Analyses of Negative Operator-caused Syntactic Inversion by Optimality Theory

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ABSTRACT: The article analyzes the negative operator-caused syntactic inversion by Optimality Theory on the basis of Yu's research and Kager's research in order to further them. When the moved negative operator causes subject-auxiliary inversion and do-support, the movement of the auxiliary verb is the only optimal choice. The inversion with negative operator movement is a little bit different from the wh-operator inversion. Yu's research has been compared with Kager's. Yu's result has been improved and Kager's research complemented. Kager's hierarchical constraints are followed.
KEYWORD: Optimality Theory (OT); syntax; negative operator; inversion; hierarchical constraints

1 INTRODUCTION

Although the Optimality Theory (OT) was presented as a new theory making researches on phonology in the early 1990s, it has been applied to all other fields of linguistics such as syntax, language acquisition and language typology etc. since it was born. OT has offered us a new perspective for us to research the languages effectively (Li 1998:72; Ma & Wang 2001 in Kager 2001:F24; Yu 2005:42).

An adverb in English can only be used as an adverbial. But the adverb can be divided into two subcategories: the operator adverb and the common adverb. The operator adverb includes the negative operator and the wh-operator with A'-movement to the [Spec, CP] (see Figure 2). The common adverb is used as an adjunct on the syntactic tree (see Figure 3, Haegeman 1994, Radford 2000, and Weng 2002). The negative operator can also be divided into two subcategories: overt negative operator (such as no, nor, never etc.) and covert negative operator (such as seldom, rarely etc.).

2 OPTIMALITY THEORY (OT) IN BRIEF

OT is a linguistic theory presented first by Alan Prince, a phonologist and Paul Smolensky, a cognitive scientist. OT has been fashionable in the whole linguistic circles and become the mainstream of linguistic theory in the 1990s (Archangeli & Langendoen 1997:1).

OT is a development of Generative Grammar (Kager 2001: F40). OT assumes that the UG constraints are universal; the constraints can be violated and the Grammar is the hierarchical ranking of the constraints. The optimal candidate can be produced by meeting the most satisfactory demands and the least serious violations of a set of violable constraints, ranked in a language-specific hierarchy. The mutual contradictory conflicts of constraints are the base of diversified expressions at the syntactic surface structure of a language.

The OT grammar is made up of the input, the Gen, the constraints in the Eval and the output etc. (see Figure 1). The input contains lexicon morphemes at the deep syntactic structure, and it could produce infinitive diversified expressions at the output if there were no constraints.

For the candidates, the Gen should respect three principles, such as: 1) Freedom of analysis: the Gen can produce diversified forms at the structure and even infinitive candidates; 2) Containment: Containing full candidates; 3) Consistency of exponence: Keep a semantic agreement in the morphemes, etc. (Prince & Smolensky 1993:11-56; Li 1998:77).

3 NEGATIVE OPERATOR + AUX. V + S

3.1 *How to use OT?*

For the negative operator + Aux. V + subject, what is inputted? Grimshaw (1997:373-422) considers that for the OT syntactic parsing methodology, if the output is a sentence with a verb, the input must be

the head of VP, which contains its argument structure, its theta-role assignment, its relevant tense and aspect etc. The Gen generates all sentences according to the syntactic principles, such as the extended projection of X' theory etc.

For the Eval, the following constraints can be used: 1) Operator in Specifier (OP-SPEC): Syntactic operator must be in specifier position; 2) Obligatory Heads (OB-HD): A projection has a head; 3) Economy of Movement (STAY): Trace is not allowed; 4) No Movement of Lexical Head (NO-LEX-MVT): A lexical head cannot move; 5) Full Interpretation (FULL-INT): Lexical conceptual structure is parsed (Kager 2001:348-353).

According to Quirk (1985:756-879), the syntactic inversion happens if: 1) a complement moves ahead from an original place when a subject is too long; 2) a negative or covert negative adverbial moves ahead; 3) a locational adverbial in PP moves ahead; 4) a mode or frequency adverbial moves ahead.

Logically a negative adverb or an adverb with negative meaning is called a negative operator. The article mainly focuses on the movement of the negative operator.

3.2 *Overt negative operator-caused inversion with an auxiliary verb*

Some groups of sentences are analyzed as follows:

(1) a. Never will she go there.
b. *Never she will go there.
(2) a. She will never go there.
b. *Will she never go there.

(1) a. When the negative operator moves to the [Spec, CP], the sentence must be inversed; (1) b. or it is wrong grammatically. (2) When the negative operator does not move, the sentence must not be inversed for (2) a. and (2) b.

It is not the appearance of CP but the A'-movement of the negative operator to the [Spec, CP] that attracts the auxiliary verb movement (following) to the [C, CP] to cause the inversion of the sentence.

Let us look at the candidate tableau Table 1 to see how the optimal candidate is produced. In the Eval, the 4 constraints are OP-SPEC >> OB-HD >> FULL-INT >> STAY according to Kager's hierarchical order (Kager 2001:354-365): The left is higher than the right. The Gen generates 4 candidates. ①④ violate the OP-SPEC constraint (mark * there), so they are eliminated (mark *! there) and are not allowed to continue the next evaluation; ② passed the OP-SPEC constraint, but violates the OB-HD constraint; at last ③ becomes the optimal candidate at the syntactic surface structure under the least violations of the constraints.

Note: As "(2) a. She will never go there." has grammatically no negative operator movement, it does not belong to the candidates with negative operator movement.

Table 1 Negative Operator Movement in the Main Clause.

Candidates	OP-SPEC	OB-HD	FULL-INT	STAY
① [$_{CP}$ e [$_{IP}$ she will [$_{VP}$ never go there]]]	*!	*		
② [$_{CP}$ Never$_i$ e [$_{IP}$ she will [$_{VP}$ t_i go there]]]		*!		*
☞③ [$_{CP}$ Never$_i$ will$_j$ [$_{IP}$ she e$_j$ [$_{VP}$ t_i go there]]]				**
④ [$_{CP}$ Will$_j$ [$_{IP}$ she e$_j$ [$_{VP}$ never go there]]]	*!			*

OP-SPEC >> OB-HD >> FULL-INT >> STAY

(* means violation, *! means being eliminated through selection, the shadow means no necessity because of lower hierarchy and ☞ means the final optimal candidate.)

More examples are shown as follows:

(3) a. She said that never would she go there.
b. * She said that never she would go there.
(4) a. She said that she would never go there.
b. * She said that would she never go there.

Table 2 Negative Operator Movement in Complement Clause

Candidates	OP-SPEC	OB-HD	FULL-INT	STAY
① [$_{CP1}$ that [$_{CP2}$ e [$_{IP2}$ she would [$_{VP}$ never go there]]]]	*!	*		
② [$_{CP1}$ that [$_{CP2}$ never$_i$ e [$_{IP2}$ she would [$_{VP}$ t_i go there]]]]		*!		*
☞③ [$_{CP1}$ that [$_{CP2}$ never$_i$ would$_j$ [$_{IP2}$ she e$_j$ [$_{VP}$ t_i go there]]]]				**
④ [$_{CP1}$ that [$_{CP2}$ would$_j$ [$_{IP2}$ she e$_j$ [$_{VP}$ never go there]]]]	*!			*

OP-SPEC >> OB-HD >> FULL-INT >> STAY

Table 2 can be explained in the same way as those of Table 1 except the CP2 in the complement clause (see Figure 6). According to Yu's (2005) analysis, the above 'that' in the complement clause has occupied the [Spec, CP], to which the negative operator must move. So XP is supposed to be only XP with a feature of [+NEG], which appears when the negative operator moves to the [Spec, XP]. XP should be CP2 in the syntactic structure in order to make the syntactic structure consistent with that of the wh-operator (see Figure 2 and Figure 6, compared with (9) in Figure 4 or (10) in Figure 5).

If there is no "that" in the sentence, one CP is enough. If there is no negative operator movement, CP2 is omitted automatically. In this condition, no inversion is necessary because an empty CP2 always violates the OB-HD constraint and the auxiliary verb movement violates the STAY constraint, too. It is apparent that the inversion with negative operator movement is a little bit different from the wh-

operator inversion (see Figure 2 and Figure 6, compared with(9)in Figure 4 or(10) in Figure 5).

It is not the appearance of CP2 but the A'-movement of the negative operator to the [Spec, CP2] that attracts the auxiliary verb movement (following) to the [C, CP2] to cause the inversion of the sentence.

3.3 *Covert negative operator-caused inversion with do-support*

Let us look at the following sentences:

(5) a. Rarely did Tom go home late.
b. *Rarely Tom went home late.
c. *Rarely went Tom home late.

(6) a. Tom rarely went home late.
b. *Did Tom rarely go home late.
c. *Went Tom rarely home late.

The "rarely" is a covert negative operator because of its negative meaning. In (5) b., it is not grammatical because the "rarely" movement has to cause the inversion of the sentence. In (6) b. and (6) c., as there is no negative operator movement, the inversion is not permitted. In order to explain (5) c., a functional head "do" has to be added in the candidates and one more constraint: No lexical head movement (NO-LEX-MVT) must be added up into the Table 3 (see Table 3).

Table 3 Negative Operator Movement in the Main Clause.

Candidates	NO-LEX-MVT	OP-SPEC	OB-HD	FULL-INT	STAY
① [$_{CP}$ e [$_{IP}$ Tom e [$_{VP}$ rarely went home late]]]		*!	**		
② [$_{CP}$ Rarely e [$_{IP}$ Tom e [$_{VP}$ *t* went home late]]]			**!		*
☞③ [$_{CP}$ Rarely did$_i$ [$_{IP}$ Tom e$_i$ [$_{VP}$ *t* go home late]]]				*	**
④ [$_{CP}$ Did$_i$ [$_{IP}$ Tom e$_i$ [$_{VP}$ rarely go home late]]]		*!		*	*
⑤ [$_{CP}$ Rarely went$_i$ [$_{IP}$ Tom e$_i$ [$_{VP}$ *t* e$_i$ home late]]]	*!				**
⑥ [$_{CP}$ Went$_i$ [$_{IP}$ Tom e$_i$ [$_{VP}$ rarely e$_i$ home late]]]	*!	*			*

NO-LEX-MVT >> OP-SPEC >> OB-HD >> FULL-INT >> STAY

Note: As "(6) a. Tom rarely went home late." has grammatically no negative operator movement, it does not belong to the candidates with negative operator movement.

If a sentence must be inversed and there is no auxiliary verb in the sentence, the auxiliary verb "do" has to be added up to the [C, CP] to help to realize the inversion of the sentence when it requires an auxiliary verb to support. The other reasons can be explained in the same way as those of the above overt negative operator.

The auxiliary verb, "do", was not in the candidates. The Gen can add some phonetic materials without changing the meaning of the morphemes of the sentences and generate some non-meaning functional head "do" in the sentence to help to realize the inversion of the sentence.

Let us look at the candidate tableau Table 3 to see how the optimal candidate is produced. In the Eval, the 5 constraints are NO-LEX-MVT >> OP-SPEC >> OB-HD >> FULL-INT >> STAY according to Kager's hierarchical order (Kager 2001:354-365): The Gen generates 6 candidates. ⑥⑤ violate the NO-LEX-MVT constraint (mark * there), so they are eliminated (mark *! there) and are not allowed to continue the next evaluation; ①④ pass the NO-LEX-MVT constraint, but violate the OP-SPEC constraint, so they are eliminated; ② passes the NO-LEX-MVT and OP-SPEC constraints, but violates the OB-HD constraint seriously; at last ③ becomes the optimal candidate at the syntactic surface structure under the least violations of the constraints

The following can be explained in the same reasons as above (see Figure 2 and Figure 6, compared with (9) in Figure 4 or (10) in Figure 5):

(7) a. Mary said that rarely did Tom go home late.
b. * Mary said that rarely Tom went home late.
c. * Mary said that rarely went Tom home late.

(8) a. Mary said that Tom rarely went home late..
b. * Mary said that did Tom rarely go home late.
c. * Mary said that went Tom rarely home late.

It is not the appearance of CP or CP2 but the A'-movement of the negative operator to the [Spec, CP or CP2] that attracts the auxiliary verb movement (following) to the [C, CP or CP2] to cause the inversion of the sentence.

4 SUMMARY

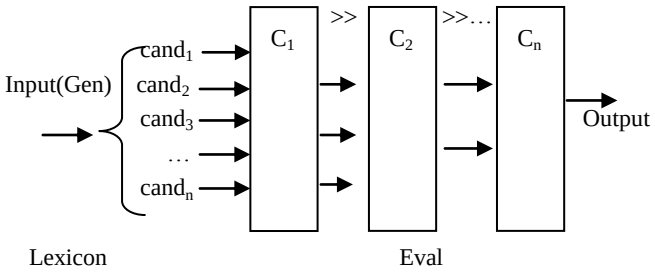
The article divides the adverbs into two subcategories: the operator adverb that includes the negative operator and wh-operator with A'-movement to the [Spec, CP or CP2], and the common adverb as an adjunct. The article mainly focuses on the movement of the negative operator. When the negative operator moves to the [Spec, CP or CP2], the movement of the auxiliary verb is the only optimal choice, which is the result from the 5 relevant OT hierarchical constraints evaluating the candidates to make an output of the optimal candidate at the syntactic surface structure under the least violations. The research narrates that after the overt or covert negative operator moves, the auxiliary verb "do" can be added up to the [C, CP or CP2] to help to realize the inversion of the sentence

if there is no auxiliary verb in the sentence and it requires an auxiliary verb to support.

The inversion with negative operator movement is a little bit different from the wh-operator inversion because the conjunction 'that' in the complement clause has occupied the [Spec, CP], to which the negative operator must move, and another [Spec, CP2] is required for the negative operator. The article improves Yu's research and complemented Kager's research.

The OT Grammar Works as an Input-output Device: (Hierarchical Constraints: The left is higher than the right in ranking)

Gen: Generator; cand: candidate; Eval: Evaluator; C: constraints



Three components: lexicon, generator and evaluator.

Figure 1 The Architecture of OT Grammar (Kager 2001:3-48)

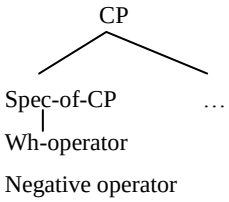


Figure 2 Negative Operator to the [Spec, CP]

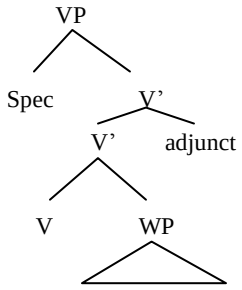
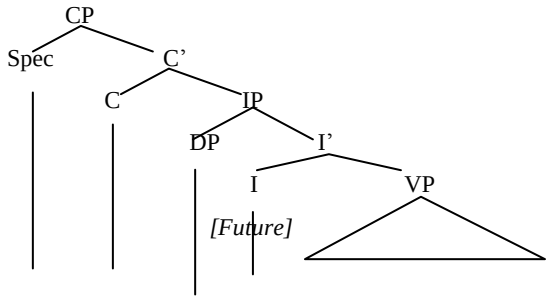
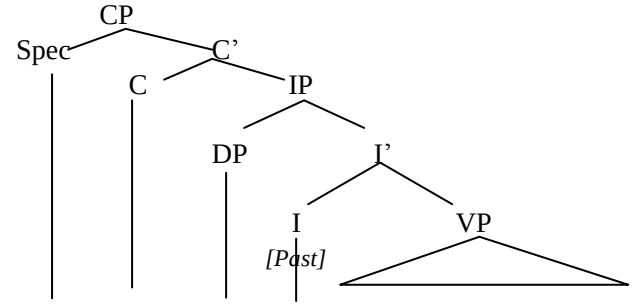


Figure 3 Common Adverb as an Adjunct



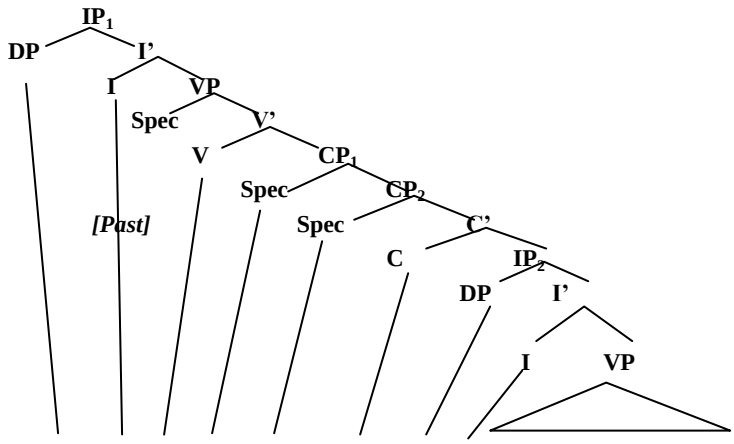
(1)a. Never$_i$ will$_j$ she e_j t_i go there.
b. *Never$_i$ *e* she will t_i go there.
(2)a. She will never go here.
b. *Will$_j$ she e_j never go there.
(9) Where$_i$ will$_j$ she e_j never go t_i ?

Figure 4 Overt Negative Operator and Wh-operator



(5)a. Rarely$_i$ did$_j$ Tom e_j t_i go home late.
b.*Rarely$_i$ *e* Tom *e* t_i went home late.
c.*Rarely$_i$ went$_j$ Tom e_j t_i e_j home late.
(6)a. Tom -ed rarely go home late.
b. *e Did$_j$ Tom e_j rarely go home late.
c. *e Went$_j$ Tom e_j rarely e_j home late.
(10) Where$_i$ did$_j$ Tom e_j rarely go t_i late ?

Figure 5 Covert Negative Operator and Wh-operator



(3)a. She –ed say that never$_i$ would$_j$ she e_j t_i go there.
(7)a. Mary –ed say that rarely$_i$ did$_j$ Tom e_j t_i go home late.

Figure 6 Overt Operator and Covert One in Complement Clause

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