Syntactic Coding of Attention Detection in Korean

Jong-Bai Hwang

When a speaker produces a sentence, he/she has to map some non-linguistic cognitive configuration of an event onto the linguistic code specified by the grammar of the language. Tomlin (1997) explains the role of attention in assigning a referent to syntactic subject in English, showing how conceptual representations are mapped into language. This study aims at elaborating his framework by exploring the grammatical means which Korean speakers employ to code attention detection, the cognitive counterpart for traditional pragmatic topic or theme. 15 Korean native speakers are asked to produce on-line descriptions of the events they witness in an animated film on computer screen. The results show that active clauses were generated 100% of the time when the agent was primed, while, if the patient was primed, passive clauses were produced more than 86% of the time, along with an alternation between active and passive. Unexpectedly, however, the morphological marker used to code the attention detection is the so-called subject marker *-i/-ka*, not the so-called topic marker *-nun*. These results suggest that a widely accepted conventional approach to the marking of topic in Korean should be complemented with more analyses of semantic/pragmatic function of the markers.

1. Introduction

Most functional approaches to grammar have examined the interaction between form and function by attempting to answer the question of how linguistic representations reveal or constrain conceptual representations (Jackendoff 1983, 1987, Lakoff 1987, Langacker 1987, 1991, Talmy 1988a, 1988b). They usually began with observations about language, and tried to make inferences about conceptual representations for the linguistic representations they observe.

On the other hand, however, there is a point in insisting that when a

speaker produces a sentence, he/she has to map some non-linguistic cognitive configuration of an event onto the linguistic code specified by the grammar of the language. Therefore, it is also necessary to try to answer another problem complementary to the first: How conceptual representations are mapped into linguistic representations. This problem does not start from observations about language, but starts with developing a theory or model of conceptualization that is language independent, and then investigates how particular languages, as well as language in general, map those independently describable conceptual representations into linguistic representations (Tomlin 1997).

One of the frameworks for investigating how conceptual representations of visual events are mapped into language is that of Tomlin (1995, 1997), which takes into account the role of attention in assigning a referent to syntactic subject in English. In his consecutive studies (Tomlin 1992, 1995, 1997), Tomlin has shown how a traditional pragmatic notion, theme or topic, can be recast in cognitive terms as a reflection of human attention. He also tried to manipulate in real time the dynamic allocation of attention to component elements of computer animated video events, and replaced the difficulty to define notion of clause level theme or topic with a cognitively grounded employment of attention. This study aims at elaborating his framework by exploring the grammatical means which Korean speakers employ to code attention detection, the cognitive counterpart for traditional pragmatic theme or topic. [1]

1.1. Some Issues on Theme or Topic in Korean

It is generally accepted that Korean has two equally important distinct sentence constructions, the topic-comment construction and the subject-predicate construction, which are related to the use of different morphological markers. Conventionally, topic is usually marked by the so-called topic marker -(n)un in Korean, and subject, by the subject marker -i/-ka. However, there has been no agreement on the exact function of the two markers, and on the semantic differences between them.

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[1] There are lots of senses which are related to these terms. In Tomlin (1995), the terms *theme* and *topic* are to be taken in their most classical senses: the information which the speaker believes is the more central, salient, or important at the moment of speech. Such sense is adopted in this paper, too. For various definitions of theme or topic, see Tomlin, Forrest, Pu, and Kim (1997).

Topic is a discourse notion, derived from the consideration of semantic or pragmatic context of a discourse, whereas the subject is a sentence-internal notion, which functions within the sentence structure. However, the current approaches to the problems of topic and subject have not established any explicit criteria to distinguish one from the other. Without any clear definition of what a discourse level theme or topic is, recourse only to the surface coding of the topic marker, *-(n)un*, has added to difficulty discussing the distinction between topic and subject in Korean. It is because the topic marker, *-(n)un*, cannot cover all the possibilities of conceptual representations of theme or topic in Korean. In other words, the notion of topic can be expressed not only through the topic marker, but also through other syntactic devices, which will be discussed later in section II. In addition, the marker *-(n)un* may be used to code different conceptual representations of importance other than theme or topic. That is, even though *-(n)un* is attached to an NP, it can express a different meaning such as contrast.[2]

Another problem in the discussion of topic or theme in Korean, which has something to do with the first problem, is that the judgment on the functions of grammatical forms which are said to be used as topic or subject is dependent upon the introspection or intuition of researchers themselves or a small number of other native speakers of Korean. This is also due to the problem of vague or weak definition for the concept of topic or theme. Most research on theme or topic in Korean has not adopted any experimental design which makes it possible to explore the relationship between form and function, or between conceptual representations and syntactic representations.

1.2. Problems in Functional Linguistics

The problems in the study of topic in Korean seem to be derived from the theoretical difficulties within functional linguistics. There are a number of persistent difficulties facing functional linguistics, four of which are well summarized in Tomlin (1990, 1995, 1997): (1) the definition and identification of central pragmatic notions, (2) the theoretical clarification of what constitutes functional interaction, (3) standards for prediction and analytical rigor, and (4) cross-linguistic comparisons.

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[2] For an example, see section 6.1.

For the functionalists trying to stipulate central pragmatic notions such as theme or topic, focus, given/new information, and so on, the problem of definition and identification of the pragmatic notions has been the most fundamental and consistent problem. In spite of continuing trials,[3] it is still hard to find convincing solutions to what those pragmatic notions really are.

The second problem is that most functional research has not been explicit in making theoretical and empirical claims on the nature of functional interactions between form and function. That is, little attention has been paid to the exploration of the nature of functional interactions and the empirical requirements necessary to distinguish real functional interactions from simple correlations or correspondences.[4] Such lack of theoretical and empirical basis for functional interactions results in many correlations and pseudo-correlations between linguistic form and function, most of which are not significant to understand how functional grammars actually work (Tomlin 1987, 1990, 1995).

Regarding standards of prediction, functional research has assumed a weak standard of probabilistic or actuarial prediction because of its problems of definition and unclear theoretical or empirical criteria for functional interactions. That is, functional researches usually specify the tendency or the probability that an event will occur under some set of circumstances, with large residues of unexplained cases relegated to the status of non-prototypicality or some other idea of unexplained variability.

Finally, cross-linguistic comparisons of functional interactions between form and function have been considered to be very difficult because they

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[3] According to Tomlin (1995), there have been two most common solutions to solve this problem, which fail to really address the problem. The first way was to proliferate additional terminology and distinctions, just as Payne's expression of focal attention to capture what has traditionally been captured by the categories of *rheme*. Unfortunately, however, it failed to address the serious problems one faces in using such expressions actually to identify instances of the category in discourse data. Another way is to develop operationally sound definitions based on the distribution of linguistic items in text data (Givón 1983, 1989). Under this approach, the distribution of linguistic forms in text data is analyzed by operational methods of calculation, which make data analysis much more reliable than any other introspective methods. However, this solution also does not directly address the theoretical questions of precisely what was measured by the method of calculation.

[4] According to Tomlin (1995), the form-function interactions are ones in which the speaker and hearer share an automated, invariant rule governing the use of some linguistic form or where the hearer can routinely and conventionally infer some meaning given the occurrence of some linguistic form.

have been almost impossible to compare discourse data between languages. Even though informally collected narratives or conversations have the advantage of naturalness, the selection of a specific grammatical form is not constrained by general conditions which make cross-linguistic comparisons available.

1.3. Attention Detection in Finer-Grained Analysis of Attention

Following Tomlin (1995, 1997), this study tries to manipulate human attention by conducting experiments and observes the effects of the manipulation. According to Tomlin, the general idea that attention is a limited mental resource or capacity is too coarse-grained to account for its manipulation and the resultant language processing, because the idea leaves unspecified the details of how exactly attention is committed to a given task or processing of stimuli. Therefore, Tomlin turns to a finer-grained analysis of attention which describes the human attention system as comprising independent yet interrelated process: Alerting, orientation, and detection. Alerting is a state of general readiness to deal with novel input. Orientation is disposition of the system to select particular kinds of input over others. Detection is the selection and registration of a particular item for further processing (Posner 1988, 1992, Posner & Petersen 1990).

The grammar of a language is best conceived as a processing system which operates directly on conceptual representations in real time. When an utterance is formulated, the grammar looks at the conceptual representation for the referent which is the so-called focus of attention, or more precisely, the referent which has been attentionally detected at the current moment. The output of this attention detection is mapped onto the syntactic subject of the formulated utterance in English (Tomlin 1997). In Tomlin's model there is no need for a linguistic category of theme or topic. The grammar merely looks at the event representation directly and maps the current attentionally detected referent onto subject. The concept of theme or topic is replaced with its cognitive counterpart, attention detection, which is well-grounded in the psychological literature and which is amenable to experimental manipulation. The cognitive concept of attention detection and its manipulation through experiments also helps overcome the issues of discussing topic or theme in Korean and the general problems of functional linguistics listed above.

2. Conventional Approaches to the Marking of Theme or Topic in Korean

As was mentioned in 1.2. above, the exact definition of topic or theme has been regarded as one of the problems in functional linguistics. It is the same with Korean, too. Generally speaking, the most widely accepted semantic characteristic of topic in Korean is the "aboutness," as it is in many other languages. That is, it is generally agreed that topic or theme is something about which to say something. With regard to other semantic or pragmatic characteristics of topic or theme, however, there has scarcely been agreement. The question of the syntactic marking of topic or theme has been even more complicated and divergent.

The question of how theme or topic is syntactically marked in Korean is regarded as one of the most difficult problems to answer, usually because of the issues and dilemmas mentioned in 1.1. and 1.2. As a whole, there are following four approaches to the syntactic marking of theme or topic in Korean:

a. Theme marked by word order and topic marker
b. Theme marked by word order only
c. Theme as a subject with subject marker
d. Theme marked by topic marker only

The most salient characteristic of Korean topic marking is that topic tends to be placed in the initial position of a sentence. Three of the four approaches mention the initial position of a sentence for topic marking as a necessary requirement for topic marking. However, the characteristic of initial position is not enough for a unit to be topic in Korean. As mentioned earlier, the so-called topic marker *-(n)un* plays a crucial role in deciding topic of a sentence in Korean. So the first and the most frequently mentioned approach to the marking of theme or topic in Korean is the combination of word order (i.e., initial position) and the morphological marking by the topic marker *-(n)un*. According to this view, the initially placed word cannot be topic without the marker *-(n)un*. Therefore, only the initial word in sentence (1a) below can be topic because the topic marker is attached to it, while the same initially placed word in sentence (1b) is just subject, not topic, in the sentence because the subject marker, not the topic marker, is attached to it:

(1) a. koyangi-nun   kay-lul   cot-at-ta
       cat-TOP   dog-ACC   follow-PAST-DECL
       '(As for the cat,) it followed the dog.'
    b. koyangi-ka   kay-lul   cot-at-ta
       cat-NOM   dog-ACC   follow-PAST-DECL
       'The cat followed the dog.'

The second approach, which also stipulates the initial position of a sentence, is that topic is what is initially placed in a sentence (Yang 1973). What case marker it takes does not matter in this approach. If an element is placed initially in a sentence, it can be a topic of the sentence, whether the element is subject, object, or even adverbial. The initial position is the only condition for a nominal component to become a topic. The so-called topic marker and the other case markers do not affect the topic status of the initially placed component at all:

(2) a. John-i   Mary-lul   i   kal-lo   ccil-et-ta
       John-NOM   Mary-ACC   this   knife-INST   stab-PAST-DECL
       '(As for John,) he stabbed Mary with this knife.'
    b. i   kal-lo   John-i   Mary-lul   ccil-et-ta
       this   knife-INST   John-NOM   Mary-ACC   stab-PAST-DECL
       '(As for this knife,) John stabbed Mary with it.'
    c. Mary-lul   John-i   i   kal-lo   ccil-et-ta
       Mary-ACC   John-NOM   this   knife-INST   stab-PAST-DECL
       '(As for Mary,) John stabbed her with this knife.'
    d. Mary-nun   John-i   i   kal-lo   ccil-et-ta
       Mary-TOP   John-NOM   this   knife-INST   stab-PAST-DECL
       '(As for Mary,) John stabbed her with this knife.'

The third view seems to be a combination of the word order (i.e., initial position) and the morphological marking by the subject marker -i/-ka. Thus only the initially placed subject which takes the subject marker -i/-ka is regarded as a topic in the sentence. It insists that -i/-ka and -nun share the function of topic-marking, but differ in other functions such as contrastiveness or exclusiveness. The semantic differences between those two markers will be dealt with in the discussion section. This approach may seem to be subsumed under the second approach, but this view focuses on the condition of case marking, which is ignored in the second

approach. Under this approach, both of the two initially placed words in the following two examples in (3a, b), which are different only in the case marking, are regarded as a topic in each sentence, sharing the same characteristics of topic-marking:

(3) a. hangwuk-i   kaul-i   ceyil   co-ta
       Korea-TOP   autumn-NOM   SUP   good-DECL
       'As for Korea, autumn is the best.'
    b. hangwuk-un   kaul-i   ceyil   co-ta
       Korea-TOP   autumn-NOM   SUP   good-DECL
       'As for Korea, autumn is the best.'

The final alternative approach possible, which is not related to the initial position of a sentence, is that any nominal unit in a sentence can be a topic if it takes the topic marker *-(n)un*. But this final view is too weak to support itself against the argument that the morphological marker *-(n)un* is not a topic marker when it is not used in the initial position. The marker *-(n)un*, when placed other than in the initial position, is said to represent different meaning, as will be discussed later. So this final approach will not be dealt with in detail in this section.

3. Thematic Management in English

This section deals with the question of how conceptual theme or topic is managed in English discourse production, by means of summarizing the experimental work done by Tomlin (1995, 1997). It is traditionally said that English speakers use active or passive voice like in (5) in order to represent a simple event semantically represented like (4) (Tomlin 1995):

(4) E1 = EAT (RED FISH, BLUE FISH)

(5) a. The red fish eats the blue fish.
    b. The blue fish gets eaten by the red fish.

The alternation between active and passive voice depends on whether it is the agent or the patient that is more central or salient or important referent in the sentence. The centrality, saliency, or importance is theoretically captured by the concept of theme or topic, and it is syntactically represented

in English as a subject or in sentence-initial position. As a result, themes or topics that are conceptually agents are syntactically realized as the subjects of actives, and patient themes or topics as subjects of passives.

Traditional insight about thematic management has developed in two principal directions. One is viewing the selection of passive as the results of the comparative significance of the two referents competing for subject assignment in relation to some higher level theme. This view has produced a lot of research designs which try to stimulate the production of active or passive clauses by using a general, global priming of a given character just prior to a targeted event involving that character (Bates and Devescovi 1989, Carroll 1958, Prentice 1967, Turner & Rommetveit 1968). These studies report that active clauses are generated when the agent is primed, and that passives are produced when the patient is primed.

The other direction regards the assignment of a referent to subject as a function of the saliency of that referent. Many studies have examined the relationship between perceptual or physical saliency of objects and syntactic coding (Bock 1987, Bock & Warren 1985, Flores d'Arcais 1987, Sridhar 1988). These studies have shown that the physical properties of a referent, such as animacy, size, or concreteness, affect the referent in its selection as syntactic subject.

According to Tomlin (1995), however, both of the prior directions fail to provide an adequate account for the phenomenon largely because the analytical residue left by each is too large to warrant claims of a general solution. In addition, although the analyses of the two directions have made important points regarding speakers' general tendencies in making the selection of subject, they have not explained the selection of a particular subject in a particular sentence. Therefore, Tomlin's experimental model aims at providing a more localistic account of the selection of active and passive, claiming that there is a rule within the grammar of English which maps the attentionally detected referent onto syntactic subject at the moment of utterance formulation. This model overcomes the problem of definition by replacing the pragmatic notion of theme with the cognitive notion of attention detection, a notion which is well-grounded in the psychological literature and which is amenable to experimental manipulation. It also recovers other problems of functional interactions, prediction, or cross-linguistic comparisons by manipulating attention detection directly, connecting the manipulation of attention with syntactic coding, and investigating the direct relationship between them. In other words, it helps

measure and manipulate mental states and examine physical evidence for the phenomenon apart from self-reports of private experience. By experimentally manipulating mental states, claims of causality, rather than mere correlation, are possible. Thus, the interaction of a cognitive state and a syntactic form can be observed independent of introspection. This is consistent with the goal of functional linguistics to explain the existence of a particular syntactic form as serving a particular communicative function.

The experimental model in Tomlin (1995) revealed something about thematic management in English discourse production: The independent manipulation of the state of attention detection within a dynamic visual stimulus led to the dependent assignment of a primed referent to syntactic subject. In this model, we do not need a linguistic category of theme or topic, or it is appropriately reduced to the term of attention. The advantage of this experimental paradigm is that the grammar merely looks at the event representation directly and maps the currently attended referent onto subject. It is this advantage of Tomlin's experimental paradigm that makes it possible for us to elaborate this model into exploring the relationship between attention detection and syntactic coding in Korean L1 discourse production. The coding of differentially attended referents is a language specific property, so a language may or may not code attention detection, and if so, may use any of a variety of linguistic devices. For English, that device appears to be syntactic subject. The question of what device is used for Korean will be explored in this experiment.

4. Methods

4.1. Hypotheses

The three principal approaches to the marking of theme or topic in Korean render the following four hypotheses, the first two of which are related to the use of the so-called topic marker -nun:

Hypothesis One: At the time of utterance formulation, the Korean speaker codes the referent which is currently attentionally detected as an initial component with the morphological marker -nun and the alternation of active and passive.

e.g. 1. predicted utterance when agent primed
　　ppalgan mwulgogi-nun paran mwulgogi-lul mek-nun-ta
　　red 　　fish-TOP　　 blue 　fish-ACC 　　eat-PRES-DECL
　　'The red fish eats the blue fish.'
　2. predicted utterance when patient primed
　　paran mwulgogi-nun ppalgan mwulgogi-eygey 　mek-hi-n-ta
　　blue 　fish-TOP 　　red 　　fish-by 　　　eat-PASS-PRES-DECL
　　'The blue fish is eaten by the red fish.'

Hypothesis Two: At the time of utterance formulation, the Korean speaker codes the referent currently attentionally detected as an initial component with the morphological marker -*nun* and the change of word order between subject and object, but without the alternation of active and passive.

e.g. 1. predicted utterance when agent primed
　　ppalgan mwulgogi-nun paran mwulgogi-lul mek-nun-ta
　　red 　　fish-TOP　　 blue 　fish-ACC 　　eat-PRES-DECL
　　'The red fish eats the blue fish.'
　2. predicted utterance when patient primed
　　paran mwulgogi-nun ppalgan mwulgogi-ka mek-nun-ta
　　blue 　fish-TOP 　　red 　　fish-by 　　eat-PRES-DECL
　　'The blue fish, the red fish eats it.'

Hypothesis Three: At the time of utterance formulation, the Korean speaker codes the referent currently attentionally detected as an initial component through word order only, putting attentionally detected referents in initial position with no change of case markers.

e.g. 1. predicted utterance when agent primed
　　ppalgan mwulgogi-nun(-ka) paran mwulgogi-lul mek-nun-ta
　　red 　　fish-TOP (NOM) 　　blue fish-ACC eat-PRES-DECL
　　'The red fish eats the blue fish.'
　2. predicted utterance when patient primed
　　paran mwulgogi-lul ppalgan mwulgogi-ka mek-nun-ta
　　blue 　fish-ACC 　　red 　　fish-NOM 　　eat-PRES-DECL
　　'The red fish eats the blue fish.'

Hypothesis Four: At the time of utterance formulation, the Korean speaker codes the referent currently attentionally detected as the initially-

placed syntactic subject of the utterance with the subject marker *-i/-ka* and the alternation of active and passive.

    e.g. 1. predicted utterance when agent primed
           ppalgan   mwulgogi-ka   paran   mwulgogi-lul   mek-nun-ta
           red   fish-NOM   blue   fish-ACC   eat-PRES-DECL
           'The red fish eats the blue fish.'
       2. predicted utterance when patient primed
           paran   mwulgogi-ka   ppalgan   mwulgogi-egey   mek-hi-n-ta
           blue   fish-NOM   red   fish-by   eat-PASS-PRES-DECL
           'The blue fish is eaten by the red fish.'

4.2. Subjects

15 Korean native speakers (9 males and 6 females) who live in the U.S. were selected as the subjects of this study. Six were graduate students in the University of Oregon, six were registered in the intensive course in the American English Institute, and the other three graduated from college. Their ages range from 21 to 30, and their average stay in the U.S. is about one year (See Appendix for details).

4.3. Materials

A computer animated film is used to permit a within-subject test of the interaction between attention detection and its syntactic coding in sentence production. The film consists of a set of 32 trials. In each trial, two fish approach each other from opposite sides of the video display, moving at equal speeds. As the two fish meet at the center of screen, one fish opens its mouth and swallows the other and then swims off the screen.

Subjects' state of attention detection is drawn to one of the two fish by means of flashing an arrow above the selected fish just prior to the subject's formulation of an utterance to describe the eating event. The direction of the agent (from the left, or the right) is counterbalanced, and the colors of the fish in each trial are randomly selected. In half of the 32 trials the agent is cued, and in another half, the patient is cued.

4.4. Procedure

Subjects' task is rather simple: They are instructed to produce on-line

descriptions of the events they witness on computer screen. The subjects should describe events as they unfold on screen, simultaneously with their initial display. The subjects are asked to keep up with ongoing events as well as they could, and to keep their eyes on the character the arrow points at. The instructions, together with cue priming of an arrow, help direct subjects' attention to the primed fish at the eating event in each trial.

The timing of priming is very crucial in this experiment. In such a visual on-screen display of events, subjects' attention moves about very fleetingly. It takes approximately 150 milliseconds (ms) to complete the shift of attention and the fovea from one target to another. That is, attention can shift six times each second as one interacts with the visual environment. In addition, any new transient movement which follows the arrow priming, such as the opening of the agent fish's jaws to swallow the patient fish, can attract subjects' attention detection away from the primed fish. Therefore, the trials are created so as to effectively block shifting away of subjects' attention anywhere else, if the subjects begin formulating utterance at the moment of the eating event is completed. The referent selected by the experimenter as the target for a particular trial is cued just 75 ms (which is much less than 150 ms) before the estimated moment of utterance formulation. With this timing, the speaker does not have time to shift attention to another referent if the cue has successfully attracted attention to the selected referent and utterance formulation begins just 75 ms later (Tomlin 1995, 1997).

5. Results

Conventional approaches to the marking of theme or topic in Korean suggest that it is most likely that the cued referent which is attentionally detected, whether it is agent or patient, will be placed in the initial position of a sentence with the topic marker -nun. If agent is primed, it will be represented as subject of an active sentence with -nun. If patient is primed, on the other hand, there are two possibilities; one is passive sentences with -nun attached to initially placed subject (i.e., Hypothesis One), and the other is active sentences with -nun attached to initially placed object (i.e., Hypothesis Two).

Another possibility is the management of attention detection through word order only. There would be no voice alternation, and subject and object

keep their case markers, resulting in SOV for agent-primed cases and OSV for patient-primed cases (i.e., Hypothesis Three).

The final expectation is that Korean would code attention detection as its sentence-initial syntactic subject with subject marker -*i/-ka*. In this case, an alternation of active and passive voice should occur. That is, the agent, if primed, would be assigned to subject in an active sentence, and the primed patient would be expressed also as subject in a passive sentence (i.e., Hypothesis Four).

The results of the experiment are rather surprising. None of the subjects in the experiment used the so-called topic marker -*nun* to code the attentionally detected referent either initially or medially, which rejected Hypothesis 1 and 2, which focus on the use of the so-called topic marker. Instead, the subjects always assigned the attentionally detected referents to subject with the subject marker -*i/-ka*, producing actives and passives alternately with the agent and patient primed referents. In other words, Hypothesis 4, which mentions the initially-placed subject and the subject marker, was supported by the results. These results are summarized in Table 1, a simple 2×2 contingency table showing the relative distribution of agent and patient primed referents.

According to Table 1, active clauses were generated whenever the agent was primed. In other words, the primed agent was always represented as subject with subject marker -*i/-ka*, and the non-primed patient always became object of the active transitive sentences. On the other hand, if the patient was primed, passive clauses were produced more than 86% of the time,[5] which is more than chance performance on the production of passives when the patient was primed. Only 33 utterances (13.75%) were actives regardless of the primed patient.

The general congruence of subjects with the expected outcome is confirmed by the individual results, which shows that there was no subject who produced exceptionally deviant outcomes such as producing active clauses exclusively.[6] Individual results show that there are 6 subjects who have no miss out of 32 trials in their performance, 2 subjects who have 1

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[5] Of 207 utterances, there occurred two utterances which are intransitive sentences with primed patient as subjects. They are regarded as hit in this experiment.

[6] The Sign Test would have examined the congruence of subjects with the expected outcome. However, it is unnecessary because even subject 1, who showed the least congruent results, is found to be congruent according to Fisher's Exact Test.

⟨Table 1⟩ Total Outcome of 15 Korean Subjects.

	Active	Passive
Agent- Primed	240 (100%)	0 (0%)
Patient- Primed	33 (13.75%)	207 (86.25%)

miss and 3 misses respectively, 1 subject who has 2 misses, 3 subjects who have 5 misses, and 1 subject who has 8 misses (See Appendix for details). Each contingency table out of each individual's results was examined using the Irwin-Fisher Exact Test to examine the probability that the observed results of each individual were due to chance. The test shows that the probability of the case which missed the most (Subject #1) is less than .01 (i.e., $p = .0012$). Therefore, we can conclude that even for the subject #1, who missed the most, there is a significant interaction between where the subject's attention detection was allocated at the moment of utterance formulation and the assignment of a referent to syntactic subject.

6. Discussion

6.1. Word Order and Morphological Markers

The results of the experiment in this study are rather confounding given the expectations from the conventional approaches to the topic marking in Korean. The strongest argument on topic marking in Korean is that the theme or topic would be placed in the initial position of a sentence with the so-called topic marker -nun, which would support either Hypothesis One or Two. However, the results definitely reject the hypotheses on the use of the topic marker. Every utterance produced by the Korean subjects in the experiment shows the use of the subject marker -i/-ka, instead of the topic marker -nun, for the attentionally detected referents, with the alternation of active and passive voices. The representation of attentionally detected

referents as subjects led to the voice alternation in which the primed agent
is coded as subject in an active clause and the primed patient is coded as
subject in a passive clause.

However, these seemingly confounding results are not totally unexpected
from the viewpoint of the function of human attention, which is more
general than the function of the morphological markers in Korean. In every
utterance produced by the subjects, the attentionally detected referents,
which are themes or topics in the discourse, are placed in the initial
position of each sentence, even though they are marked by the subject
marker, not by the topic marker. Gernsbacher (1990) presented a perspective
which is related to the communicative function of the first mention in a
sentence or paragraph. The initially-placed component, according to this
perspective (Givón 1986), is said to code importance and function to attract
attention. Many researchers manipulated importance through perceptual
salience, animacy, definiteness or other ways, in order to show that important
concepts are initially represented in a sentence or paragraph (Clark & Chase
1974, Johnson-Laird 1968a, 1968b, Turner & Rommetveit 1967, etc.).

The above argument from functional linguists suggests that speakers or
writers make use of different grammatical forms, such as passive or
left-dislocation, to accomplish certain communicative functions, such as
attracting attention (Gernsbacher 1990). This view fits well with the results
of the experiment in this paper, in that the subjects consistently placed the
attentionally detected referents initially as subjects with the alternation of
active and passive constructions. If there were no case markers to mark
topic or subject in Korean, the results in this paper would be the same as
those of English in Tomlin (1995). Therefore, what is to be explained about
the results in this experiment is just why the subjects consistently used the
subject marker, not the topic marker, to code the initially-placed and
attentionally detected referents. The reason may be traced to several sources,
some of which are related to the uncertain nature of the Korean morpholo-
gical markers, others to the limitations of the experiment itself. The
following discussion tries to find out the reason through reconsidering the
Korean morphological markers and some limitations of the experiment which
is employed to manipulate the allocation of attention.

6.2. Nature of the Morphological Markers -nun and -i/-ka in Korean

The results, which are rather unexpected with respect to the conventional

approaches to topic marking in Korean, seem to reflect some debate on the nature of the two morphological markers, the so-called subject marker *-i/-ka* and the so-called topic marker *-nun*. To begin with, the names of the two markers (i.e., subject marker, and topic marker) have been thought to represent their function of marking subject and topic respectively. However, the relationship between the two functions and the two markers is not so simple, because topic marking and subject marking function on different levels, and they are related to both of the markers. That is, the function of topic marking is a discourse notion, and both of the morphological markers *-nun* and *-i/-ka* can function as "topic" markers when we talk about semantic or pragmatic context of discourse. Similarly, if we consider syntactic relation only, both *-nun* and *-i/-ka* can function as "subject" markers and be attached to subject of a sentence.

The argument that topic marking and subject marking can be achieved by both *-nun* and *-i/-ka* in Korean does not mean that the two markers have the same function in all respects. In addition, the argument is not enough to fully explain the results of the current experiment that all the subjects made use of the subject marker *-i/-ka* (not the topic marker *-nun*) in all their utterances to mark attention detection which is substituted for topic or theme. There must be semantic or pragmatic differences between the two markers, and the differences should be revealed first to solve the problem of markers in the present study. The discussion about the nature of the two morphological markers starts from the assumption that *-nun* is not the sole most important device to mark topic or theme in Korean, and goes on to explore the question of what the exact semantic or pragmatic functions of the two markers are.

With regard to the function of the marker *-nun*, the primary function has been said to be that of topic marking. However, it is generally agreed that the topic marking function of *-nun* is confined to the sentence initial position and semantically very restricted. That is, unless *-nun* is attached to the sentence initial component, it is used to mark another function rather than topic or theme, and even in the sentence-initial position, it can provide other meanings. Many studies have often suggested that the primary semantic function of *-nun* is not topic marking but expressing contrastiveness (Sohn 1980, Yang 1973, 1975). They argue that *-nun* is used as topic marker in the initial position of a sentence, while in any other position, it is used to express contrastiveness. According to Sohn (1980), the basic function of *-nun* is that of contrast, which is strengthened or

weakened for its discourse context or position. He insists that the function
of topic marking of *-nun* result from the weakening of its basic function of
expressing contrastiveness when it is used in the initial position of a
sentence. Shin (1975) also emphasizes the initial position of *-nun* as topic.
He argues that the functional meaning of *-nun* is captured as contrast
which makes salient one choice out of many things of a kind. For example,
the following sentence contrasts 'book' with other things such as 'pencil' or
'notebook'.

(6) sensayngnim-i   chayk-un   cu-si-et-ta
    teacher-NOM   book-CONT   give-HON-PAST-DECL
    'The teacher gave me a book (not other things).'

In sentence (6), *chayk* ('book') is an object of the verb *cu-ta* ('give'), which
is supposed to take the object marker *-(l)ul*. By taking *-nun* instead of
-lul, the object becomes the thing to be contrasted with other things.
According to Shin, the marker *-nun*, which has the meaning of contrast,
often acquires the meaning of topic when it is used in the sentence initial
position. Therefore, what is more important in marking topic or theme in
Korean is not the use of the so-called topic marker *-nun*, but the initial
position of a sentence. It also implies that other markers such as *-i/-ka* can
be attached to mark topic or theme in a sentence.

It has been generally accepted that *-i/-ka* has the function of subject
case marking. Though *-nun* can be attached to subject in a sentence,
-i/-ka is the most widely used marker to mark subject of a sentence.
However, the marker has some other semantic functions, the most important
one of which is to express exclusiveness, or exclusive selection. The
function of expressing exclusiveness of *-i/-ka* is well compared with
contrastive function of *-nun* in the following examples:

(7) a. ku   saram-i   ttena-t-ta
       the   man-NOM   leave-PAST-DECL
       'The (very) man left.'
    b. ku   saram-un   ttena-t-ta
       the   man-CONT   leave-PAST-DECL
       'The man left (but someone else did not).'

The sentence (7a) is used when the subject, the man, is chosen exclusively,
while (7b), when the subject is contrasted with other men.

Thus, the two markers, *-nun* and *-i/-ka*, reveal difference in the semantic aspect, but it is also true that with respect to the marking of topic or theme, they share a common characteristic in that both of them can express topic or theme in the initial position of a sentence. The function of topic marking by the so-called subject marker *-i/-ka* has been supported by many studies (See Section 2.3, Shin 1975, Sohn 1980). However, even if *-nun* and *-i/-ka* share the function of topic marking, the fact that the marker *-i/-ka* is a subject marker makes one difference between them. It is that the topic marking by the subject marker *-i/-ka* is always done through attaching the marker to subject of a sentence, while the so-called topic marker *-nun* can make any initially-placed component of a sentence a topic of the sentence. This difference between the two markers is not important here for the discussion in this study, so it will not be discussed any longer.

As regards another difference which is crucial for the discussion of this study, it can be argued that the common characteristic of topic marking of *-nun* and *-i/-ka* is influenced by the semantic difference between them, so that their topic marking is semantically different from each other. In other words, the meaning of contrast which *-nun* gives and the meaning of exclusiveness which *-i/-ka* gives are reflected in the respective representation of topic or theme by *-nun* and *-i/-ka*. When the meaning of contrast is weakened in the initial position of a sentence, the component to which *-nun* is attached comes to lose contrastiveness and takes on generic meaning. That is, when the meaning of contrast is weakened and the object of contrast becomes uncertain in the initial position of a sentence, *-nun* is used to mark topic or theme in the sentence. This is also related to the givenness of topic marking component which takes *-nun*. Generally speaking, initial components which are regarded as topic and take *-nun* are thought to express definiteness or givenness in Korean. The following sentences involve topic, which is definite or already known, in their initial position:

(8) a. saram-un   malha-nun   tongmwul-ita
       man-TOP   speak-ADJ   animal-DECL
       'Man is an animal who can speak.'
    b. Kumkangsan-un   hangwuk-eyse kacang arumdawun
       Mt. Kumkang-TOP Korea-in   most   beautifu
       san-ita
       mountain-DECL
       'Mt. Kumkang is the most beautiful mountain in Korea.'

'Man' in (8a) is a generic term which covers every kind of man, and it can be a topic of the sentence and takes the topic marker *-nun*. The proper noun in (8b), which is a topic in the sentence, is an object which everyone knows and also shows definiteness. Thus, topic marking by *-nun* derives from the function of contrast and involves definiteness or givenness based on the context.

The difference between *-nun* and *-i/-ka* in topic marking can be shown when *-i/-ka* is used for the above sentences in (8) instead of *-nun*. The marker *-i/-ka* cannot be attached to generic nouns like in (8a), while it can be attached to proper nouns like in (8b):

(9) a. ?*saram-i   malha-nun   tongmwul-ita
       man-TOP   speak-ADJ   animal-DECL
       'Man is an animal who can speak.'
    b. Kumkangsan-i   hangwuk-eyse   kacang   arumdawun
       Mt. Kumkang-TOP Korea-in   most   beautiful
       san-ita
       mountain-DECL
       'Mt. Kumkang is the most beautiful mountain in Korea.'

The example in (9a) shows that *-i/-ka* cannot be used with generic nouns to mark them topic in subject position of a sentence, which indicates that *-i/-ka* is different from *-nun* in topic marking. The difference between them is confirmed by (9b), where *-i/-ka* is possible with proper nouns to mark topic of a sentence, but the semantic function of the topic by *-i/-ka* is different from that by *-nun* in (8b). The semantic function of topic marking by *-i/-ka* has little with definiteness or givenness. Rather, the topic marking by *-i/-ka* is related to its semantic function of exclusiveness mentioned above. Generally speaking, the initial subject with *-i/-ka* in a sentence is given attention and determines or sets the scope of a whole sentence. This use of *-i/-ka* is semantically different from the use in other positions:

(10) a. besu-ka   iri-ro   on-ta
        bus-NOM   here-to   come-DECL
        'The bus comes here.'
     b. iri-ro   besu-ka   on-ta
        here-to   bus-NOM   come-DECL
        'Here comes the bus.'

The initial components of the sentences, *bus* 'the bus' in (10a) and *iri-ro* in (10b), are the objects of speaker's or listener's attention, and those attended objects are used to set the scope of the whole sentence. Therefore, the marker *-i/-ka* is thought to function differently in (10a) and (10b) respectively. That is, in (10a), the subject *bus* does the function of setting the scope of the sentence, while the subject in (10b) just has neutral function as a subject in the sentence.

Such use of *-i/-ka* in the initial position is divided into two different uses: One is neutral or general scope setting, and the other is selective scope setting. Selective scope setting presupposes something and makes the subject the object of focus, so that the subject cannot be topic of a sentence, while neutral or general scope setting does not presuppose anything and the subject is not the object of focus, so that the subject can be topic of a sentence. The following examples show the difference between them:

(11) hanul-i   pwuru-ta
     sky-NOM (TOP)   blue-DECL
     'The sky is blue.'

(12) (Q: What is blue?)
     hanul-i   pwuru-ta
     sky-NOM (TOP)   blue-DECL
     'The sky is blue.'

In (11), the speaker has no presupposition, and he just says what he feels about the sky. The subject *hanul* 'the sky' in (11), therefore, sets the scope of the sentence that he is talking about the sky which he is looking at. In (12), however, the question presupposes that something is blue, and the speaker selects *hanul* 'the sky' as the object of being blue. In addition, the former appears only initially, while the latter can appear anywhere in a sentence.

Considering the differences between *-i/-ka* and *-nun*, the results of the present study are not confounding or surprising any longer. In the experiment, subjects are supposed to describe what is happening on the screen, so there is no presupposition about what they are talking about. That is, the subjects in the experiment selected the referent as subject of a sentence based not upon any presupposition or givenness, but upon other semantic aspects such as scope setting or exclusiveness. Therefore, the

Korean subjects' use of word order and the morphological marker -i/-ka in coding attention detection can be fully predicted from the semantic aspects of the marker -i/-ka.

So far, we have examined the nature of the two important markers which can mark topic or theme in Korean, and their semantic difference which seems to explain the subjects' use of -i/-ka to code attention detection in the experiment of the present study. From the discussion so far, it becomes evident that an attentionally detected referent which is topic or theme is assigned to the initial position of a sentence as syntactic subject in Korean, which is the same as English. There occurs an alternation between active and passive according to the priming of agent or patient. What is different from English is that Korean attaches morphological markers to the attentionally detected referent in the subject position. The morphological marker which is used to code the attention detection is the so-called subject marker -i/-ka in the present study, not the so-called topic marker -nun.

6.3. Limitations of the Experiment

Several problems or limitations appear with regard to the experiment and the results of the study. First, the manipulation of subjects' attention is not so complete as to be sure that subjects have not shifted their attention by the cue of the experiment but by some other contextual factors. Actually, it is almost impossible to maintain full control over subjects' movements of attention. Such a lack of full control seems to be related to the misses of 13.75%, where subjects uttered active sentences when patients were primed. However, the unexpected utterances or the lack of full control do not make the claims or experimental results merely actuarial. Tomlin (1995) maintains that an occasional failure within an experiment to maintain control over the cognitive states of an experimental subject does not reduce the merits of the experiment and it most certainly does not make the predictions actuarial rather than individuated. The experimental scheme in this study does help make individuated predictions about the form of subjects' individual utterances based on a direct function of the control of attention detection.

Secondly, the experiment seems to involve so simple an event that the results cannot cover all the semantic or pragmatic functions of topic or theme in Korean. As a matter of fact, there still exists a possibility of different grammatical forms such as left-dislocation with markers other than

-i/-ka to mark topic or theme in different constructions in Korean. If the use of *-i/-ka* by subjects of this study was to accomplish a certain semantic function, such as coding topic or theme as a selective referent, then speakers or writers may make use of a different grammatical device to express some other semantic functions. However, even if the experiment involves very restricted setting for the production of various syntactic devices, the results and claims of this study should be regarded as an empirical evidence for the use of word order and the so-called subject marker to mark topic or theme in Korean. The experimental paradigm employed here provides empirical bases for such an argument through revealing the direct allocation of human attention to conceptual represen-tation at the moment an utterance is formulated.

7. Conclusion

The results of the experiment in this study reveal that, in Korean, the attentionally detected referent, which is topic or theme in the discourse, is placed sentence-initially with the morphological marker *-i/-ka*. The experimental paradigm suggests that the subject and voice of a sentence in Korean are determined directly by the allocation of attention to conceptual representation at the moment an utterance is formulated, which is thought to contribute to the development of a general cognitive theory of functional interaction.

The four kinds of problems of functional linguistics mentioned in Section 1.2. may be redeemed by the experimental paradigm in this study. First, the problem of definition and identification can be avoided by adopting the experimental paradigm in which attention detection can be manipulated directly and the effects of those manipulations directly observed. Second, the problem of functional interaction can be addressed by demonstrating a direct causal interaction between the manipulation of attention detection and syntactic coding. Third, the problem of standards for prediction and analytic rigor can be solved also by adopting the experimental methods. Finally, the problem of cross-linguistic comparisons can be mitigated by the cross-linguistic comparability of discourse data which is possible under the assumption that the cognitive processes of attention employed during the experiment are universal.

In conclusion, the treatment of a fundamental discourse notion as cognitive

processes of attention, and the employment of experimental methods in this study have helped understand how syntactic devices of word order and morphological markings are employed in discourse production. The experimental paradigm and research findings in this study should contribute to the development of cognitive model of discourse comprehension and production in future studies.

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Appendix

Subjects' Information and Individual Results

Subjects	Age	Gender	Years in the U.S.	Actives (Hits)	Passives (Misses)	Passives (Hits)	Actives (Misses)
1	30	M	2 yrs	16	0	8	8
2	26	F	2 yrs	16	0	11	5
3	28	M	3 yrs	16	0	14	2
4	24	F	3 yrs	16	0	13	3
5	21	M	4 mons	16	0	16	0
6	23	M	4 mons	16	0	16	0
7	24	M	3 mons	16	0	16	0
8	22	M	1 mon	16	0	16	0
9	26	M	1.5 yrs	16	0	13	3
10	26	F	4 mons	16	0	11	5
11	28	F	6 mons	16	0	11	5
12	23	F	4 mons	16	0	15	1
13	23	F	4 mons	16	0	16	0
14	25	M	7 mons	16	0	16	0
15	24	M	4 mons	16	0	15	1

Seoul National University
San 56-1, Shillim-dong, Kwanak-gu
Seoul 151-742, Korea
E-mail : jongbai@yahoo.com