domain of a Wh-phrase. For instance, when FPD ends at the end of the subordinate clause (= **Local FPD**) as in (2) below, this clause is interpreted as an indirect Wh-question embedded in a yes/no question. When FPD is prolonged to the end of the entire clause (= **Global FPD**) as in (3), on the other hand, it is interpreted as a direct Wh-question embedding a *whether*-clause. The sentences in (2) and (3) are identical except for the prosody accompanying them.<sup>2</sup> (**BOLD CAPITALS** = emphatic accent,  = post-focus

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<sup>1</sup> The observations here have been supported by various pitch-track recordings, which cannot be presented here due to space restriction. Such recordings show that the value of F<sub>0</sub> for emphatic accents may vary depending on the speaker and the amount of emphasis, and that FPD is more appropriately characterized by its post-focus reduction. Both Deguchi and Kitagawa (2002) and Ishihara (2002) present pitch-track diagrams for FPD, and some of the recordings can be listened to by visiting [<http://www.iub.edu/~ykling/Symposium.html>].

<sup>2</sup> As will be examined closely in Sections 2 and 3.3, however, the patterns deviating from this prosody-scope correlation can be observed because of both grammatical and extra-grammatical reasons, which is one of the central issues handled in the proposed project.

reduction, ↑ = final interrogative rise, which wins over post-focus reduction), *Italic Capitals* followed by ' = unreduced post-EDP lexical accent)

- (2) [ John-wa [ Mary-ga **NA**ni-o tabeta-ka ] /mademo siritagatteiru-no↑ ]  
 -TOP -NOM what-ACC ate-COMP<sub>WH</sub> even.now want.to.know-Q  
 'Does John still want to know [ **what**<sub>1</sub> Mary ate **t**<sub>1</sub> ]?'  
 (3) [ John-wa [ Mary-ga **NA**ni-o tabeta-ka] imademo siritagatteiru-**no**↑ ]  
 what-ACC ate-COMP<sub>WHETHER</sub> -COMP<sub>WH</sub>  
 'With respect to **what**<sub>1</sub> does John still want to know [ **whether** Mary ate **it**<sub>1</sub> ]?'

Their observations suggest that the scope of a Wh-in-situ can be successfully extracted out of a Wh-island at LF, and that the variable and unstable judgments of Subjacency effects in Japanese come about because the prosody is not properly controlled when the judgments are elicited. Indeed, Hirotsu (2004) reports that 43 out of 52 subjects (82.7%) find a sentence like (1) ambiguous in her perception experiment.<sup>3</sup> Even this cursory case study of the Wh-island issue in Japanese reveals some of the fundamental methodological challenges that formal syntax faces. First, it is not always easy to obtain uniform grammatical judgments. When disagreement surfaces, each researcher tends to adhere to his/her own judgment and to ascribe the differences to dialectal variations. Second, researchers also tend to make their own decisions on what factors are peripheral and hence reside outside of the domain of their explanation, but their reasoning is not necessarily clear or well-justified. Third, grammaticality judgment is not free from the structural complexity and the richness of contextual information, among other things, which affect the degree of processing difficulty. This means that we can distill grammaticality judgment only after we succeed in carefully abstracting away such extra-grammatical factors. It is, however, unclear at best how much care or attention is generally paid to this matter when grammatical judgments are elicited despite the fact that this issue has been repeatedly discussed in the literature.<sup>4</sup>

This research project is an attempt to integrate into formal syntax three aspects that are often considered peripheral, namely prosody, processing factors and pragmatics (information structure, in particular). The main research questions we will pursue are the following.

- (4) a. Although many speakers can obtain the matrix Wh-scope interpretation in a Wh-island context, the fact remains that it is not always an easy reading. What exactly are the factors that lead language users to favor the embedded Wh-scope reading?  
 b. Given that the semantic end (= Wh-scope) is tied to the phonetic end (= Focus Prosody), how and where in our cognitive system should this correlation be characterized?  
 c. Once prosody and information structure is properly controlled, what purely syntactic facts about Wh-interrogatives can we identify, and how does affect the way we will pursue the formal theory of syntax?

We choose interrogative sentences in Japanese as the main empirical domain of investigation because we believe that they present themselves as an ideal ground for asking the questions in (4). It is often noted that there are two popular strategies in natural languages that grammatically reflect information structure. One is a prosodic manipulation which places prosodic prominence on the novel/focused/emphasized constituent(s) in a sentence. The other is a syntactic manipulation in which a constituent with a certain information status is dislocated from its canonical position to a particular position in a sentence. (See Zubizarreta (1998) for the idea of parameterizing such strategies.) Japanese employs both strategies extensively — focused/emphasized material is phonologically signaled by promoting the pitch of an accent while the language also makes a frequent use of scrambling that is often assumed to be sensitive to information structural status, especially when it applies in a long-distance fashion. In addition, Japanese is equipped with a morphological means (i.e., the topic marker -

<sup>3</sup> Hirotsu's experiment controls prosodic properties (prosodic reduction after Wh-phrases and major phrase boundaries after Q-morphemes). See Sections 2.1 and 2.2 below for discussion.

<sup>4</sup> See also Schütze (1996) for highly relevant discussion.

*wa*) to single out the topic of a sentence. Topicality is one of the essential notions in information structure and often serves to compensate for the language's lack of obligatory marking of definiteness, another important concept in information structure. In short, Japanese uses all the known strategies of the grammatical encoding of information structure, making itself an ideal language to investigate. The choice of interrogatives as the primary subject of our studies is also based on several factors. Interrogative sentences in Japanese show distinctive prosodic patterns which closely reflect their information structure. Ordinarily a Wh-phrase is focused, and the rest of the sentence serves as the background against which the question is asked (cf. Krifka (2001a)), and Japanese Wh-phrases receive focal accents (Ishihara (2003)) as expected from the information structure. While the interpretation of a question stays more or less constant from language to language, its syntax shows a vast range of cross-linguistic variations, the most famous of which is the dichotomy between overt Wh-movement and Wh-in-situ. A Wh-movement presents itself as a showcase of various syntactic constraints which have helped us develop a restrictive theory of grammar. With the more fine-grained approach of the proposed project to Wh-interrogatives, it is hoped that some of the puzzles, such as judgment discrepancies will be demystified, and that new light will be shed on the nature of the constraints on movement, including Subjacency and Superiority.

The proposed research project is highly interdisciplinary. The two PIs have already published several articles on some interdisciplinary issues individually and collaboratively, and will contribute to the research goals based upon their expertise (Kitagawa for Syntax and Prosody-Syntax interface, and Tomioka for Semantics, Pragmatics, Syntax and their interfaces). It is strongly felt, however, that the scope of the project demands more than the two PIs' skills and knowledge combined, particularly in the areas of phonetics-phonology and psycholinguistics. There will be several scholars from diverse disciplines to participate in our project, and the most active involvement is expected to come from Haruo Kubozono of Kobe University (phonetics-phonology) and Yuki Hirose of University of Tokyo (psycholinguistics), who are highly competent and active researchers in their respective fields. Their research bases being in Japan also makes the recruiting of the subjects for our experiments much easier. Concrete plans for their participation in the proposed project will be laid out below. The other scholars to be mentioned below, both domestic and foreign, will function as consultants for theoretical and/or experimental aspects of the project. Involving close collaboration by the researchers with different expertise, this project, we believe, has great potential to establish a truly interdisciplinary research community for linguists as well as a larger group of researchers working on human cognition. If successful, it could provide an important step toward establishing a more reliable empirical method in theoretical linguistics.

## 2. Explaining Acceptability Judgments

The prosody-sensitive analysis of Subjacency introduced above can be used to achieve the next level of empirical adequacy when we readdress the Subjacency effects reported in the literature as a different type of empirical issue — the Subjacency judgment in a sentence like (5) reflects the fact that speakers are often biased toward the subordinate Wh-scope interpretation induced by Local FPD as in (5a), overlooking the matrix Wh-scope interpretation induced by Global FPD as in (5b).

- (5) a. Satoo-kun-wa [<sub>CP2</sub> Suzuki-kun-ga NAni-o tabeta kadooka ] oBO'ete-imasu-ka?  
 Mr. Sato-TOP Mr. Suzuki-NOM what-ACC ate whether.or.not remember-COMP<sub>WH</sub>  
 'Does Mr. Sato remember [ **whether** Mr. Suzuki ate **what** ]?'
- b. Satoo-kun-wa [<sub>CP2</sub> Suzuki-kun-ga NAni-o tabeta kadooka ] oboete-imasu-ka↑?  
 what-ACC whether.or.not -COMP<sub>WH</sub>  
 '**What**<sub>1</sub> is such that Mr. Sato remember [ *whether* Mr. Suzuki ate **it**<sub>1</sub> ]?' (Nishigauchi (1990: 31))

The relevant question to ask then is: how does this subordinate scope preference arise? As Kitagawa and Fodor (2003) noted, proper attention to prosody is necessary but is only the beginning of establishing more stable methodology. Building upon their analysis, the project begins with an attempt to identify and clarify several likely causes of this subordinate scope preference. This task requires very close

attention, first, to the semantics and pragmatics involved in the scope extraction out of Wh-islands, and second, to the restrictions imposed on the processing of Wh-questions in Japanese.

## 2.1 Pragmatic Factors

As has been well-known, language users can hardly accept even a grammatical sentence when they fail to imagine a pragmatic context in which the presented utterance makes sense. Wh-scope extraction out of a Wh-island is harder in some sentences than others even when appropriate prosody is assigned, and this asymmetry in many cases can be ascribed to such pragmatic factors. When we try to interpret (5) above as a matrix Wh-question, for instance, the sentence would involve the following presuppositions.

- (6) There is some food item *x* such that there is a question *q* such that *q* is whether or not Mr. Suzuki ate *x* and Mr. Sato remembers the answer to *q*.

(6) as the background of (5b) demands a very specific and somewhat rare pragmatic context, which is typically not provided in judgment solicitations. Awkwardness in a case like (5) is, therefore, due at least partly to the semantic/pragmatic burdens of having to satisfy too many presuppositions imposed on the language users when they process sentences involving islands. (See Crain and Steedman (1985) for a processing account for similar phenomena.) In constructing examples, it pays off to be 'pragmatics-friendly,' as witnessed by (7).

- (7) Hokenzyo-wa [ syokutyuudoku-kanzya-zenin-ga  
 health.department food.poisoning-victim-all-NOM  
 ittai      **NA**ni-o tabeta-*kadooka* ]      hissi-de      kakunin-si-yooto-teiru-**no**↑?  
 on.earth    what-ACC ate-COMP<sub>WHETHER</sub>      desperately      trying.to.confirm-COMP<sub>WH</sub>  
 'What is such that the Department of Health is desperately trying to confirm *whether* those who  
 suffered from food poisoning all ate it?'  
 Presupposition: There is some food item *x* such that there is a question *q* such that *q* is whether or not the food-poisoning victims ate *x*, and Health Department is trying to confirm the answer to *q*.

Many speakers find (7) much more acceptable than (5b). The existence of "a specific food item as the cause of food poisoning" is quite easy to imagine because of the specific pragmatics involved in these sentences.<sup>5</sup>

In short, the derived LF as an interface representation must be evaluated through its interaction with pragmatics so that the sentence can be regarded as felicitous, and this often narrows down the scope possibilities of an ambiguous Wh-interrogative construction. The unacceptability of a sentence that may arise from the interaction of LFs and pragmatics, we believe, is a quite formidable and perhaps ubiquitous trap that could mislead syntacticians into incorrect grammatical hypotheses based upon extra-syntactic anomalies/difficulties. (Further progress and future agenda of this research topic will be summarized in some detail in Section 4.)

## 2.2 Processing Factors

The "biased" grammaticality judgments toward embedded Wh-scope can be also traced back to some general processing constraint. Since 1980s, psycholinguists have repeatedly identified processing constraints which would require that dependencies between two linguistic expressions/positions in a sentence be resolved as soon as possible (Frazier and Clifton (1989), de Vincenzi (1991), Miyamoto and Takahashi (2002)), among others). As Miyamoto and Takahashi note, all of these perhaps fall under one general processing principle that requires the strain on working memory to be reduced to the minimum. (See also Inoue and Fodor (1995)'s "Minimal Everything Principle.") If such a processing constraint inducing the minimization of dependencies is at work, it is likely to favor subordinate clause

<sup>5</sup> We believe that the pragmatics involved in (7) is independent of the notion D(iscourse)-linking (Pesetsky (1987)). While a D-linked Wh-phrase does sometimes evoke the kind of elaborate presupposition that is required for the matrix scope interpretation, it is neither necessary nor sufficient to guarantee the availability of the matrix reading.

scope for Wh-in-situ in ambiguous Japanese examples we have examined above (e.g., (2)/(3)).

The minimization of dependencies, however, is not the only processing principle at work in favor of the embedded Wh-scope reading — those who detect Subjacency effects in the ambiguous sentences are evidently adopting analysis associated with Local FPD (as in (3) above), overlooking the acceptable analysis to be paired with Global FPD (as in (4)). One question that arises here is why this preference for Local FPD surfaces even when grammaticality judgments are elicited through the silent reading of the written examples. Although this observation may initially appear puzzling, Bader (1998) and Fodor (1998) and others since, have argued that even silent readers project prosodic contours onto sentences, which can then affect subsequent syntactic processing. Fodor (2002) formulated this finding into the Implicit Prosody Hypothesis as in (8), providing experimental support based on parsing preferences in languages including English, French and Croatian. Hirose (1999) and Hirose (2003) also present experimental support for this hypothesis from Japanese.

- (8) **The Implicit Prosody Hypothesis:** In silent reading, a default prosodic contour is projected onto the stimulus, and it may influence syntactic ambiguity resolution. Other things being equal, the parser favors the syntactic analysis associated with the most natural (default) prosodic contour for the construction.

Kitagawa and Fodor (2003) argue further that a universal tendency to avoid monotonous prosody (Selkirk (1984), Kubozono (1993)) favors Local-FPD over Global-FPD in ambiguous examples, and that this prosodic preference encourages the syntactic processing for subordinate scope, eventually resulting in the impression that matrix scope is unacceptable for Wh-in-situ.<sup>6</sup>

To validate this hypothesis, Fodor and Kitagawa in cooperation with Hirose conducted a pilot psycholinguistic experiment. The target sentence was as in (9), which is, unlike the earlier examples, **unambiguous**. The embedded Wh-phrase *dare* 'who' must be associated with the matrix Wh-COMP *-no* since the declarative complementizer *-to* 'that' in the subordinate clause is incompatible with it.

- (9) Kimi-wa Kyooko-ga hontoowa [ **dare-o** aisiteita-**to** ] i'mademo omotteiru-**no**?  
 you-TOP -NOM in.reality who-ACC love-COMP<sub>THAT</sub> even-now thinking-COMP<sub>WH</sub>  
 'Who do you still think that Kyoko in fact loves?'

This in turn means that Global FPD should be assigned to (9). However, if there is a tendency to assign Local FPD to (9) in silent reading, as hypothesized above, then (9) should be judged unacceptable more often when presented in written form than when spoken appropriately with Global FPD. As expected, the target sentences in the experiment are accepted more often in listening than in reading. The difference is not large but it is statistically significant ( $p < .01$ ). In the reading condition, the rate of acceptability falls in the middle of their matched grammatical fillers and matched ungrammatical fillers. But in the listening condition they draw much closer to the grammatical fillers, supporting the hypothesis that the grammar does indeed license them, though only with a very particular prosody. A more detailed review of these experimental outcomes can be viewed by visiting [[www.iub.edu/~ykling/experiments.html](http://www.iub.edu/~ykling/experiments.html)]. Its written version Kitagawa and Fodor (To appear: downloadable from [[www.iub.edu/~ykling/research.html](http://www.iub.edu/~ykling/research.html)]) also summarizes and discusses a similar experiment on English.

Hirose and Kitagawa have redesigned this pilot experiment and started to run its part. Some notable revisions are: (i) In addition to the grammaticality judgments, whether the subjects are interpreting the sentences with the subordinate or matrix Wh-scope is being confirmed by letting them select an appropriate answer to each question sentence, and (ii) The subjects are now limited to the speakers of Tokyo Japanese. A progress report on this experiment can be viewed by visiting [[www.iub.edu/~ykling/experiments.html](http://www.iub.edu/~ykling/experiments.html)]. Hirose and Kitagawa have also started a series of experiments involving production and perception in order to evaluate prosody-Wh-scope correlations. It will be briefly described in Section 3.3 below.

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<sup>6</sup> In this regard, the "additional-Wh effect" discovered by Watanabe (1992) may prove to be a case in which the problem of monotonous prosody is naturally resolved. Note that the addition of an extra Wh-phrase results in the avoidance of long post-focus reduction due to the emphatic accent imposed on/accompanying the second Wh-focus.

### 3. Competence and Performance of Prosody-Scope Correlation

#### 3.1 Grammar of Prosody-Scope Correlation

In most generative grammatical approaches, sounds and meanings are mediated by syntax, and phonetic and semantic interpretations are carried out based on the information provided by two distinct output representations of grammar. The simplest approach then is to consider that the prosody-scope correlation in Wh-interrogatives is no exception to such general phenomena. An important task to be fulfilled in this approach therefore is to find a way to encode into syntax a piece of information which induces FPD on the phonetic end and Wh-scope interpretations on the semantic end in an interlocking fashion. Since COMP as the head of a domain of Wh-scope corresponds to the endpoint of FPD, we may consider that association between a focus Wh and COMP may be synchronized in two distinct ways both at PF and LF, as in (10) and (11). Each instance of such synchronized Wh-COMP association eventually yields the "Subordinate scope-Local FPD" pair and the "Matrix scope-Global FPD" pair.

- (10) Subordinate scope/Local FPD:
- |        |  |
|--------|--|
|        | ..... <i>Subordinate</i> .....   |
|        | <i>Scope</i>   |
| a. LF: | [ <sub>CP</sub> John-wa [ <sub>CP</sub> Mary-ga <b>nani</b> <sub>i</sub> -o tabeta- <b>ka</b> <sub>COMP</sub> ] siritagatteiru]-no <sub>COMP</sub> ] |
|        | what-ACC   |
| b. PF: | [ <sub>CP</sub> John-wa [ <sub>CP</sub> Mary-ga <b>NAni</b> -o ta'beta- <b>ka</b> <sub>COMP</sub> ] siRITAGA'tteiru]-no <sub>COMP</sub> ↑]           |
|        | ..... <i>Local FPD</i> ..  |
- 'Does John want to know what Mary ate?'

- (11) Matrix scope/Global FPD:
- |        |  |
|--------|--|
|        | ..... <i>Matrix Scope</i> .....  |
|        |  |
| a. LF: | [ <sub>CP</sub> John-wa [ <sub>CP</sub> Mary-ga <b>nani</b> <sub>i</sub> -o tabeta-ka <sub>COMP</sub> ] siritagatteiru- <b>no</b> <sub>COMP</sub> ]] |
|        | what-ACC   |
| b. PF: | [ <sub>CP</sub> John-wa [ <sub>CP</sub> Mary-ga <b>NAni</b> -o ta'beta-ka <sub>COMP</sub> ] siritagatteiru- <b>no</b> <sub>COMP</sub> ↑]             |
|        | ..... <i>Global FPD</i> .....  |
- 'What is such that John wants to know if Mary ate it.'

More than one way to establish such Wh-COMP association has been pursued under the minimalist program (Chomsky (1995)). Ishihara (2003), for example, proposes that a FOCUS feature is assigned to the Wh-phrase by some COMP in the course of overt syntactic derivation, and this feature comes to be interpreted at both interface levels (PF and LF). Kitagawa and Deguchi (2002) propose that in a Wh-interrogative construction: (i) a complex of focus features (Phonetic [F], Semantic [F]) is introduced as part of lexical information of a Wh-word (interpretable) and that of a COMP (uninterpretable) when the Numeration is formed, (ii) Phonetic [F] and Semantic [F] are sent to PF and LF separately when Spell-Out splits lexical information, and (iii) agreement must take place between [F] of Wh and that of a COMP at PF as well as at LF to accomplish legitimacy. Note that these approaches share the hypothesis that the correlation between prosody and Wh-scope is established **only by way of syntax**, when a Wh-word and a COMP are associated due to **focus features** introduced to these designated lexical items. (The core intuition behind this approach can be traced back to Chomsky (1970) and Jackendoff (1972). See also Zubizarreta (1998).)

#### 3.2 Syntax-PF Interface

How exactly does this syntactic encoding come to be represented at PF and LF? Furthermore, how do these interface representations come to be implemented in larger contexts for phonetic and semantic performance involving other cognitive systems? One of the proposed project's main goals is to elucidate the way LF of a Wh-interrogative sentence is derived and how it interacts with pragmatics including information structure. This research topic will be discussed in some detail in Section 4 below.

As a secondary research interest of the proposed project, it is also asked how the prosodic domains of FPDs are syntactically encoded and represented at PF. As is most clearly illustrated by Global FPD

as in (12), the domain of FPD established by a Wh-COMP association certainly need not correspond to any syntactic constituent.

- (12) [<sub>CP</sub> John-wa [<sub>CP</sub> Mary-ga **DA**re-to atteita-ka ] situkoku siritagatta-**no**]↑  
 what<sub>[F]</sub>-with -COMP<sub>WHETHER</sub> -COMP<sub>[F]</sub>  
 ↑ .....↑  
 'Who<sub>1</sub> is such that John persistently asked [ **whether** Mary was seeing **him**<sub>1</sub> ]?'

One non-trivial question that arises here is whether the Wh-COMP association established in the course of derivation of PF creates any hierarchically structured phonological unit. If that turns out to be the case, does that phonological constituent correspond to any type of phonological phrase discussed in the literature or does it have to be identified as some novel type of phonological unit? Research on phonological phrasing has produced a considerable body of work (e.g., (Selkirk (1984), Nespor and Vogel (1986), Truckenbrodt (1995)), and Japanese is one of the main beneficiary (e.g. Pierrehumbert and Beckman (1988), Selkirk and Tateishi (1991), Nagahara (1994), and Sugahara (2003)). A view on focusing effects on phrasing that is frequently adopted in the literature is that intonational phrasing is altered when focus is involved (Pierrehumbert and Beckman (1988): henceforth P&B): A focused element blocks the intonational process of downstep (or catathesis) and starts a new intonational phrase (called 'major phrase' in the terminology of Poser, Kubozono and Selkirk, and 'intermediate phrase' in P&B's). Kubozono (1989) and Kubozono (2004), however, pointed out that the presence of downstep can be objectively confirmed only when we examine the lowering of a pitch with close attention to its paradigmatic aspect rather than its syntagmatic aspect, i.e., by carefully comparing the pitch of the allegedly downstepped item when it is immediately preceded by a lexical accented item and by an unaccented item. If we would like to examine the existence and identity of a phonological phrasing for (Local) FPD, we must also evaluate the observed F<sub>0</sub> boost induced by the emphatic accent placed on a focus Wh as well as the retention of high pitch in the matrix clause and its relation to the preceding reduction of accents, taking heed of this warning. Two research questions as in (13 i-ii) below have been raised and two experiments have been designed to examine them. The results of these experiments would provide us with an initial clue as to whether or not we should identify the domain of FPD as a major phrase/intermediate phrase:

- (13) (i) Whether or not an emphatic accent, which marks the starting point of FPD, blocks downstep.  
 (ii) Whether or not a lexical accent retained in the matrix clause, which marks the end of Local FPD, blocks downstep.

The pilot of the first experiment has been already designed and carried out by Kubozono, in which a pair of sentences as in (14) were compared:

- (14) a. ana'ta-wa ao'mori-de na'oko-to **NA**'ni-o mima'sita-ka?  
 you-TOP Aomori-in Naoko-with what-ACC saw-COMP<sub>WH</sub>  
 'What did you see with Naoko in Aomori?'  
 b. ana'ta-wa oomori-de naomi-to **NA**'ni-o mima'sita-ka?  
 you-TOP Oomori-in Naomi-with what-ACC saw-COMP<sub>WH</sub>  
 'What did you see with Naomi in Oomori?'

In Wh-questions in (14), the Wh-word, *NA'ni* 'what', bears focus. (14a) contains a sequence of lexically accented elements before the focused Wh-word, whereas (14b) involves a sequence of lexically unaccented elements in the same position. The production experiment which used seven native speakers of Tokyo Japanese as subjects clearly indicate that the pitch height of the focused Wh-elements is influenced by the accentedness of the material immediately preceding them, and the intonational process of downstep is NOT blocked by the left boundary of the FPD according to the paradigmatic definition of the term. This result suggests that focus does not block downstep, and hence does not introduce a new major (or intermediate) phrase boundary as long as this phonological phrase is defined as the domain of downstep. The relevant statistics and discussion of this experiment as well as the draft of a written work (Kubozono (To appear in 2006)) can be accessed by visiting [[www.iub.edu/~ykling/experiments.html](http://www.iub.edu/~ykling/experiments.html)].

Kubozono and Kitagawa are in the process of designing the second experiment to be carried out in the proposed project, which pertains to the question in (13ii). It will involve recordings of the subjects' production of indirect Wh-questions as in (15a-b):

- (15) a. John-wa [ *I'tu a'kira-ga kyo'oto-de na'oko-to a'tteita-ka* ] *YU'mi-ni MA'da hanasiteinai.*  
 John-TOP when Akira-NOM Kyoto-in Naoko-with seeing-COMP<sub>WH</sub> Yumi-DAT yet have.not.told  
 'John is yet to tell Yumi when Akira was seeing Naoko in Kyoto.'  
 b. John-wa [ *I'tu minoru-ga kyo'oto-de naomi-to mometeita-ka* ] *YU'mi-ni MA'da hanasiteinai.*  
 whenMinoru-NOM Kyoto-in Naomi-with arguing.with-COMP<sub>WH</sub>  
 'John is yet to tell Yumi when Minoru was quarreling with Naomi in Kyoto.'

If the end of Local FPD in these examples corresponds to the right boundary of one intonational phrase and introduces a new major (or intermediate) phrase boundary, the retained lexical accent in the matrix should be free of downstep involving preceding lexical accents. Instead, the pitch range of the material immediately following these boundaries (*YU'mi-ni* 'Yumi-DAT') should be reset more or less equally in (15a) and (15b). If, on the contrary, the pitch of H\* on *YU'mi-ni* exhibits pitch differences between (15a) and (15b) in such a way that the H\* is realized at a lower pitch region in the former than in the latter, it will suggest that no major (or intermediate) phrase boundary exists where Local FPD ends. (16) below lists some of our current conjectures on the possible results of this experiment.

- (16) a. By comparing the F<sub>0</sub> peak of *kyo'oto-de* 'in Kyoto' in (15a) and that in (15b), we can conform the presence (or absence) of downstep there in paradigmatic terms.<sup>7</sup>  
 b. Since all of the five phrases in the FPD domain in (15a) including the Wh-phrase are lexically accented while only two of such phrases are accented in (15b), the cumulative effect of downstep should be stronger in (15a) than in (15b). As a result, if downstep continues onto the matrix item *YU'mi-ni* beyond the Local FPD domain, the H\* of this item is naturally expected to be realized lower in pitch in the (15a) than in (15b).  
 c. The Wh-complementizer *-ka* possibly is a recessive affix (e.g., *yaME-RU* 'stop-PRES' vs. *yaME-RU-ka* 'stop-PRES-COMP'). If so, it may obscure the contrast of downstep effects between (15a) and (15b).

### 3.3 Mismatches between Competence and Performance

Suppose that synchronized encoding of prosody and scope takes place in the way described above by way of Wh-COMP association, and comes to be represented in LF and PF. As a grammatical process, i.e., as part of the linguistic competence of Japanese speakers, this encoding is "exceptionless" and yields a consistent result — establishing only a legitimate and correct pair of domains for focus prosody and Wh-scope interpretation. As described in Section 2, however, close investigation of extra-grammatical factors such as pragmatics, prosody and processing permits us to identify various factors that often induce biases toward subordinate scope of embedded Wh-phrases and Local FPD when potentially ambiguous Wh-questions are processed. A complex Wh-interrogative construction of the sort examined above (e.g., (1)), in other words, is heavily handicapped for one type of prosody and one type of scope. It is misguided, therefore, to attempt to construct a formal theory of syntax without filtering out such biasing factors. We should also be warned, however, that speakers' intuition about the prosody-scope correlation may not be easily duplicated in a straightforward manner in experimental studies, no matter how it may be improved under the new methodology. This is due to the aforementioned strong biases against the matrix scope readings. In Hirotani (2003)'s experimental research, for instance, two major observations are reported. In her **production** study, the subjects often produced Local FPD, rather than the expected Global FPD, when the sentence is intended to have the matrix Wh-scope reading. Also in her **perception** study, Global FPD often fails to induce the expected matrix scope preference — 54 % of her subjects still chose the embedded scope, while Local FPD proved useful to elicit the embedded scope readings. Hirotani concludes from these results that the prosody-scope correspondence in the form that is intended in Kitagawa and Deguchi (2002) and Ishihara (2003) holds only partially: 'Local FPD = embedded Wh-scope' but 'Global FPD ≠ matrix Wh-scope'. This

<sup>7</sup> See Ishihara (2003) for the arguments that the lowering of F<sub>0</sub> observed in the transition from a Wh-focus to a subsequent material in the post-focus reduction (e.g., from *I'tu* 'when' to *a'kira-ga* 'Akira-NOM' in (15a)) should not be regarded as downstep.

conclusion is not the only interpretation of Hirotani's experimental results, however. Complex presuppositions and the processing principle to minimize dependencies always work against the matrix scope reading in perception. Thus, even with the appropriate prosody, it is probably unreasonable to expect totally 'noise-free' results in experiments. The same is true for production. Speakers are predisposed to Local FPD due to the tendency to avoid monotonous prosody. This would result in more 'rhythmic' prosodies for matrix Wh-scope sentences than the strict prosody-scope correspondence thesis predicts. All things considered, therefore, Hirotani's results do not necessarily contradict the prosody-scope correspondence grammar predicts, but they can be interpreted as the confirmation of the complexity of the phenomena in question. See Kitagawa (2005) (downloadable from [www.iub.edu/~ykling/research.html]) for more discussion on these issues.

With such a warning in mind, Hirose and Kitagawa are in the process of designing an experiment to re-examine the psychological reality of prosody-scope correlations, and a small-scale pilot has just been run in Japan. In this experiment, special attention has been paid to pragmatic likelihood of matrix Wh-scope readings.<sup>8</sup> The objective of the experiment is also slightly shifted from Hirotani (2003). Since we cannot expect to see absolute, 'carte blanche' effects of prosody on Wh-scope, the main target is 'comparative' effects of Global FPD and/or post-focus reduction. The first part of the experiment involves a production study. Three native speakers of Tokyo Japanese, who had verified that they find all of the prepared complex Wh-interrogative sentences scopally ambiguous, were asked to read aloud each of those sentences in accordance with the interpretation they assign. (Absolutely no instruction or description of the prosodic properties of the sentences was provided for them.) A cursory phonetic analysis of their recordings shows a fair amount of variations among speakers as well as sentences, but suggests that these speakers generally distinguish two prosodic patterns, each of which corresponds to, or at least reminds us of, Local FPD for subordinate scope and Global FPD for matrix scope, respectively, in regard to post-focus reduction. In the second part of the study, a perception experiment is conducted using the recordings of one of these speakers. The subjects are asked to indicate the way they interpret the Wh-questions they perceived auditorily by selecting one of the three answer options — (i) an "identity answer" for a direct Wh-question, (ii) a "yes/no answer" for an indirect Wh-question, and (iii) rejection of the question itself as incorrect. The initial impression on the result (which is yet to be fully analyzed) is in accordance with the observation presented above concerning the discrepancies between competence and performance of Wh-interrogatives. Although there was an overall bias towards the embedded scope readings, the **listeners** were more likely to choose the answer consistent with the matrix Wh-scope interpretation when the **speaker** of the utterances originally intended the matrix scope reading. This contrasts with the cases in which the speaker of the utterance intended the embedded scope in a statistically significant way ( $p < 0.01$  for both subject and item). The example sentences, auditory stimuli, correlation between each subject's tendency and their background, and other accumulated data involved in this pilot experiment are currently under scrutiny in preparation for a larger-scale experiment.

#### 4. Implications to the Syntactic Theory

With the proposed approach to Wh-interrogatives that integrates prosodic, pragmatic and processing effects, we will be in a better position to distill core syntactic properties of Wh-interrogatives. The re-

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<sup>8</sup> It seems that some of the test sentences used in Hirotani (2003) strongly discourage the matrix Wh-scope readings. The following are some examples.

- (i) a. Otetudaisan-wa syuzin-ga                    **DAre-o** sagasiteiru-ka                    iimasita-ka?  
 maid-TOP                    master-NOM                    who-ACC                    looking.for-COMP<sub>WHETHER</sub>                    said-COMP<sub>WH</sub>  
 'Did the maid tell you who the master was looking for?'  
 over 'Who<sub>1</sub> was the maid told you if the master was looking for her<sub>1</sub>?'  
 b. Naokosan-wa Zyakku-ga                    **DAre-o** saketeiru-ka                    kiiteimasu-ka?  
 Naoko-Top                    Jack-NOM                    who-ACC                    avoiding-COMP<sub>WHETHER</sub>                    informed-COMP<sub>WH</sub>  
 'Has Naoko been informed who Jack is avoiding?'  
 over 'Who<sub>1</sub> is such that Naoko has been informed if Jack is avoiding her<sub>1</sub>?'

examination of constraints on movement, such as Subjacency, will have particular importance in the project. The encoding of Wh-scope at LF will also be a major theoretical issue to be addressed.

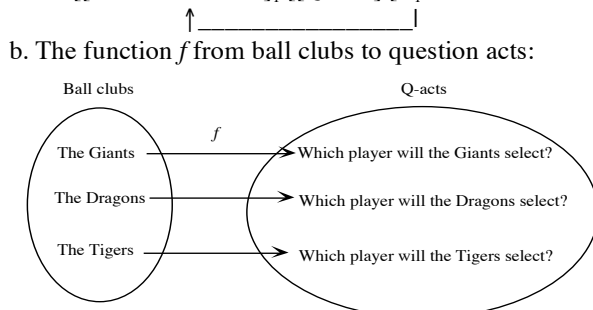
#### 4.1 Subjacency in Japanese and Beyond

The findings summarized above suggest that Subjacency does not apply to in-situ Wh-questions in Japanese, and that what were regarded as Subjacency effects in the past are due to pragmatic and processing difficulties. What do they tell us about Subjacency in general? Assuming that overt movement such as English Wh-movement is constrained by Subjacency, one may wish to return to Huang's/Chomsky's characterization of Subjacency that it constrains only overt syntax. This possibility can be re-interpreted in more recent syntactic terms as the thesis that Subjacency constrains the movement of those features relevant to phonetic interpretations after Spell-Out/Transfer starts a derivation toward PF. It probably is feasible to recognize more full-fledged "PF-deriving syntax" that is independent of "overt syntax," and identify possible constraints imposed on it (cf. Ueyama (1998), Ueyama (2003) and Merchant (1999)). A viable alternative to this view is found in a series of works by Robert Kluender (Kluender (1991), Kluender (1998), Kluender (2004), Kluender and Kutas (1993)), who argues that Subjacency effects are derived from general properties of processing independent of syntactic principles, and the facts reported here so far are certainly compatible with this hypothesis as well. There is yet another possibility, however, that may not seem as obvious an option as the other two. That is, Subjacency is a constraint on syntactic movement in general, overt or covert, and in-situ Wh-phrases do not show Subjacency effects simply because they are truly immobile. The (re-) emergence of non-movement analyses of Wh-in-situ, such as the choice-function account of Reinhart (1997) and the revival of Hamblin (1973)'s point-wise functional application by Kratzer and Shimoyama (2002), has made this third option a distinct possibility. What kind of empirical evidence verifies this hypothesis? We certainly must look beyond Huang (1982)-style Wh-movement at LF, the very existence of which is now in doubt. If there are other kinds of LF movement that manifest Subjacency effects (even with prosody, pragmatics, and processing under control), then the third possibility has empirical advantage over the other two. Indeed, the PIs and their close colleagues recently claimed that such instances do exist. It has been noted for some time that a multiple Wh-question in Japanese can seek either a multiple-pair (or pair-list) or a single-pair answer (Miyagawa (1997), Boskovic (1998)). In the question in (17), for instance, the speaker can be asking the addressee to provide a list of multiple pairs of ball clubs and players or a single-pair (though the latter reading may be pragmatically discouraged in this particular instance).

- (17) *Dono-kyuudan-ga dono-yuuboo-sensyu-o itii-simee-sisoona-no?*  
 which.ball.club-NOM which.promising.player-ACC select-as-#1-likely-COMP<sub>WH</sub>  
 'Which ball club is likely to select which promising player as its No.1 draft pick?'

Kitagawa and Tomioka (2004) and Kitagawa, Roehrs and Tomioka (2004) noticed, however, that, when a multiple Wh-question like (17) is embedded within a Wh-island, the result is grammatical with the matrix scope for both Whs **but only under the single-pair meaning**. Kitagawa, et al. give the following explanation for this 'interpretive island effect': (i) Wh-scope can be assigned to in-situ Wh without movement, (ii) a single-pair interpretation requires no movement and is immune to a Wh-island effect, (iii) in a multiple-pair interpretation, the first Wh-phrase moves at LF over the question act operator QUEST, as shown in (18a), and the entire question denotes a function from individuals to question acts as shown in (18b).

- (18) a. LF: [[**which ball club**]<sub>1</sub> [[QUEST] [ t<sub>1</sub> will select which player?]]]





natural class of 'Anti-Topic Items' since they cannot be topic-marked (i.e., *\*daremo-wa* 'anyone-top'/'*dareka-wa* 'someone-top'). They must belong to the given, background portions of the sentences, but their anti-topicality prevents them from being 'given' by virtue of being topics. They must appeal to the other means, the post-focus reduction, to be ensured their background status. The scrambling of a Wh, which is focused, will create such a prosodic structure. Under this account, the unacceptability of (19 a-b) stems from less than perfect structural realization of the required information structure. The importance of intervention effects to the proposed project is two-fold. They present yet another opportunity where pragmatic and prosodic information (e.g., topicality, post-focus reduction) highlights a completely new facet of the familiar problem. Second, their status as evidence for LF Wh-movement now needs to be under new scrutiny. In this respect, a new proposal within the movement tradition by Ko (2005) and some of the recent non-movement alternatives such as Beck (2006)'s and Kim (2005)'s will be closely examined to see whether any modification and/or amendment should be made to the pragmatic theory of intervention effects.

### 4.3 LF Syntax of Wh-scope and Wh-Focus Dependencies

With non-movement analyses of Wh-in-situ gaining more and more popularity, the semantic scope of an in-situ Wh is no longer a simple matter of its position at LF. In Kratzer and Shimoyama (2002)'s version of Hamblin semantics, for instance, a Wh is 'caught up' by the closest COMP, where the scope is determined. However, it would leave the lack of Wh-islands in Japanese unaccounted for. A more promising proposal is found in Beck (2006). She argues that the only semantic value of a Wh-phase is a focus value of Rooth (1992), which roughly corresponds to the Hamblin set of possible answers. Consequently, any constituent containing a Wh-phrase also has focus values only, lacking an ordinary semantic value, **until** it is combined with a Q-morpheme, whose role is to 'promote' the focus value of its sister to the ordinary value. With a Q-morpheme, therefore, an interrogative sentence has an ordinary value, which looks like a focus value (a set of alternatives). Unlike Kratzer and Shimoyama's system, the relation between a Wh and a Q-morpheme is argued to be 'selective' in Beck's analysis so that long distance dependencies between the two elements are possible. We believe that it is possible to enhance Beck's idea by incorporating focus into Wh-dependencies.

Contrary to what we have assumed so far, a Wh-phrase is not always the focus of a sentence. One such instance is found with a contrastive topic (CT).

- (21) (zyaa) **KEN**-wa            nani-o        yon-da-no?  
       then Ken-TOP<sub>CONTRAST</sub> what-ACC read-past-COMP<sub>WH</sub>  
       'What did **KEN** read, then?'

The English translation suggests that (21) calls for a context in which the question of the form 'what did x read' itself is considered as given information, and the lack of focal accent on the Wh-phrase confirms its background status. An unfocused Wh can appear with a focused Wh in one sentence, and that is where an interesting pattern emerges. Kitagawa (2006) and Kitagawa and Tomioka (2005) observe that the two types of Wh-phrases cannot co-occur within a single CP ((22a)) while the co-occurrence restriction is lifted when they take scope associated with two distinct COMPs ((22b)).

- (22)
- a. #Dare-ga asokode nani-o katta-no?            'WHO bought what there?'  
       who<sub>[F/Qw]</sub>-NOM there what<sub>[Qw]</sub>-ACC bought-COMP<sub>[F/Qw]</sub>
- b. John-wa [ Dare-ga asokode nani-o katta-ka ] sonnani siritagatteiru-no?  
       John-TOP who<sub>[F/Qw]</sub>-NOM there what<sub>[Qw]</sub>-ACC bought-COMP<sub>[Qw]</sub> that.much want.to.know COMP<sub>[F/Qw]</sub>  
       'WHO<sub>1</sub> is such that John wants to know so eagerly [ what he<sub>1</sub> bought there ]?'

The contrast here calls for the need for a formal means to distinguish a focused and unfocused Wh-phrases, which we believe can be provided by postulating both Wh-question-feature ( $Q_w$ ) and focus-feature ( $F$ ). With the hybrid nature of the dependency between a focused/unfocused Wh-phrases and COMP, the contrast is reduced to the matter of feature association: The unfocused Wh and COMP in (22a) cannot agree, but no such disagreement is found in (22b). The selectivity in Beck's interrogative semantics should not be determined randomly but must be licensed by the matching focus feature. The proposed project will pursue formalization of this idea.<sup>10</sup>

The following summarizes some concrete research topics that are central to the core theoretical investigations in this project.

- (23) a. Re-examine island sensitivities of multiple Wh-questions (particularly for islands other than Wh-islands) and compare the results with the cases with CTs. Consider other phenomena in Japanese that are arguably island sensitive, such as sluicing with case-marked remnants (Fukaya and Hoji (1999)) and comparatives (Kikuchi (1987)). Seek possible extension of the new findings to other constraints of movement, such as Superiority Effects, as outlined in Kitagawa, Roehrs and Tomioka (2005). (Kitagawa, Tomioka)
- b. Consider the possibility that the LF Subjacency effects in Japanese discussed above can be accounted for by processing factors, such as those proposed by Kluender. (Kitagawa, Tomioka)
- c. One of the objections to a pragmatic analysis of intervention comes from Ko (2005)'s observation that intervention effects do not arise with in a *why* question. Explore the possibility that this fact can be explained by the special presupposition of a *why* question (i.e., in 'why  $p$ ?', the truth of  $p$  is presupposed independently of the value of *why*). Re-evaluate Tomioka's pragmatic analysis in light of the new analyses of intervention effects as focus intervention (e.g., Beck (2006), Kim (2005)).<sup>11</sup> (Tomioka)
- d. Give a precise semantic characterization of unfocused Wh-phrases, particularly in connection with contrastive topics. (Tomioka) Establish an analysis of the hybrid feature system (i.e.,  $Q_w$  and  $F$ ) of Wh and COMP which would derive Beck (2006)'s semantic selectivity between the two elements. Compare it with Ishihara (2003)'s secondary focus analysis of unfocused Whs. (Kitagawa, Tomioka)
- e. It has been noted (e.g., Sugahara (2003)) that a non-Wh portion of a question can contain new information (e.g., In *Where can I buy newspapers?*, 'newspaper' can be new information). Examine how this fact is incorporated into the Krifka-style focus-background partition of a Wh-interrogative. Investigate its relation to the notion of accommodation (e.g., a possible Japanese translation of the English question above has 'newspapers' as a thematic topic) and to focus projection (cf. K. Ito (2003)). (Tomioka)

## 5. Plan of Project

The genesis of the proposed project dates back to 2001 when the two PIs began their collaborative research on Japanese interrogatives. Since then, they have presented the results of their research, as well as their individual papers that are related to the topic of the project at a number of conferences and journals. It was very clear from the very beginning, however, that the nature of the research program requires the involvement of linguists whose expertise complements the PIs'. It did not take long for an invitation to be extended to Kubozono and Hirose to join the project group, and they have been very active collaborators of the PIs ever since. They are now regarded as important and integral members of the project. The four linguists were the core members of the two successful workshops; *Workshop on Prosody, Syntax and Information Structure (WPSI) 1 and 2*, held at Indiana University in 2004 and at Universität Potsdam in 2005. (The program of the workshop and the information on the participants can be found in the following website. [[www.iub.edu/~ykling/wpsi.html](http://www.iub.edu/~ykling/wpsi.html)] and [[www.sfb632.uni-potsdam.de/events/ws180305.php](http://www.sfb632.uni-potsdam.de/events/ws180305.php)].) During the workshops, the possibility of future collaboration was discussed, and in addition to Kubozono and Hirose,

<sup>10</sup> Kitagawa and Tomioka (2005) claim that, while a  $Wh_{[Q_w]}$  (= unfocused Wh) cannot associate with  $COMP_{[Q_w/F]}$ ,  $Wh_{[Q_w/F]}$  (= focused Wh) can establish association with the two COMPs ( $COMP_{[Q_w]}$  and  $COMP_{[F]}$ ) simultaneously. Hence, the agreement between the two elements is far more complex than (22a-b) suggest.

<sup>11</sup> Preliminary results of this mini-project are reported in Tomioka (To appear-a) and Tomioka (2006).

the following scholars have agreed to participate, to varying degrees of involvement, in the project as consultants: Janet Dean Fodor (CUNY-Graduate Center), Masako Hirotsu (Max Planck Institute-Leipzig), Shinichiro Ishihara (Univ. Potsdam), Tomoyuki Kubo (Kyushu Univ.), S.-Y. Kuroda (UC San Diego), and Jennifer Venditti (Columbia Univ.). Some of the colleagues of the PIs at the two institutions will also participate in the research project as informal consultants: Ken de Jong (phonetics), Leslie Gabriele (semantics) and Sandra Kuebler (computational linguistics) at Indiana University, and Irene Vogel (phonology) and Benjamin Bruening (syntax) at the University of Delaware.

The theoretical portion of the project is carried out by the PIs and the RAs at their respective institutions. As for the experimental components, the division of labor between the PIs, the RAs, and the main consultants (i.e., Kubozono and Hirose) is drawn in the following fashion. The PIs take initiative with the RAs' assistance in preparing the stimuli and running at least part of the pilot experiments while the consultants oversee the progress. Kitagawa will be responsible for designing experimental research involving syntax-prosody interaction, and Tomioka will play a major role in controlling semantic and/or pragmatic biases in the testing material. The core experiments are mostly carried out in Japan by the consultants and their assistants. The tabulations of results will be one of the main duties of the RAs, and the consultants provide aid for the statistical analyses. The PIs are primarily responsible for theoretical examination of the results although the consultants are expected to play a major role in this process as well. The results will be co-authored by all the individuals involved. This plan inevitably requires close and constant communication among all the members. Although we will try to minimize the cost of the collaboration by using teleconferencing technologies, we find it imperative for the PIs and the consultants to meet at least twice a year. The RA at Indiana, who will be more involved in the experiments than his/her counterpart at Delaware, will accompany the PIs to Japan and play an active role in designing and carrying out the experiments. Thus, we ask for the funding for the traveling expenses to/from Japan as one of the major budget items. (To counterbalance the cost for international travel, the PIs refrain from requesting summer salary.)

The first year of the project (FY2007) will have several components. (i) Kitagawa and his RA will analyze the data of the perception experiment described at the end of 2.2, the results of which are expected to be available by the beginning of the project year. Hirose and Kitagawa prepare the results for publication. (ii) The two PIs and Kubozono together will prepare the stimuli for the production experiment in Section 3.2, and Kubozono and his assistant will run its pilot experiment in Japan. (iii) The RA in Delaware will launch the website of the project and remain responsible for its maintenance. (iv) The two PIs and their RAs begin a regular study group (via tele-conferencing) on theoretical issues surrounding Subjacency. (v) Tomioka will conclude his work on *why*-questions in intervention effects and prepare it for publication. (vi) The PIs, the consultants and a few other collaborators will gather in Indiana in Spring for Workshop on Prosody, Syntax and Information 3 (WPSI 3) to report progress and discuss the future direction. The discussion will continue when the PIs and the RA at Indiana visit the consultants in Japan.

In the second year (FY2008), the production and perception experiments described in Section 3.3. will be re-designed and conducted as in (i)-(iv): (i) The PIs, the RAs and Hirose will prepare the stimuli for the production experiment, taking the results of the earlier pilot into consideration. Special attention will be paid to the minimization of pragmatic biases against the matrix Wh-scope. (ii) The production experiment will be conducted involving more speakers in Japan, and the RAs will phonetically analyze the recordings. (iii) A large-scale perception experiment will be conducted in Japan by Hirose and her assistants. (iv) The RAs will begin collection and tabulations of the data. (v) Tomioka and his RA will pursue a formal semantic/pragmatic analysis of unfocused Wh-phrases and combine with systematic investigation of contrastiveness by reviewing the phonological, semantic, and pragmatic literature on this topic. The results will be incorporated into the PIs' continuing work on multiple Wh-questions and a focus-feature agreement hypothesis. (vi) Tomioka and his RA will begin re-analysis of information structure of interrogatives with special emphasis on Wh-questions with additional new information (24e) and focus projection. (vii) The RA in Delaware will continue to manage the project's website and take responsibility for arranging the consultants' visit to Delaware and their public lectures. (viii) The study

group on Subjacency will continue. (ix) The consultants will visit Delaware in March, and the PIs and the RA at Indiana will visit Japan in June to report progress and discuss the future direction. The consultants and the PIs will give open lectures while they are in Delaware.

The final year (FY2009) will see (i) the conclusion of the PIs' work on multiple-Wh questions with focused and unfocused Wh-phrases. They will write up the results for publication. (ii) The result of the production experiment with Kubozono will be ready for publication. (iii) The perception and production experiments with Hirose and her assistant will wrap up during this year. The collection and tabulation of the data will be completed by the beginning of the year, and the statistical analysis and theoretical discussion will follow soon after. (vi) The study group on Subjacency will conclude, either as a joint paper co-authored by the PIs and the RAs for a journal, or a working paper volume (to be published from IULC). (v) In addition, the PIs plan to start exploring the possibility of duplicating the above experiments in other dialects of Japanese and/or other languages. In particular, the Fukuoka dialect of Japanese is worth close examination since it has prosodic patterns quite different from Tokyo Japanese but has been confirmed to show a type of prosody-Wh-scope correlation, as pointed out by Kubo (2001)). It is certainly possible that, with co-operation from Kubo, who is one of the project consultants, we will prepare the material and run a pilot experiment to verify the prosody-Wh-scope correlation in this dialect during the year. Another good candidate for cross-linguistic extension of the project is the Northern Kyungsang dialect of Korean, which is a pitch accent language like Japanese. Kubo has conducted some initial fieldwork on this Korean dialect and observed certain prosody-Wh-scope correlations. Although it is unlikely that such cross-linguistic investigations will be completed within one year, the PIs hope to pave the way for the future research. In the spring or fall of 2009, the University of Delaware will host a conference on the theme of the project, which will feature as invited speakers the PIs, Kubozono, Hirose, and at least three of the project consultants listed above. The three-day conference will also include papers invited and/or selected from the general submission. The RA at Delaware will take primary responsibility in organizing the workshop. The PIs will edit a volume based on the conference presentations and contact publishers to seek the appropriate venue for its publication.

This three-year project requires significant involvement of the graduate students in the research, and one of the main budget items is the support for graduate Research Assistants. The RAs are expected to be involved in most of the project activities, including preparing the stimuli, collecting and analyzing the experimental data, and theoretical and analytical studies of the project topics. The RA at Indiana will also be partially responsible for running pilot experiments and recruiting subjects for them. The RA at Delaware will be in charge of the project's web management and organizing the final-year conference. They will meet with their PIs on a weekly basis to discuss the progress during the regular semesters. They will be involved in more intensive activities during summer months. At each of the two institutions, there is already a good candidate for the assistantship. Kenji Yoshida of Indiana University, a second-year student, has background in phonetics while he was a student and a university instructor in Japan. He is also knowledgeable about statistics. He will be particularly suitable as Kitagawa's assistant since the project in Indiana will involve experimental materials. Sachie Kotani of the University of Delaware has worked on focus projection of contrastive topic marking in Japanese, and her research interests match the project theme very well. Both are native speakers of Japanese. Each PI has a history of successful collaboration with other scholars, and the project will provide invaluable opportunities for the graduate assistants to interact and be engaged with the PIs and the other project members.

The educational and professional merits of this project goes beyond those for the graduate assistants who are directly involved in the project. The PIs plan to jointly develop a course on methodological issues in prosody-syntax-information structure interfaces which will be taught at each of the PIs' institutions. Such a course will be beneficial to graduate students in linguistics in general, regardless of their research orientations. The course material will be made available on-line for wider distribution. The PIs also plan to submit a course proposal on the same topic to LSA Summer Institute (2009), in which the course will serve much larger and more diverse linguistic population.