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English and Korean Speakers' Realtime Sentence Construction: Effects of Word Order

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This study investigates realtime sentence production by speakers of two typologically different languages, English and Korean, in line with the assumption that the mechanisms underlying sentence production are contingent on the morphosyntax of an individual language. It is reasoned that the canonical word order of a language tailors the speakers' process of sentence production—how they plan and construct sentential content incrementally, and that this in turn seems to influence their nonnative language learning and processing. In particular, because subjects are denoted by reference to tense in English while they are denoted by overt case markers in Korean, it is hypothesized that English speakers' message formation and linguistic encoding center on verbs, but Korean speakers elect a subject first and then draw a predicate accordingly. An online experiment was conducted with three groups: 25 English natives, 28 Korean natives and 25 Korean L1-English L2 learners, the results of which show that English L1 speakers are disposed to construct sentences based on verb information, but Korean L1 speakers on noun information; and the L1 patterns are persistent in L2 processing as well.

1. Introduction

Studies of language processing are centrally concerned with the mechanisms underlying language production—how a conceptual representation is encoded into a sentence over time. Although language can be characterized as a cognitive module (e.g., Fodor, 1983; Kempen & Hoenkamp, 1987; Levelt, 1989), it still has much to do with basic cognitive resources as well, involving algorithms that maneuver data in sequence. The process of language production comprises multiple steps: formulating ideas in a propositional format, lexically encoding and arranging them, and finally articulating their phonological forms. The first step of sentence production is to decide what to say. It is a planning phase in which the speaker adjusts a message into a set of discrete ideas. At lexical encoding, those intentional/conceptual units are converted into lexemes with semantico-syntactic features, which are merged and enumerated so that their grammatical relations are interpretable. Lastly, word forms corresponding to the products of syntax are inserted and their phonological representations are articulated.

Mediating between thought and language, a message carries an intention to communicate before it is turned into a string of words with linear-temporal boundaries. Because of the inherent limitations of cognitive resources, the speaker needs to spell out what has been configured while some other constituents are still under construction. A sentence is built around a core concept

which expands in the ensuing process of incorporating other concepts. The core concept can be an entity that is most attended to (e.g., Ertel, 1977), or it can be an action or a state (Griffin, 1998; McNeill, 1992). According to Osgood (1980), people perceive events in order of agent, action, and patient, or of figure, state, and ground. However, language permits variations in word order because each concept has varying degrees of topicality, emphasis, new/oldness, closeness, etc. For example, people tend to begin grammatical role assignments with what is most accessible or salient from the previous discourse (e.g., Blackmer & Mitton, 1991; Lindsley, 1975 Myachykov, Posner, & Tomlin, 2007). And, when a noun is primed by a semantically related item or a biased context, they often begin with the primed noun (e.g., Bock, 1986; Bock & Warren, 1985; Igoa, 1996; Myachykov, 2007; Prat-Sala & Branigan, 2000). Due to its mental activation and continued relevance, a referent in the preceding discourse often serves as a subject, which leads newer information to typically fall in the end.

Speakers plan their utterance to some extent. But the units of planning can hardly be defined by absolute criteria since they vary across speakers, sentences, languages, and even within an individual speaker, influenced by a range of linguistic and non-linguistic factors. Nonetheless, researchers have learned that linguistic encoding in English seems to occur in a clause-by-clause manner (e.g., Ferreira & Dell, 2000; Ford & Holmes, 1978). According to Garrett (1980), Levelt (1989), Bock & Levelt (1994), speakers first select a global template for a sentence, and then determine its serial order at a separate stage (but see Kempen & Harbusch, 2004; Branigan, Pickering, & Tanaka, 2008, who argue against the two stages of grammatical encoding).

Formal linguistics, which was based largely on Indo-European languages, has worked on mathematical models of linguistic competence independent of general cognitive and contextual interventions. One of its principal foundations lies in the axiom that a sentence is the projection of a verb. For example, in a version of generative grammar, verbs specify their syntactic environments in the form of subcategorization. Accordingly, *put* is represented in the lexicon as requiring a subject, an object, and a locative prepositional phrase. A later version associates clause structures with thematic roles, wherein verbs are represented with their logical arguments (Chomsky, 1981 cf. Bresnan & Kaplan, 1985; Gazdar el al., 1985). So a sentence is derived bottom-up, initiated by a verb's mapping its arguments to a structural frame. If this line of reasoning is correct, it should be inferred that verbs play a central role in language production. For example, latency patterns prior to utterance indicate that people often plan a subject and a verb together at the outset (Lindsley, 1975). Pickering and Branigan (1998, 1999), and Branigan, Pickering & Cleland (2000) found that verb identity increases the magnitude of syntactic priming; people are inclined to use the same construction as their interlocutors used, and the effects are greater when the verbs in the prime and the target sentences are identical. These lend support to the contention that verbs determine the global template of a sentence constrained by their semantico-syntactic properties, hence are to be planned earlier than other constituents. However, it is worth to note that only a small set of languages has actually been studied psycholinguistically (Jaeger & Norcliffe, 2009).

A sentence might be produced as a whole if it is simple, and thus its planning is completed to begin with. On many occasions, however, speakers produce a sentence gradually with intermediate linkers such as pauses, fillers, syllabic lengthening, etc., especially when the sentence is a composite of complex phrases and clauses. This progressive aspect of sentence production suggests that planning for a sentence is often incomplete at the time of utterance onset, and that the speaker starts to utter the first few words while or before retrieving the remaining part of the sentence in the middle of the utterance. The previous theoretical and experimental studies largely agree that insofar as English is concerned, the composition and processing of sentence centers on verbs. In doubt is whether this would be generalized to other languages with different grammatical characteristics.

Language is a spontaneous and distinguished cognitive ability. It is a compiled system of independent components which operate by their own rules and algorithms. The characteristics of the rules and algorithms in the modules are shaped in the course of acquiring the target language. They vary between languages slightly yet significantly, one example of which is the locus of the present discussion: The subject is appointed by tense in English while it is by a postposition in Korean. The grammatical quality in question suggests an important aspect of English speakers' sentence planning and production. The expression of a subject accompanies tense, and tense in turn accompanies a constituent with verbal features. Therefore, the link between the subject and the tensed verb is strong, and so comprises initial planning and encoding. Meanwhile, the subject in Korean is identified by a postposition. It is thus likely that a predicate is determined later in accordance with a selected subject. In a word, I will try to demonstrate that sentence planning pivots on verbs in English, while it does on nouns in Korean —a difference that leads to direct consequences for the (non-)native speakers' speech patterns.

2. Research Hypotheses

Table 1 summarizes the points of contrast between English and Korean. I will ground these assumptions in the subsequent discussion.

TABLE 1. Contrasts between English and Korean

	English	Korean
Content construction	• A verb and its arguments, using a verb as its pivot	• A topic and its predicate, using a nominal as its pivot
Morphosyntax	• A subject is denoted by its location relative to a tensed verb	• A subject is denoted by a postposition
Initial planning	• Constitutional template based on verbal valence	• Topicalization of an information unit
Lexicon structure	• Verbs as roots, and nouns as their parameters	• Nouns as roots, and verbs as their attributes

A notable difference between the two languages lies in the fact that English requires one and only one subject to be present in a sentence while Korean does not impose such a constraint. English tense and Korean nominative markers serve a similar grammatical function: They designate the subject of the sentence. This grammatical characteristic of the English tense is

described in terms of case by generative grammar. According to the theory, tense assigns its nominative case to a noun phrase in its specifier position. Case is an uninterpretable grammatical feature that must be checked off in the course of syntactic derivation. Every NP needs a case to appear in a sentence. Tense has a strong EPP feature that attracts an NP into the front position via which they check each other's uninterpretable features (e.g., Chomsky, 1995).

The grammatical characteristic at issue suggests an interesting aspect of English speakers' sentence planning and production. The expression of a subject accompanies tense, and tense in turn accompanies a predicative element, i.e., a verb or an auxiliary. Therefore, the alliance of the subject and the tensed verb is strong. The triadic complementary relation between subject, tense, and verb in English leads to the inference that they are encoded in parallel. As grammar constantly requires them to necessitate each other, the choice of one is associated with the other; in other words, the choice of a subject consorts with a verb to use. It follows that the first step of English speakers' sentence construction is to construct contents based on verbal properties —a point that has long been accepted and theorized by the majority of English grammarians. Because of this characteristic, I refer to English as a "predicate-oriented" language: A tensed predicate along with a subject is included in the primary planning unit. It may well be called a verb-oriented language because only verbs combine with tense in English. This term is useful particularly for a comparison with topic-oriented languages like Korean, which I turn to shortly.

The concurrent resolution of subject and verb engenders two directions in the decision making. The speaker may give priority to a subject and then choose a verb, or inversely s/he may give priority to a verb and then choose a subject accordingly. For example, it is more likely that the speaker takes the subject-then-verb route if s/he wants to keep a certain perspective and an established reference in discourse or if there is no obvious temporal motion or change to be expressed. The converse would be the case if there is no prominent perspective or shared reference in discourse or if there is a motion or a change that is highly informative. It is hypothesized that when there is little pragmatic context or an apparent verbal element in the contents, English speakers would take verbs into consideration at the beginning.

In contrast, the subject in Korean is identified and grammatically licensed by a postposition. Thus, a predicate is likely determined later in accord with the selected subject, as illustrated, for example, by honorifics. Korean speakers usually settle on a topic in the first place. Topic is a pragmatic notion. It is clear that syntactic nominals, no matter what their grammatical and pragmatic roles are, have nothing to do with tense in Korean syntax. If a topic appears in a Korean sentence, it can be a syntactic subject, an object, a verb phrase, a clause, or any other constituents. In view of syntax, it is simply a nominal or a nominalized constituent that a predicate predicates. Korean speakers tend to construct a sentence from identifying a topic; they construct contents by way of electing a topic among information units, the process of which will be called topicalization henceforth. Accordingly, the selection of a predicate depends on a chosen topic.

This is a subtle yet important difference between verb-oriented and topic-oriented languages. To illustrate, when Korean speakers create a sentence to express an event, they first ask what the event is about, while on the other hand, English speakers ask what motion or change occurs in the event and who and what are involved in it (Li & Thompson, 1976). They may or may not have the same answer. It requires extensive research to indentify factors intervening in the selection of a topic. They may refer to such notions as information saliency, newness, familiarity,

distance, and so on. For now it is enough to take into account the point that topic is often realized as a syntactic subject especially when there is no shared topic between speakers, and thereby hypothesize that Korean speakers would plan a subject first and then draw a predicate later.

As mentioned earlier, generative grammarians argue that a verb has its necessary arguments to appear in a sentence. According to them, a verb in the lexicon has its argument structure that projects to syntax. In the same vein, most theorists (e.g., Chomsky, 1981; Jackendoff, 1991) uphold that a verb contains the categorial information of its arguments, or further that the subcategorization information itself carries a specific meaning (e.g., Goldberg, 1995). All these accounts are somewhat different at their descriptive levels, but they share a basic idea about English syntax such that verbs play a central role in sentence construction. From a perspective of sentence processing, if a tensed verb is planned at the beginning, it is likely that English speakers take clausal constitution to be the initial planning unit. This property of content construction can be described as a composition of a verb and its arguments. It has actually been a dominant view on English syntax that verbs link the other constituents and define their grammatical roles and relations.

This also suggests an aspect of English speakers' lexical knowledge. It is evident on little inspection that the lexicon is not a linear array of lexical items but a structured network of data that connects with one another in a format useful for efficient search and retrieval. If verbs play a pivotal role in sentence construction, they are likely to be stored in the place of primary access and connect other items that frequently occur with them. In this respect, it is reasonable to say that one's lexical knowledge about a verb includes information such as its argument structure, subcategorization, collocated words, etc. In a highly simplified view, verbs become roots in the data structure with nouns subordinate to them. Frequency is an apparent source of determining connections among them. More interestingly, however, if the lexicon is structured in that way, it may give rise to directional inequality in retrieval: The speaker's retrieval of an associate noun when cued by a verb and retrieval of the cued verb from the associate noun may not be equal. For instance, the speaker's retrieval from *maintain* to *position* and from *position* to *maintain* may not be equal at least quantitatively. On the contrary, Koreans may show the opposite pattern because the language induces late selection of a verb. It is thus possible that nouns become roots in the structure of the lexicon and verbs are subordinate to them, so the directional inequality works in the reverse order.

Given that verbs play a pivotal role in English sentence construction, the initial planning of a sentence involves identifying the number of arguments to be expressed by the verb. The determining feature of a verb's valence has been described in terms of transitivity. A verb is either intransitive or transitive or ditransitive. It follows that transitivity defines the relation between a verb and its arguments, hence the entire clausal constitution. Then, the initial planning of English sentences is devoted to the identification of arguments based on transitivity, unlike in Korean where the initial step is the identification of a topic (e.g., Jung, 2004; Rutherford, 1983, 1989). To rephrase, the initial step of sentence production in English is to conceive the transitivity of what to express, thereby the constitutional template of a sentence is determined, whereas Korean sentences are commonly constituted by a pair of a topic and a predicate, having no direct concern with verbal transitivity. It is then hypothesized that at the initial stage of sentence production, Korean speakers are disposed to select a topic while English speakers plan

the constitution of a sentence determined mainly by verbal valence.

On these rationales, the present study tests two hypotheses: (a) English speakers will plan sentences with a verb as the pivot; (b) Korean speakers will plan sentences with a topic as the pivot. Because topics are most often persons or objects which are realized as syntactic nouns, they will focus more on nouns than on verbs in the beginning of sentence construction.

3. Method

3.1 Participants

The experiment was conducted using a picture description task. Participants were grouped into three: The first group was 28 Korean natives who produced Korean sentences while watching a series of pictures presented on a computer screen; The second group was 25 Korean natives who produced English sentences instead of Korean; Finally, the third group was 25 English natives who produced English sentences. For the sake of convenience, I will refer to the first group as KK, the second group as KE, and the third group as EE. The comparison between KK and KE was drawn for the purpose of observing L1 transfer effects.

All participants were university students whose ages range from 18 to 35. The KE group consisted of intermediate or advanced learners of L2 English, who scored over 200 on a recent (less than three-year old) TOEFL CBT or equivalent scores on other standardized English proficiency tests.

3.2 Procedure

Participants looked at a series of pictures and were asked to produce sentences as quickly as possible. Each picture was composed of three separate pictures: two representing objects such as people, food, animals, things, etc., and the other representing an action. For critical items, there were two person pictures and one action picture. Participants were asked to use all three pictures for making a sentence. The action picture represented an action that involved a semantic agent and a theme or patient, so the two person pictures would be encoded as subjects or objects and the action pictures would be verbs.

The three pictures appeared in three different orders. In the first condition, the two person-pictures appeared consecutively, and then the action-picture followed. In the second, one person-picture appeared first, then the action-picture, and finally the other person-picture followed. In the third, the action-picture came first, and then the two person-pictures followed consecutively. The first picture appeared for 0.5 second on the screen and then disappeared at the same time as the following picture appeared. The second picture also stayed for 0.5 second and disappeared when the third picture appeared on the screen. That is, they switched on and off momentarily in three controlled orders. Since the two person-pictures represent nouns and the action-picture represents a verb, I will refer to the first condition as NNV (or V3), the second as NVN (or V2), and the third as VNN (or V1), respectively.

The experiment was composed of three blocks. To reduce inter-item variance, an item of the same picture composition was presented in the three experimental conditions. The first section

included 4 practice items in addition to 8 NNV, 8 NVN, and 8 VNN items. Participants took a 20-second break between blocks.

Because there is not enough time for concurrent linguistic encoding, speakers need to stack the picture images temporarily in their memory and construct a sentence through retrieving and encoding them in a certain order. It is hypothesized that the time spent for completing a sentence would be shorter when the sequence of pictures and that of linguistic encoding match each other than when they do not. According to the discussion earlier, English speakers tend to consider a verb at the initial planning of a sentence while Korean speakers encode a subject and its predicate sequentially. It was thus predicted that English speakers would perform faster in the VNN condition than in the NNV or NVN condition. On the other hand, Korean speakers would do faster in the NNV or NVN conditions than in the VNN condition.

On the basis of these hypotheses, I measured and group-compared participants' response times elapsed from the onset of a stimulus to the completion of a sentence. As aforementioned, in order to minimize other external variables, each item of the same picture composition was presented in three different sequences, so a repeated-measures ANOVA of split-plot design was conducted for statistical analyses.

4. Results and Discussion

Table 2 displays the descriptive statistics of the three groups. Overall, Group KE took more time to produce sentences than the native groups. They were fastest in the NVN condition that matches the English word order. Group KK responded faster in the NNV condition than in the other conditions. In contrast, Group EE was faster in the VNN condition than in the others. More detailed comparisons will follow.

TABLE 2. Descriptive Statistics

Conditions	Group	N	Mean	SD
VNN	KK	28	9.5224	2.28089
	KE	25	13.1066	1.48343
	EE	25	7.7344	2.50463
	Total	78	10.0981	3.05592
NVN	KK	28	8.9584	2.38170
	KE	25	12.7450	1.53431
	EE	25	9.1384	2.73126
	Total	78	10.2297	2.84192
NNV	KK	28	8.7396	2.21464
	KE	25	12.8750	1.60638
	EE	25	9.2684	2.38000
	Total	78	10.2345	2.76930

Table 3 shows the results of a multivariate test (Wilks' Lamda). The main effects (denoted as Factor) are not significant, which means that the aggregated mean differences between the three experimental conditions are not significant. The test suggests that there are significant interactions between the three groups and the three different conditions in which they produced sentences, which account for 46% of the total variation partialling out other factors.

TABLE 3. Multivariate Tests of Main and Interaction Effects

Effect		Value	F	Hyp. df	Err. df	Sig.	η^2
Factor	Wilks' λ	.933	2.671	2	74	.076	.067
Factor*Group	Wilks' λ	.293	31.353	4	148	.000	.459

The sphericity assumption was not violated: Mauchly's W=.950; χ^2=3.765; df=2; Sig.=.152. A pooled ANOVA table is compiled accordingly.

TABLE 4. ANOVA Table

Source	SST	df	MSS	F	Sig.	η^2
Between						
Intercept	24428.621	1	24428.621	1792.558	.000	.960
Group	822.592	2	411.296	30.181	.000	.446
Error	1022.085	75	13.628			
Within						
Factor	1.441	2	.721	2.653	.074	.034
Factor*Group	46.056	4	11.514	42.389	.000	.531
Error	40.744	150	.272			

The ANOVA suggests that between-subjects and between-groups differences are significant. In other words, some participants are faster than others, and groups are different in their mean response time. Group KE was slower than Groups KK and EE as seen in the descriptive statistics. Our main interest is in within-subjects differences due to three experimental conditions (denoted as Factor*Group), which results in df=4; F=42.389; Sig.=.000; η^2=.531. The three groups behaved differently to a large extent so that 53% of the total variance was accounted for by the interaction between groups and conditions. The small effect size of the within variability by Factor (η^2=.034) implies that individual speakers in a group behaved similarly under three different conditions.

Table 5 shows within-subjects (polynomial) contrasts between, first, VNN and the aggregation of NVN and NNV and, second, between NVN and NNV on the other. The significance level was adjusted for multiple tests (a=.025). It turned out that whether verb information was given first or not made a crucial difference in group performance.

TABLE 5. Within-Subjects Contrasts

Source	Factor	SST	df	MST	F	Sig.
Factor	V1 vs. V2 and V3	8.602	1	8.602	4.974	.029
	V2 vs. V3	.015	1	.015	.029	.866
Factor*Group	V1 vs. V2 and V3	269.788	2	134.894	78.000	.000
	V2 vs. V3	2.183	2	1.091	2.140	.125
Error	V1 vs. V2 and V3	129.706	75	1.792		
	V2 vs. V3	38.253	75	.510		

Overall, the research hypotheses are confirmed. Let us look at the results group by group in more detail.

A multivariate test suggests that Group KK behaved differently according to the three

experimental conditions: F=17.606; df=2; Sig.=.000; η^2=.575. The sphericity assumption was not violated. The ANOVA table shows that both between- and within-subjects differences are significant.

TABLE 7. Group KK ANOVA Table

Source	SST	df	MSS	F	Sig.	η^2
Between						
Intercept	6915.513	1	6915.513	454.046	.000	.944
Error	411.233	27	15.231			
Within						
Factor	9.136	2	4.568	16.650	.000	.381
Error	14.816	54	.274			

Tests of within-subjects contrasts reveal that the differences between VNN (V1) and NNV (V3) and between VNN (V1) and NVN (V2) are significant, while the difference between NVN and NNV is not. Recall that Korean speakers responded fastest in the NNV condition, second fast in the NVN condition, and third in the VNN condition.

TABLE 8. Group KK Within-Subjects Contrasts

Source	Factor	SST	df	MSS	F	Sig.	d
Factor	V1 vs. V2	8.909	1	8.909	13.614	.001	.120
	V1 vs. V3	17.160	1	17.160	36.341	.000	.171
	V2 vs. V3	1.340	1	1.340	2.580	.120	.047
Error	V1 vs. V2	17.669	27	.654			
	V1 vs. V3	12.750	27	.472			
	V2 vs. V3	14.029	27	.520			

The results indicate that Korean speakers plan and produce sentences with a noun in the first place.

A multivariate test suggests that Group KE did not respond differently to a significant degree in the three conditions: Λ=.841; F=2.169; df=2; Sig.=.137; η^2=.159.

TABLE 9. Group KE ANOVA Table

Source	SST	df	MSS	F	Sig.	η^2
Between						
Intercept	12497.913	1	12497.913	1901.068	.000	.988
Error	157.780	24	6.574			
Within						
Factor	1.678	2	.839	2.991	.060	.111
Error	13.463	48	.280			

More exact statistics on within-subjects contrasts reveal that there is a significant difference between the VNN condition and the NVN condition while the other contrasts are not significant. Recall that Group KE produced sentences most quickly in the NVN condition and delayed most in the VNN condition.

TABLE 10. Group KE Within-Subjects Contrasts

Source	Factor	SST	df	MSS	F	Sig.	d
Factor	V1 vs. V2	3.270	1	3.270	4.503	.044	.117
	V1 vs. V3	1.342	1	1.342	2.450	.131	.073
	V2 vs. V3	.422	1	.422	1.032	.320	.041
Error	V1 vs. V2	17.425	24	.726			
	V1 vs. V3	13.146	24	.548			
	V2 vs. V3	9.818	24	.409			

The effects of the experimental conditions were less noticeable in Group KE than in Group KK. Group KE responded fastest in the NVN condition which matches the English word order. Both KK and KE delayed most in the VNN condition. This implies that Korean speakers give priority to nouns in both L1 and L2 sentence planning.

Finally, a multivariate test suggests that Group EE responded to three experimental conditions differentially: F=88.606; df=2; Sig.=.000; η^2=.885. The ANOVA indicates that both between- and within-subjects differences are significant.

TABLE 11. Group EE ANOVA Table

Source	SST	df	MSS	F	Sig.	η^2
Between						
Intercept	5694.669	1	5694.669	301.656	.000	.926
Error	453.072	24	18.878			
Within						
Factor	36.176	2	18.088	69.651	.000	.744
Error	12.465	48	.260			

Tests of within-subjects contrasts show an anti-symmetric pattern to Group KK in that the differences between VNN (V1) and NNV (V3) and between VNN (V1) and NVN (V2) are significant, while the difference between NVN and NNV is not. Conversely, English speakers responded fastest in the VNN condition, second fast in the NVN condition, and third in the NNV condition.

TABLE 12. Group EE Within-Subjects Contrasts

Source	Factor	SST	df	MSS	F	Sig.	d
Factor	V1 vs. V2	49.280	1	49.280	81.835	.000	.259
	V1 vs. V3	58.826	1	58.826	165.373	.000	.300
	V2 vs. V3	.422	1	.422	.703	.410	.025
Error	V1 vs. V2	14.453	24	.602			
	V1 vs. V3	8.537	24	.356			
	V2 vs. V3	14.406	24	.600			

It points out that English speakers are inclined to plan sentences with verbs in the first place.

5. Conclusion

The goal of this study was to show that there are distinct behavioral patterns between English and Korean speakers in sentence production. It was reasoned that English speakers are disposed to pivot on a verb while Korean speakers elect a subject first and then draw a predicate accordingly. On the assumption that time spent for completing a sentence would be shorter when the sequence of information units and that of linguistic encoding match with each other than when they do not, it was predicted that English speakers would perform faster when provided with a verb first, while Korean speakers would do faster with a noun first. The results confirmed the predictions for the native groups. The L2 group was faster in the NVN condition, where the order of the picture presentation matched the canonical English word order.

The implications of these findings for foreign language teaching and learning are summarized as follows: (a) L1 acquisition gives rise to a particular pattern of the speaker's cognitive processing; (b) The pattern is significantly different from one language group to another; (c) Syntax is the main cause of the pattern; (d) The L1 pattern is persistent in the speaker's L2 processing to a considerable extent although this study goes short of providing new information about L2 proficiency; (e) L2 learning may benefit from learning the target language processing pattern, if it is learnable.

We have seen that a particular language shapes its speakers' manner of speech planning. To use a metaphor, suppose that objects (or forms) in a world drive their users to be right-handed and that objects in another world, which are formally different from, but functionally equivalent to the ones in the world of the right-handed, drive their users to be left-handed. What if a right-handed person wants to use the objects in the world of the left-handed? My own view is that L2 learning is analogous to this situation. Is it possible for a right-handed person to become left-handed? We know that children and adults may differ. If a right-handed child and an adult were in the land of the left-handed, we may expect that the child would become a left-handed or ambidexter eventually, whereas the adult might not become left-handed and keep using his/her right-hand to use the formally left-hand-biased objects. The question seems no less of teachability than of possibility. If the adult cannot somehow use his/her right-hand, s/he may become left-handed. In normal contexts, there is no way to keep the adult from using his/her right-hand. So, adult L2 learning may benefit from a controlled setting that compels L2 processing while blocking L1 processing, if the purpose of the learning were to become left-handed or ambidextrous, so to speak. For instance, Korean learners of L2 English learners may be trained, with the aid of guided drilling, to start L2 speech planning or construct L2 vocabulary knowledge on the basis of verbs, instead of nouns.

Lastly, this study bridges the gap between theoretical linguistics and its practical value to language teachers by providing a partial answer to what is automatized in L1 learning and why. L2 pedagogy that directs learning efforts to the target language speakers' manner of speech may gain more than otherwise.

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