PARSE (wh) and the Ineffability Problem of Multiple Wh-Questions

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1. Introduction

One of the tasks of modern linguistic theory is to explain the reason of impossible forms and interpretations. In the traditional generative syntax, the way of ruling out ungrammatical sentences is quite simple: if sentence S violates any syntactic principle, S is regarded as ungrammatical. In this view, principles are inviolable, and violation of a principle makes the sentence violating it ungrammatical. In the early 90's, the Minimalist Program (Chomsky 1995) has started, and the notion of economy has been introduced in syntax with many interesting analyses proposed. With this notion, sentence S, which does not violate any principle per se, is regarded as ungrammatical if there is another sentence S' that is "better than" S. In this approach, grammaticality is determined by competition between two expressions or more. The Minimalist Program still assumes, however, that principles are inviolable, and not all syntactic phenomena can be accounted for based on the notion of economy or competition.

Optimality Theory (OT) proposed by Prince and Smolensky 1993 is different from the Minimalist Program, taking the radical view that constraints are violable and (totally) ordered, and an expression which satisfies a higher ranked constraint is regarded as optimal, hence, grammatical, even if it has many violations of lower ranked constraints. In other words, ungrammatical forms/interpretations are necessarily

blocked by grammatical forms/interpretations.

This OT approach faces an interesting problem when we consider ungrammatical cases which seem not to have grammatical counterparts. This is called the ineffability problem. In this paper, I will discuss two particular ineffable cases as follows.

(1) English ineffable multiple wh-question
*Who left why?

(2) Italian ineffable multiple wh-question
*Chi ha detto cosa?
who has said what

In the principles-and-parameters approach (cf. Chomsky 1981), the ungrammaticality of (1) was extensively discussed and it was claimed that (1) violates the Empty Category Principle (ECP). What is important is that the ECP is an inviolable principle so that the violation of it causes the ungrammaticality. In OT, however, we have to say that (1) is blocked by another "better" expression. The question is, then, what it is. Incidentally, the ungrammaticality of (1) cannot be due to the semantic ill-formedness, since, for example, the Japanese counterpart *dare-ga naze deteitta no* 'who left why' is perfectly fine. To the best of my knowledge, the ungrammaticality of the Italian ineffable multiple wh-question (2) has never been discussed in the principles-and-parameters approach or the Minimalist Program. In OT, again, the ungrammaticality of (2) has to be accounted for by claiming that there is another "better" expression than it.

This paper discusses how OT should account for the ineffability problems in (1) and (2), with special attention to Legendre, Smolensky

and Collins's 1998 approach using PARSE(wh). Their analysis will be discussed in unidirectional (traditional) OT syntax and semantics, and in bidirectional OT recently proposed by Blutner 2000. The empirical and theoretical difficulties caused by PARSE(wh) will be pointed out, and alternative analyses will be suggested.

2. Unidirectional OT Syntax and Semantics

In OT syntax, it is widely assumed that the input has the complete semantic information, and the job of OT syntax is to determine the optimal syntactic form which realizes the semantic information given in the input. For example, Grimshaw 1997 assumes that the input contains argument structure, indices for references and scope, and semantic features such as [+Q] and [+focus] (see also Samek-Lodovic 1996). What OT syntax does, thus, can be regarded as production optimization.

In the case of the ineffable multiple wh-question (2), the input should be something like (3).

(3) a. semantic representation:

?x?ysaid(x, y)

(cf. $\lambda p[\exists x \exists y$ [person(x) & thing(y) & p = $\lambda w[said_w(y)(x)]]$)

b. conventional clause-like representation:

Q_i Q_j [who$_i$ ... what$_j$]

(3a) is a simplified semantic representation of question, the Karttunen/ Hamblin semantics of which is given below it. (3b) is a more structured representation, where the bracket stands for clause and Qs represent the scope of the co-indexed wh-phrases. (3a) and (3b) have the same value.

There have been several proposals made to the ineffability problem. Prince and Smolensky 1993 propose Null Parse, which roughly says that a candidate in which nothing is pursed wins the competition. The idea that the candidate with no phonological realization can be a winner does not work in syntax in general, however. An easy example is that, the null parse necessarily has more serious violations than candidates whose elements are partially unparsed (cf. Ackema and Neeleman 1998), which suggests that it not be easy to make the null parse win.

Legendre, Smolensky and Wilson 1998 claim that syntactic features of a word can be partially unparsed, arguing that PARSE(wh), which requires that the [wh] feature of a wh-phrase be parsed, is violable and if it is unparsed, the rest of the feature bundle is phonologically realized as an indefinite NP. Let me review their account. The other relevant constraints that they assume are; *Q: No empty question operator, and *ABSORB: No absorption strategy. In Italian, PARSE(wh) is outranked by *Q and *ABSORB. The competition is shown in Tableau 1 (I use English words just for convenience).

Tableau 1: Multiple Wh-Questions in Italian

Input: Q_i Q_j [who$_i$ ... what$_j$]	*Q	*ABSORB	PARSE(wh)
a. who$_{i[j]}$ [t_i ... what$_{j[j]}$]		*!	
b. ☞ who$_i$ <Q_j>[t_i ... <what$_j$>]			*
c. <Q_i><Q_j>[<who$_i$> ... <what$_j$>]			**!

*Q requires a wh-phrase to be in [Spec, CP]. Candidate a satisfies this constraint. Candidate b and c satisfy this constraint vacuously since the Qs in these candidates are unparsed, represented with angle brackets. *ABSORB is the ban on absorption. Absorption is a strategy by which a wh-in-situ is interpreted depending on the moved wh-phrase. This strategy is represented by a bracketed index [j]. In this competition,

candidate a uses this strategy, so that it violates *ABSORB. Candidate b has one violation of PARSE(wh) while candidate c has two. The multiple wh-question in (2), thus, loses to candidate b, whose output form is *Chi ha detto qualcosa*? (Who has said something?).

Using PARSE(wh) seems to work well, but it is not enough. Let us consider the English case in (1). What is the output which wins over *who left why*? To get a grammatical output like *who said what*, we need the ranking PARSE(wh) >> {*Q, *ABSORB } for English, as shown in Tableau 2.

Tableau 2: Multiple Wh-Questions in English

Input: Q_i Q_j [who$_i$ ... what$_j$]	PARSE(wh)	*Q	*ABSORB
a. ☞ who$_{[i,j]}$ [t_i ... what$_{[i,j]}$]			*
b. who$_i$ <Q_j>[t_i ... <what$_j$>]	*!		
c. <Q_i><Q_j>[<who$_i$> ... <what$_j$>]	*!*		

But clearly, this doesn't work for (1). This ranking incorrectly makes *who left why* the optimal output. One might suggest the possibility to add an constraint like *wh-adv in-situ, which says "wh-adverbs such as *why* or *how* may not be in-situ." If this constrain is ranked above PARSE(wh), then the candidate *who left why* violates it, as shown in Tableau 3.

Tableau 3: *Who left why* in English (questionable result)

Input: Q_i Q_j [who$_i$ ... why$_j$]	*wh-adv-in-situ	PARSE(wh)	*Q	*ABSORB
a. who$_{[i,j]}$ [t_i ... why$_{[i,j]}$]	*!			*
b. ☞ who$_i$<Q_j>[t_i ... <why$_j$>]		*		
c. <Q_i><Q_j>[<who$_i$> ... <why$_j$>]		**!		

Interestingly enough, the winner in this competition is candidate b, where the [+wh] feature of *why* is unparsed. But what is the

phonological form of it? The adjunct *why* does not have its indefinite NP counterpart. An apparent close expression for the adjunct *why* is the PP *for some reason*, but this PP expression should be regarded as the indefinite counterpart to for what reason. Furthermore, using the PP *for some reason* causes the violation of FAITHFULNESS type constraints since the input does not have the preposition *for* and the noun *reason*. So, the approach with PARSE(wh) does not work to resolve the ineffability problem.

Now let us consider the ineffable multiple wh-quesitons from the OT semantics view point. OT semantics deals with how a given syntactic form is interpreted. Here again, we have an interesting theoretical question just like OT syntax, or OT in general. That is, how rich is the input form in OT semantics? What is being done in the OT semantics literature is as follows. For example, suppose we have a sentence [...A...[...B...[...C...]]], where C is an anaphoric expression. Then one of the semantics jobs is to choose the optimal antecedent for C (cf. Hendriks and de Hoop 2000). In OT semantics, by using the tableau as follows, the optimal interpretation is determined.

Tableau 4: Usual OT semantics format (a case of anaphoric relation)

Input: [...A ...[...B ...[...C ...]]]	C1	C2	C3	...
a. [...A_i ...[...B_j ...[...C_i ...]]]				
b. [...A_i ...[...B_i ...[...C_j ...]]]				
c. [...A_i ...[...B_j ...[...C_k ...]]]				
⋮				

The point is this: the sentence form [...A...[...B...[...C...]]] serves as an input, and importantly, there is no index assigned, which means no anaphoric relation is given in the input. Instead, possible anaphoric relations are represented in each candidate, and the constraint ranking

determines the optimal interpretation.

It is interesting to consider how the Italian wh-question *Who has said something*, which is the optimal output of *who said what*, is interpreted. Here I would like to discuss the competition between two candidates, given in (4), where each candidate is represented as an LF-syntactic representation and a simplified logical expression.

(4) Input: who has said something (Italian)

a. LF: who$_i$ [+Q]$_i$ has said something
   Interpretation: ?x∃ysaid (x, y)

b. LF: who$_i$ [+Q]$_i$ has said something$_i$
   Interpretation: ?x?ysaid (x, y)

In candidate a, the object is existentially quantified and the sentence-initial wh-phrase is correctly interpreted as a question, being bound by the [+Q] feature, which is assumed to be in the C-head. In candidate b, the object is bound by the Q as well as the subject, so that the resulting interpretation is *who has said what.* This is the absorption strategy discussed in Tableau 1. Notice that nothing is wrong with the object in b having the index i. Candidate b violates *ABSORB, which candidate a does not. A potential constraint that candidate a violates is the extra use of the existential quantifier, which is not in the input, but if the ban on the use of the existential quantifier is ranked lower than *ABSORB, we can make candidate a the winner as desired.

To sum up so far: To resolve the ineffability problem concerning multiple wh-questions in Italian, Legendre et al. 1998 propose that the wh-feature can be unparsed, and we have seen that the resulting output like *who has said something* is correctly interpreted in OT semantics by using the same constraint ranking. We have also seen that the

unparsing strategy does not work well for the English ineffable case in (1).

3. Bidirectional OT

The models of OT syntax and OT semantics we have assumed so far is unidirectional; from forms to interpretations or from interpretations to forms. Blutner 2000 proposes a new OT model, which is called Bidirectional OT (BiOT). The idea of this model is based on pragmatics or discourse semantics. As is well-known, pragmatic principles such as Gricean conversational maxims have OT flavor. For example, the maxim of quantity says, "Do not say less than is required, and do not say more than is required." The quantity of information to be conveyed is not absolute. Rather the maxim requires that it largely be dependent on the hearer' need. This kind of situation is not easy to formalize with a set of inviolable principles while approaches with a set of violable constraints can capture such context-flexibility. Grice's original maxims are seen as the requirement to the speaker. But the hearer is also expected to use the same maxims the other way around. So the maxims are used from two perspectives. From the speaker's perspective, the maxims require the speaker to make the optimal form (the production perspective), and from the hea rer's perspective, they force the hearer to choose the optimal meaning (the interpretation perspective). These two perspectives correspond to what OT syntax and semantics do, respectively. This means that pragmatic principles such as the Gricean maxims can be formalized with OT syntax and semantics.

In recent semantics/pragmatic such as dynamic semantics (cf. Groenendijk and Stokhof 1991 among others), the meaning M (of the

semantic form, i.e. LF) of the form F is regarded as its context change potential. The (semantic form of the) form F updates the current context σ and gives a new context M. This is represented as in (5).

(5) $[\text{sem}(F)](\sigma) = M$

(in the dynamic semantics notion, $\sigma[\text{sem}(F)] = M$)

Based on (5), Blutner 2000 formalizes the OT generator Gen as in (6).

(6) $\text{Gen}_{\sigma} = \{<F, M>: \sigma[\text{sem}(F)]M\}$

A form-meaning pair, or an input-output pair, <F, M> is such that M is a potential result of updating σ with sem(F). Blutner then defines the optimal <F, M> as in (7), where $\succ$ means "more harmonic than."

(7) Bidirectional OT (strong version)

(Q) <F, M> satisfies the Q-principle iff $<F, M> \in \text{Gen}_{\sigma}$ and there is no other pair <F', M> such that $<F', M> \succ <F, M>$.

(I) <F, M > satisfies the I-principle iff $<F, M> \in \text{Gen}_{\sigma}$ and there is no other pair <F, M'> such that $<F, M'> \succ <F, M>$.

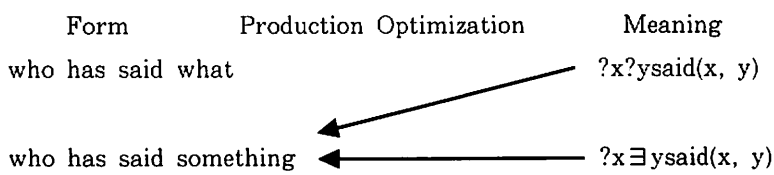
<F, M> is called optimal iff it satisfies both the Q-principle and the I-principle.

The Q-principle in (7) seeks the optimal form for the given meaning, and the I-principle chooses the optimal interpretation for the given form. BiOT in (7) requires both principles to be satisfied.

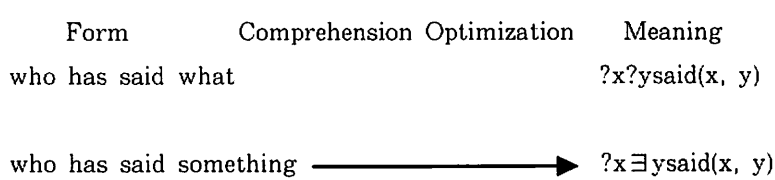
BiOT makes an interesting account for the Italian ungrammatical sentence **who has said what*. For the ease of explanation, let me adopt the diagrams used in Beaver and Lee 2004 as in (8), which are very

instructive to understand the BiOT algorithm.

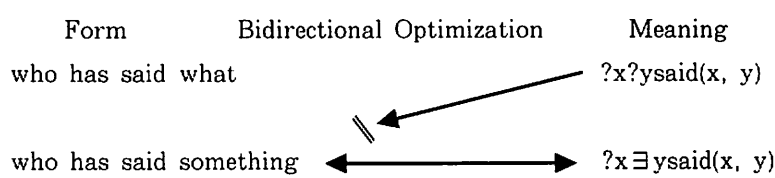
(8) a.



b.



c.



(8a) is the diagram for the Q-principle. Suppose <F, M> = <*who has said something*, ?x?ysaid(x, y)>. We have to check whether this pair satisfies the Q-principle. The relevant competitor is the pair <*who has said what*, ?x?ysaid(x, y)>, and given the constraint ranking *ABSORB >> PARSE(wh) in Italian, this competitor is less harmonic than the other. So, the pair <*who has said something*, ?x?ysaid(x, y)> satisfies the Q-principle. This is illustrated by the arrow from '?x?ysaid(x, y)' to *who has said something*. By the same token, no pair is more harmonic than <*who has said something*, ?x∃ysaid(x, y)>, when the input is '?x∃ysaid(x, y).' The satisfaction of the I-principle is given in (8b). As seen in OT semantics above, for the input *who has said something*, the optimal interpretation is '?x∃ysaid(x, y),' so, the pair

<*who has said something*, ?x∃ysaid(x, y)> is more harmonic than anything else and satisfies the I-principle. Notice that the form *who has said what* has no arrow. This is because this form is not generated, and therefore it never functions as an input.

It is very clear from (8a, b) that the pair which satisfies both the Q- and the I-principles is <*who has said something*, ?x∃ysaid(x, y)>, as shown in (8c). This diagram also means that in BiOT only this pair is the optimal output and the other pairs lose to it. In (8c), thus, the arrow from '?x?ysaid(x, y)' to *who has said something* is blocked, which Beaver and Lee call pruning.

This result is very important. Remember that to resolve the ineffability problem, Legendre, et. al. 1998 propose that the [+wh] feature of *what* can be unparsed and interpreted as an indefinite like *something*. Theoretically this technique is very wise, but intuitively it sounds a little bit unnatural. Once the BiOT approach is taken, however, the pair <*who has said something*, ?x?ysaid(x, y)> is never regarded as optimal, which amounts to saying that there is no output for the meaning '?x?ysaid(x, y)' in Italian. This accounts for the ineffability in the intuitively convincing way, but a new question arises; Is PARSE(wh) necessary at all? I will come back to this point later.

Blutner 2000 also proposes a weak version of BiOT as follows.

(9) Bidirectional OT (weak version)

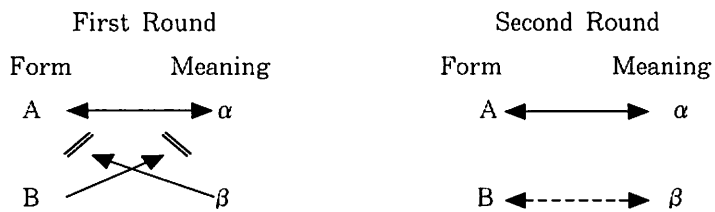
(Q) <F, M> satisfies the Q-principle iff <F, M> ∈ Gen_{σ} and there is no other pair <F', M> satisfying the I-principle such that <F', M> ≻ <F, M>.

(I) <F, M > satisfies the I-principle iff <F, M> ∈ Gen_{τ} and there is no other pair <F, M'> satisfying the Q-principle such that <F, M'> ≻ <F, M>.

<F, M> is called super-optimal iff it satisfies both the Q-principle and the I-principle.

The most salient difference between the strong and weak versions is that in weak BiOT, the super-optimal form-meaning pair is computed recursively. Let us see the Q-principle first. A form-meaning pair <A, B> can satisfy the Q-principle even if there is another pair <A', B> which is more harmonic with respect to the Q-principle. The point is that the existence of the pair <A', B> which satisfies the I-principle prevents <A, B> from satisfying the Q-principle. The same algorithm applies to the satisfaction of the I-principle, too. Weak BiOT works for the case called partial blocking, diagramed as in (10).

(10)



Since weak BiOT applies iteratively, more than one optimization is computed. In (10), the first round competition chooses <A, α> as the optimal. This pair excludes every pair which has either A or α. In this example, <B, α> and <A, β> are excluded (pruning). In the second round, the optimal one is chosen among the remaining pairs. In (10), since <B, β> does not compete against <A, α>, and therefore satisfies both the Q-principle and the I-principle, it is the optimal pair, represented by the dashed arrow, which Beaver and Lee call grafting.

In the case of Italian ineffable multiple wh-questions, the result given by weak BiOT is the same as the one by strong BiOT. The pair

<*who has said something*, ?x?ysaid(x, y)> does not satisfy the Q-principle, since another pair <*who has said something*, ?x∃ysaid(x, y)> satisfies the I-principle and more harmonic than it. If we check more candidate pairs, we will get other optimal pairs by recursive application of the weak BiOT algorithm. But it is enough for us to find that the pair <*who has said something*, ?x?ysaid(x, y)> is never chosen. See Beaver and Lee 2004 for the detailed analysis and the problem with weak BiOT.

4. Alternative Analyses

The discussion so far gives rise to the following question: Do we really need PARSE(wh) to resolve the problem with the ineffable wh-questions? This constraint has both empirical and theoretical problems. Empirically, it is not clear what form blocks the ungrammatical English multiple wh-question **who left why*. Without adding any other constraint, the constraint ranking in English PARSE(wh) >> {*Q, *ABSORB} predicts that *who left why* is grammatical. If we add a new constraint like *wh-adjunct in-situ, which says "wh-adjunct such as *why* or *how* may not be in-situ," then the optimal output will be the one in which the [wh] feature of *why* is unparsed, but it is not clear what is the phonetic realization of it. Theoretically, the status of the output to which PARSE(wh) crucially applies is questionable, in particular, under the BiOT approach. In the standard unidirectional OT syntax with PARSE(wh), the optimal form of the input '?x?ysaid(x, y)' in Italian is *who has said something*, where the [wh] feature of the object wh-phrase is unparsed, but in BiOT, the form-meaning pair <*who has said something*, ?x?ysaid(x, y)> cannot win any competition, as shown in the previous section. Since the input '?x?ysaid(x, y)' is never realized as

who has said something, the theoretical status of PARSE(wh) is really questionable.

In this section, I would like to propose an alternative to PARSE(wh). Let me begin with the Italian case. Vieri Samek-Lodovic (personal communication) informed me that (2), repeated as (11), is actually acceptable if the subject is interpreted as D-linked.

(11) Chi ha detto cosa? (D-linked interpretation on *chi*)
who has said what

If this judgment is correct, the Italian constraint ranking concerning wh-movement is pretty much like the English one. The minimal difference between Italian and English multiple wh-questions is that in the former the first wh-phrase must be D-linked while in the latter such requirement is not imposed. The fact that in English the first wh-phrase does not have to be D-linked is shown in (12) where the subject wh-phrase is used with the aggressively non-D-linked expression *the hell* (see Pesetsky 1987 for the detail).

(12) Who the hell ate what?

The difference between the two languages concerning multiple wh-questions can be captured by the following constraints.

(13) D-LEFT : The leftmost wh-phrase in multiple wh-question must be D-linked.
*[D] : Do not use the D-linking feature [D].
PARSE[D] : Parse the D-linking feature [D].

In Italian, these constraints are ranked as D-LEFT>> *[D]>> PARSE[D], and the English ranking is PARSE[D]>> *[D]>> D-LEFT. In Tableau 5 the input does not have the D-linking feature [D], and Tableau 6 is the case where only the object has that feature.

Tableau 5: Multiple Wh-Questions in Italian (no [D] in the input)

Input: Q_i Q_j [who$_i$ ... what$_j$]	D-LEFT	*[D]	PARSE[D]
a. who$_{i[j]}$ [t_i ... what$_{[j]}$]	*!		
b. ☞ who[D]$_{[i]}$ [t_i ... what$_{[j]}$]		*	
c. who$_{[i]}$ [t_i ... what[D]$_{[j]}$]	*!	*	

Tableau 6: Multiple Wh-Questions in Italian (the object with [D] in the input)

Input: Q_i Q_j [who$_i$ ... what[D]$_j$]	D-LEFT	*[D]	PARSE[D]
a. who$_{i[j]}$ [t_i ... what[D]$_{[j]}$]	*!		
b. ☞ who[D]$_{[i]}$ [t_i ... what[D]$_{[j]}$]		*	*
c. who[D]$_{i[j]}$ [t_i ... what[D]$_{[j]}$]		**!	

As shown in Tableau 5, even if the input has no [D] feature, the candidate in which the subject has the [D] feature wins the competition. In English, on the other hand, the candidate most faithful to the input is the optimal output, as in Tableaux 7 and 8.

Tableau 7: Multiple Wh-Questions in English (no [D] in the input)

Input: Q_i Q_j [who$_i$ ... what$_j$]	PARSE[D]	*[D]	D-LEFT
a. ☞ who$_{i[j]}$ [t_i ... what$_{[j]}$]			*
b. who[D]$_{i[j]}$ [t_i ... what$_{[j]}$]		*!	
c. who$_{i[j]}$ [t_i ... what[D]$_{[j]}$]		*!	*

Tableau 8:Multiple Wh-Questions in English (the object with [D] in the input)

Input: Q_i Q_j [who$_i$ ... what[D]$_j$]	PARSE[D]	*[D]	D-LEFT
a. who$_{[i]}$ [t_i ... what[Ð][$_{[j]}$]	*!		*
a. who[D]$_{[i]}$ [t_i ... what[Ð]$_{[j]}$]	*!	*	
b. ☞ who$_{[i]}$ [t_i ... what[D]$_{[j]}$]		*	*

The crucial difference between the PARSE(wh) approach and my proposal is that in the former, the sequence *who has said what* does not serve as an input in OT semantics while, in my approach, it does. If the Italian form *who has said what* is the OT semantics input, then the constraint ranking given above chooses '?x?ysaid(x, y): x[D]' as the optimal interpretation. This means that the pair <*who has said what*, ?x?ysaid(x, y): x[D]> is bidirectionally optimal. So, the unnatural result that the PARSE(wh) approach reaches never takes place.

Finally, let us discuss the English ineffable case in (1). The semantic representation of the input that we have to consider should be something like (14).

(14) ?x?y∃e[e = left(x) & y = reason(e)]

This semantic representation can be roughly paraphrased as: what are x and y such that there is an event e in which x left and y is the reason of e. This formula contains two propositions in the nucleus scope and they are conjoined, so in a more colloquial style it can be read as "Who left and why?" I would like to claim that the sequence *who left and why*? is actually the optimal form which makes *who left why* ineffable. The competition and relevant constraints are given below.

(15) *wh-adv-in-situ : Wh-adverbs (such as *why or how*) may not be in-situ.

*FCat : Do not use a functional category.

Tableau 9: Multiple Wh-Questions in English (with wh-adverb)

Input: Q_i Q_j [who$_i$ ... why$_j$]	*wh-adv-in-situ	*FCat	*ABSORB
a. who$_{[i]}$ [t_i ... why$_{[i]}$]	*!		*
b. ☞ [who$_i$ [t_i ...]] and [why$_{[i]}$]		**...	

Candidate b has the conjunction *and*, which the input does not have. So, this candidate violates *FCat. I assume that there are two CPs conjoined in candidate b and *why* is in the second [Spec, CP]. This structure thus satisfies *wh-adv-in-situ, but at the same time using an additional CP causes the violation of *FCat. The precise clause structure of the second CP of candidate b is not clear, but if it has a complete structure like [$_{CP}$ [$_{IP}$ ...]], then *FCat is violated more times. In English, however, *FCat is outranked by *wh-adv-in-situ, so candidate b wins the competition.

5. Conclusion and Remaining Problems

In this paper, I have discussed the two cases of ineffable multiple wh-questions; **who left why*? in English and **chi ha detto cosa*? (who has said what?) in Italian, focusing on Legendre, Smolensky and Wils on's 1998 approach with PARSE(wh). I have claimed that PARSE(wh) does not work well, pointing out the following two problems. (i) It is not clear what is the phonological realization of *why* with the [wh] feature unparsed. An apparent candidate is *for some reason*, but this should be considered to be the unparsed counterpart to *for what reason*. (ii) In Italian, *who has said something* is regarded as the optimal form for

the input '?x?ysaid(x, y),' but if the bidirectial OT approach is taken, the form-meaning pair <*who has said something*, ?x?ysaid(x, y)> never win the competition. This result gives rise to the question of whether PARSE(wh) is necessary.

I have suggested alternative analyses of these two ineffable cases without PARSE(wh). In the case of Italian, the multiple wh-question in question is actually grammatical if the subject is interpreted as D-linked. I then proposed a set of constraints and their ranking, according to which the candidate whose subject is interpreted as D-linked wins the competition even if it is not D-linked in the input. In the case of **who left why*, I proposed that this loses to *who left and why*?, which is semantically more faithful to the intended interpretation Q_i Q_j [who$_i$ ... why$_j$] than the candidate where the [wh] feature of *why* is unparsed.

There are remaining problems, though. For example, the case of wh-extraction out of a relative clause is ineffable, as in (16).

(16) *Who did John buy the book [that t wrote]?

The Japanese counterpart to (16) is OK, so we cannot reject (16) on the semantic basis. With PARSE(wh), the optimal output will be *John bought the book that someone wrote.* The constraints and the ranking that I proposed do not say anything about a sentence like (16). My suggestion is that the grammatical form to which (16) loses could be something like *John bought a book and who wrote it*? or *who wrote the book that John bought*? In any case, the input 'Q_i John bought the book that [whoi wrote]' must be radically restructured, violating FAITHFULNESS type constraints many times. Likewise, wh-extraction from adjunct clauses or from coordinate constructions will face the

same kind of problem. I leave these issues open.

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PARSE(wh) と多重wh疑問文の表現不可能性問題

論文要旨

最適性理論（OT）では、制約は順序付けられており、違反可能である．そして、複数の候補の中でより上位の制約をみたしている候補が、入力に対する最適解、即ち文法的出力となる．このような文法観では、すべての非文法的表現／解釈は、何らかの文法的表現／解釈に必然的に阻止されていることになる．しかし、一見、対応する文法的表現が存在しないような非文が存在する．これをどのように処理するかが、OTにおける表現不可能性問題（the ineffability problem）とよばれるものである．

本論では、表現不可能性問題の例として、英語とイタリア語の多重wh疑問文をとりあげ、Lgendre, Smolenky and Wilson (1998) で提案されたPARSE (wh) という制約を用いた解決案が妥当でないことを、単方向的OT統語論と単方向的OT意味論、及び、双方向的OTの観点から議論する．そして、イタリア語で非文として扱われてきた多重wh疑問文 *Chi ha detto cosa?* (who has said what?) は、主語が談話連結（D-linking）として解釈されれば文法的となり、この解釈が談話連結されない解釈を阻止しているという分析を提案する．また、英語の非文多重wh疑問文の一つである **Who left why?* は、等位接続を用いた *Who left and why?* が最適出力であると考えれば、PARSE (wh) を用いた場合の不自然な結果に比べて、直観的により妥当な文法形式・解釈の対が得られることを示す。