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Developmental aspects of English argument structure constructions for Korean-speaking second language learners: Usage-based constructional approaches to language development

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HIGHLIGHTS

- Significant improvement in understanding argument structure constructions.
- Excessively frequent use of two-argument constructions than three-argument ones.
- Stubborn use of prefabricated chunks and incorporation of new and old language items.
- Support for merging narrowly stabilised L2 routines with other resources as necessary.
- Evidence of sustaining efficiency driven by human domain-general cognitive factors.

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ABSTRACT

This study investigates developmental aspects of English Argument Structure Constructions (ASCs) for Korean-speaking second language (L2) learners, providing evidence of how they manifest human domain-general cognitive systems during language acquisition via usage-based constructional approaches to language development. Participants were instructed on six English ASC types with their representative verbs for three months. The data from grammaticality preference tasks, writing tests, and free-writing tasks were analysed. Comprehension data from the grammaticality preference tasks showed significant improvement in understanding ASCs after instruction, supporting sentence-level generalisations for language comprehension independent of individual verbs. The production data from the writing tests demonstrated more frequent use of two-argument constructions than three-argument ones, which indicates the internal complexity between ASC types. The results of the writing tests also displayed skewed exploitation of verbs representative of the target ASCs, implying a frequency-sensitive nature of language acquisition. All production data further revealed active use of prefabricated chunks and incorporation of new and old language items. Taken all together, these observations suggest language learners' merging narrowly stabilised L2 routines with other (non-)linguistic resources as necessary, sustaining efficiency in a sentence-building process, under the superintendence of cognitive factors when satisfying communicative intents.

1. Introduction

Usage-based linguistics views languages as dynamic systems gradually emerging from learners' stored experiences with (non-)linguistic input [13]. Language acquisition is thus based on such human domain-general cognitive factors as abstraction, entrenchment, prototypicalisation, and so forth (e.g., [17,24,32,62]). Especially from constructionist perspectives, it is assumed as a null hypothesis that natural languages are learnt without applying any innate linguistic principles [11]. Of special interest in this context is the significance of argument structure constructions: Form-meaning-function pairings which provide a medium for delivering basic propositions of human behaviours in a language [33,36].

Indeed, the vital function of argument structure constructions in language acquisition has been actively reported in settings where English is the first language (e.g., [21,22,58]) and the second language (L2) (e.g., [7,37,40,43,46,65]). However, despite several trials

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to draw linguistic or pedagogical implications from instructing selective argument structure constructions (e.g., [39,59]), there have been few studies to date clearly devoted to assessing the impact of implementing serial argument structure constructions into Korean-speaking L2 learners' acquisition of English. Also, it is somewhat less clear what is actually happening in their mental grammar right after Korean-speaking L2 learners start to accumulate constructional knowledge of English.

With these in mind, the current study aims to investigate developmental aspects of Korean-speaking L2 learners in relation to English argument structure constructions. The study specifically focuses on language learners' manifestation of cognitive mechanisms during language processing and acquisition. This research will thus expand the current understanding of L2 learners' mental grammar under the major tenets of usage-based constructional approaches to language development. In particular, the present study will yield convincing evidence as to how learners' knowledge of English argument structure constructions emerges and then grows, demonstrating their active utilisation of domain-general factors to accomplish target communicative intents.

2. Background knowledge

2.1. Usage-based linguistics and construction grammar

Usage-based linguistics emphasises language use as a core factor for shaping a language. In this framework, a language is understood as a structured inventory of linguistic repertoires drawn from people's perceptual experiences, conceptualising language phenomena and acquisition with the involvement of the full scope of cognition [41,57]. A grammar is then explained as a fundamentally abstract, schematic, and symbolic, yet gradually evolving, system via human domain-general cognitive factors on the basis of language users' (and learners') accumulated experiences [17,19,24]. Language acquisition thus becomes essentially input-driven and sensitive to the actual experience of language use with other types of knowledge other than the language itself [19,24,68].

Of the various determinants of learning in usage-based linguistics, this study particularly focuses on frequency effects. According to Ellis [23], the frequency of occurrence intimately tunes language processing and acquisition since humans are born with an incisive sense of frequencies that is strong enough to recognise frequency distributions and their central tendencies. Frequency effects are generally believed to play an essential role in language acquisition, aiding learners in acquiring lexical frames and extending those frames to generalised abstract representations in L1 settings (e.g., [12,18]) and also L2 settings (e.g., [27,29]). The recent study by Ambridge, Kidd, Rowland, and Theakston [3] further explicates the ubiquity of frequency effects by emphasising that a learning mechanism is at least frequency-sensitive, and this sensitivity of frequency in childhood continues into older childhood and adulthood. Consequently, language acquisition may be, in essence, a matter of probabilistic by-products that are closely associated with the frequency of such occurrence.

The experiment in this study utilised two types of frequency. One is type frequency, a word distribution permitting no overlap in the vocabularies in a text. Voluminous research has proven the association between type frequency and ease of language acquisition and the generalisation of existing constructional schemas (e.g., [48]). The other category is token frequency, that is, the overall distribution of words in a text. The so-called 'Zipfian distribution' [70] in natural languages functions as learners' optimisation in language acquisition by providing a single very high frequent exemplar that is also prototypical in its meaning [14,35]. To sum, especially in the initial stage, low-type yet also high-token frequency may help learners perceive lexical frames and spontaneously produce the configurations [14,25,32,35]. After the initial stage, a high type frequency may allow learners to abstract the patterns, providing information about the number of discrete items that can fill the slots in the representations [25,48].

In L2 acquisition settings, the effectiveness of token and type frequency appears to be rather debatable. To illustrate, Ellis and Ferreira-Junior [27] showed L2 learners' use of verb-argument constructions driven by the highest and prototypical exemplars, thereby supporting the power of low-variance input. By contrast, a series of research (e.g., [49,52,69]) provided evidence that the two types of frequency indicate no distinguishable difference in the acquisition of target language systems. Even though this discrepancy exists, both sides clearly agree that frequency is still an essential factor in L2 acquisition contexts and serves a facilitative function when pursuing language learning.

Of special interest in this regard is the appropriate linguistic unit to use for dealing with language phenomena and acquisition. Words themselves only serve a limited and imperfect means of expression. Rather, symbolic units of form-meaning-function mappings exist, distinct from individual lexical items in a sentence and conventionalised in speech communities, as constructions [26,31]. A number of research (e.g., [16,31,32,62]) has revealed the nature of constructions as follows: Constructions have their own meanings, independent of the verb(s) within those frameworks; they are contained in a language user's lexicon and form structured inventories of the speaker's (grammatical) knowledge; and they are symbolic in that they blend morphosyntactic and lexical forms with semantic, pragmatic, and discourse functions associated with them.

Constructional approaches commonly assume the existence of pairings of form, meaning, and function and the direct association of semantics with surface structures (i.e., "*a what-you-see-is-what-you-get syntax*" in Ref. [33]; p. 455), an inheritance network amongst the constructions, and crosslinguistic variability and generalisation via human domain-general cognitive systems [34]. These assumptions are highly consistent with the usage-based explanations of (the formulation of) language knowledge. They involve "the distributional analysis of the language stream and the parallel analysis of contingent perceptual activity" ([26]; p. 368), thus starting from item-based piecemeal learning with concrete exemplars of language use under the mechanism of statistical learning [15,24,38]. This mechanism naturally captures the necessity of having emergent considerations of linguistic systematicity (e.g., [19,54]) combining frequency of occurrence and human cognition [24,28]. The ultimate goal of language acquisition is then to enlarge the inventory of constructions through gradual abstractions of specific construction instances, eventually obtaining automaticity of construction uses with broad generalisability to varied social interactions [57]. Therefore, it is crucial that language learners are exposed to a wider range of (language) events and actual construction usages so as to approximate their language knowledge to the target language system.

2.2. Argument structure constructions and their growth

Amongst constructions, a set of form-meaning-function combinations "provide the means of expressing simple propositions in a language" ([36]; p. 74). They are referred to as Argument Structure Constructions (ASCs) (Table 1, adapted from Goldberg [31]. Sethuraman [58] points out that the meanings related to argument structures are connected directly to ASCs, not solely to the individual verbs. In the same vein, [33] explains that ASCs are phrasal (i.e., they consist of an array of grammatical relationship between arguments) but do not necessitate having any phrase structure tree.

Table 1
English ASCs.

Type	# of Arguments	Abstract form	Meaning	Example
Intransitive	1	S-V	X acts	The sun disappeared.
Intransitive-motion	2	S-V-$Obl_{direction}$	X moves Y	He went to the library.
Intransitive-resultative	2	S-V-Obl_{result}	X becomes Y	His face turned red.
Transitive	2	S-V-O	X acts on Y	Harry loves Jane.
Ditransitive	3	S-V-O_1-O_2	X causes Y to receive Z	He sent him a letter.
Caused-motion	3	S-V-O-$Obl_{direction}$	X causes Y to move Z	She kicked my bag under the desk.
Resultative	3	S-V-O-Obl_{result}	X causes Y to become Z	She talked herself blue in the face.

Du Bois [21] further elaborates the functions of ASCs in two ways: They serve systematic frameworks 1) to co-establish grammatical and semantic relations between elements and 2) to combine an event with the participants who are engaged in that event. The concept of ASCs is widely accepted in cognitive linguistics as a highly explanatory theoretical construct [22]. As Littlemore [45] puts it, language users and learners can access the full resources of knowledge frames from their mental grammar more effectively by utilising ASCs rather than by resting solely on such narrowly-defined linguistic knowledge as vocabulary.

According to Goldberg [31]; there is an internal relationship between English ASCs (Fig. 1, adapted from Goldberg [31]). Such information as word order facts, case-marking properties, and links between syntactic-semantic relationship is inherited from the high node constructions into dominated ones [31,34]. For example, intransitive and transitive constructions mark the upper layer of the hierarchy, which means that they are simpler in terms of their forms and meanings. Simple transitive constructions are particularly thought to be the most productive representations of child language acquisition because of their fundamental relationship to human behaviour (i.e., transitivity) [20,64]. In contrast, resultative constructions are regarded as a derivation of caused-motion constructions, that is, the surface structure of resultative constructions is similar to that of caused-motion constructions, and the meaning of resultative constructions emerges from the transition (or movement) of abstract concepts (i.e., result) from X to Y. Sethuraman [58] empirically found a partial relationship between some of the ASCs in her study on child language acquisition, showing the developmental hierarchy and gradual progression when one is learning constructions. Moreover, this sort of developmental sequence is actively reconfirmed in the settings where English is learnt as an L2 (e.g., [6,7,40,42,43]). Constructions are thus related to one another logically and meaningfully [31,32,34,41]; as [33] notes, and indeed, much of our knowledge and its development can be subsumed within a network of constructions.

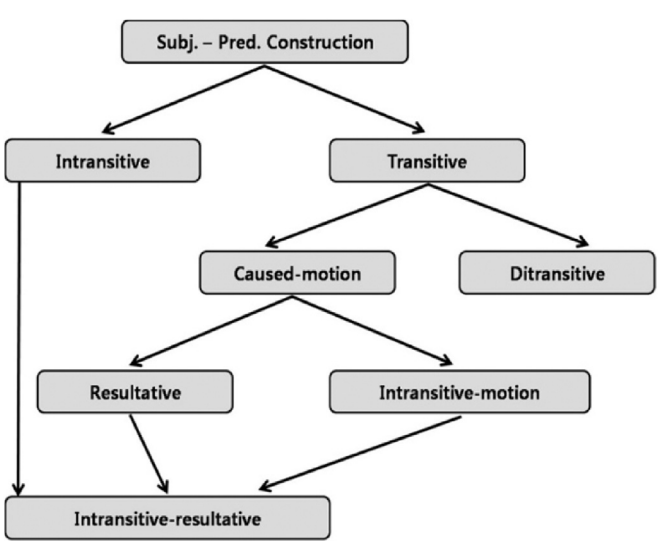

Fig. 1. Information hierarchy of English ASCs.

Then the question arises as to how constructions emerge and grow in language learners' mental grammar. Studies on language development, especially from usage-based perspectives, show that the initial state of language acquisition is described as the piecemeal learning of concrete exemplars—mainly verbs; as the learner's cognitive ability grows and their learning experiences accrue, they generalise individual words through their cognitive mechanisms to derive organised and abstract categories [27,32,35,61,62]. Indeed, verbs seem to play a pivotal role in construction learning. Goldberg [31] explains that verb-centred constructions are salient in the input process because they are related to certain fundamental perceptual primitives. Ellis and O'Donnell [28] also recognises verbs as the bedrock of the syntax-semantics interface, commenting that verbal semantics is strongly interwoven with the syntagmatic constraints that affect verb distributions. Construction growth is, therefore, likely to be accompanied by the growth of verb knowledge [58].

The indispensability of verbs as a key factor for igniting the growth of ASCs has been actively reported. To illustrate, Tomasello [60] reveals that children initially use verbs conservatively (i.e., the way they have heard these verbs previously); children pair arguments and syntactic markings on a verb-by-verb basis, and patterns and morphological markers acquired from one verb are not immediately generalised for others (a.k.a. *verb island hypothesis*). Goldberg et al. [35] also attests to the idea that certain light verbs are central to the acquisition of argument structures, demonstrating a strong tendency for one general-purpose verb to occur very frequently compared to other verbs being used (e.g., *do* in transitive constructions, *give* in ditransitive constructions, *put* in caused-motion constructions, and *go* in intransitive-motion constructions). This skewedness shows a striking resemblance in meaning between the constructions and the verbs, making the association between construction meaning and form thus much easier to comprehend and produce [35]. The recent study of Ellis et al. [29] further verifies the close association between verb-argument constructions (ASCs in this paper) and verbs, demonstrating the Zipfian distribution of ASCs with one verb type for the lion's share of all tokens of the constructions as well as the faithfulness of verbs to specific ASCs.

This knowledge leads us to contemplate the utilisability of ASCs with their high-correlative verbs as an effective language learning material. ASCs are reported to serve a key frame as a vehicle for language acquisition since their central senses are linked to the basic experiences of human beings (e.g., [6,7,39,56]). Also, as earlier research has detailed, every abstract ASC is learnt inductively from each instance of verbs in its construction [1,32,62]. Focusing on ASCs in accordance with corresponding verbs as a prototype can therefore be one of the efficient pedagogical strategies particularly at the beginning stage of each learning-teaching incident [41]. To this end, the experiment was conducted by providing participants with selected ASCs and their matchable verbs under frequency manipulation based on the following research questions:

Table 2
Information on participants.

Code[a]	Gender	1st Semester Final Test Score (out of 100)	Motivation on the Classes	Code	Gender	1st Semester Final Test Score (out of 100)	Motivation on the Classes
A	Male	88	Highly Motivated	I	Male	98	Highly Motivated
B	Male	93	Unmotivated	J	Male	85	Somewhat Motivated
C	Male	96	Highly Motivated	K	Male	87	Somewhat Unmotivated
D	Male	93	Somewhat Unmotivated	L	Male	92	Somewhat Motivated
E	Female	86	Unmotivated	M	Male	92	Somewhat Motivated
F	Female	93	Somewhat Unmotivated	N	Male	83	Highly Motivated
G	Male	87	Somewhat Motivated	O	Male	42	Somewhat Motivated
H	Male	90	Somewhat Motivated				

[a] The participants were randomly coded as alphabets for the purpose of anonymity.

RQ 1: Does instruction skewed towards selected ASCs with their matchable verbs influence participants' acquisition of the target language items?

RQ 2: How are aspects of usage-based constructional approaches to language development manifested in the (second) language learning process?

It was subsequently predicted that 1) the exposure to English ASCs (with their representative verbs) would encourage participants to understand and use the target language items, and 2) the participants would demonstrate gradual growth of the target language items via featuring human domain-general cognitive factors.

3. Methods

3.1. Participants and stimuli

15 participants, all in their first year of middle school (mean age: 13; 2, SD: 0.4), participated in a regional English writing course. No one had learnt or even heard of such linguistic jargons as constructions, verbs, or the like. Participants' initial English proficiency was measured by their final English scores in the first semester, but that information was not importantly considered based on the researcher's judgment that the learners' developmental aspects and their motivation/participation in each session were of greater importance. The information on the participants is summarised in Table 2. There was also a control group, which consisted of 6 intermediate-level participants who were in their second year of middle school (mean age: 14; 5, SD: 0.5) and who had no background of linguistics. They received no instruction but were asked to do repetitive writing tasks only.

Table 3 illustrates linguistic materials used in the experiment. First, six types of ASCs were chosen (e.g., *transitive, ditransitive, caused-motion, resultative, intransitive-motion,* and *intransitive-resultative constructions*). Each type of constructions was allocated to over two instructional sessions. Next, based on the Zipfian distribution of ASCs (see Section 2.2) from the previous frequency-related corpus research findings (e.g., [9,35,51,66]), six representative verbs were adopted (e.g., *do, give, put, make, go,* and *become*) for the corresponding ASCs to facilitate construction learning. Other verbs (verbs in round brackets in Table 3) were additionally included in the stimuli to assist participants' cognisance of the characteristics of each constructions and expand their linguistic knowledge naturally.

3.2. Experiment procedure

The class was held twice a week for three months. Table 4 overviews the outline of the course. The internal hierarchy between ASCs was reflected in the presentation sequence of the configurations. Each class was composed of a guessing activity with pictures, instructions by the researcher, picture descriptions and one writing practice session on a given topic, so that the participants could constantly practice the target constructions. The participants were forbidden the use of any electronic devices during all the sessions; the researcher assisted with their inquiries about English words. After each session, the researcher gave the participants positive feedback on their writing, mainly on the general comprehension and impressions, not on specific grammatical accuracy of the language use.

Table 5 outlines the general flow of each class. A certain type of ASCs was distributed over two sessions. The first session started with a review of the last class, manipulating the input frequencies of verb-construction sets (i.e., four sentences with the target verb, and then four additional sentences including other selected verbs). Next, the participants were asked to depict four pictures using the target verb, continuing with the explicit descriptions of the target construction in light of their relevant structural, semantic, and functional characteristics. The participants were then given additional pictures with the selected verbs to encourage them to sustain their guessing activity to expand their linguistic knowledge. The corresponding Korean translations were presented simultaneously to help the participants grasp the meaning of the pictures.[1] Lastly, the participants were asked to complete a free writing task on the selected topic. The second session was nearly identical to the first session except for the 'Extension' stage in which the participants were given more and different various types of verbs in order to utilise their prior knowledge and further activate their cognitive mechanisms.

3.3. Data collection and analysis

The comprehension data were collected by a grammaticality preference task (GPT) to investigate whether the participants showed any changes or improvements in their perception of ASCs after the instruction. The participants of the instruction group[2] were asked to choose the most appropriate sentence from the eight options that described each picture. Of these eight options, six options were based on the target ASCs, and the other two were an intransitive-unergative construction (i.e., Subject-Verb) and 'none of the above'. All the options except for the last one included nonce verbs that do not exist in English. The number of total items was 30 (with no fillers), and 30 s was allowed for the students to answer each item. When this time elapsed, the PowerPoint slide automatically moved to the next. The test was conducted twice (i.e., the

[1] An anonymous reviewer cast doubt on whether Korean translations presented during instruction could mislead participants' L2 performance. Even though the Korean equivalent sentences were not mentioned verbally and the characteristics of English ASCs were stressed throughout instruction, the participants might not fully deviate from strong repercussions of L1 translations. This point remains a possible limitation of this experiment. Refer to Chapter 6 for more discussion of L1 influence issues.

[2] The control group did not take part in GPT.

Table 3
Linguistic materials and distribution.

Type[a]	Verb	Type	Verb
TR (1)	*do* (make, take, say, like)	IM (1)	*go* (come, get, fall, move)
TR (2)	*do* (get, hit, kick/open, close/want, think)	IM (2)	*go* (walk, lie, stand, look, live, sit)
DI (1)	*give* (get, tell, show, bring)	RT (1)	*make* (have, let, get, keep)
DI (2)	*give* (bring, lend, hand, buy/fax, bake, cook, blow)	RT (2)	*make* (drive, call, wipe, talk, hammer, kick)
CM (1)	*put* (get, take, leave, pick)	IR (1)	*become* (get, turn, grow, look)
CM (2)	*put* (kick, hit, push, wash, throw, fly)	IR (2)	*become* (fall, go, keep, freeze)

[a] TR, DI, CM, RT, IM, IR are abbreviations of transitive, ditransitive, caused-motion, resultative, intransitive-motion, and intransitive-resultative constructions, respectively.

Table 4
Outline of course.

Step	Content ("Writing topic")
Pre-test	Grammaticality Preference Task; Writing Task ('Make your own story')
1st	Transitive (1): Basic features, Writing ('Introducing myself')
2nd	Transitive (2): Extension, Writing ('Your sense of values')
3rd	Ditransitive (1): Basic features, Writing ('Planning')
4th	Ditransitive (2): Extension, Writing ('On rainy days')
5th	Caused-motion (1): Basic features, Writing ('Making food')
6th	Caused-motion (2): Extension, Writing ('Describing scenes')
7th	Intransitive-motion (1): Basic features, Writing ('Trip to somewhere')
8th	Intransitive-motion (2): Extension, Writing ('Describing scenes')
9th	Resultative (1): Basic features, Writing ('Your daily life')
10th	Resultative (2): Extension, Writing ('Describing scenes')
11th	Intransitive-resultative (1): Basic features, Writing ('After five years')
12th	Intransitive-resultative (2): Extension, Writing ('Four seasons in Korea')
Post-test	Writing Task ('Make your own story'); Grammaticality Preference Task
1st delayed post-test	Writing task ('Make your own story')
2nd delayed post-test	Writing task ('Make your own story'; 1 week after the 1st delayed post-test)

Table 5
General procedure of each class.

Type	Stage	Time (min.)	Content (the number of sentences)
First Session	Warm-up	5	Greetings; Review of the last class (4-1-1-1-1); Introduction
	Verb	10	Target verbs (4 * 2)
	ASC	5	Direct explanation on the target ASC
	Semi-open	5	4 more verbs (2-2-2-2); Filling in the blanks with the pictures
	Writing	15	Free writing (topics given)
Second Session	Warm-up	10	Greetings; Review of the last class (4-1-1-1-1); Introduction
	Extension	15	Pictures & example sentences (verbs expanded)
	Writing	15	Free writing (topics given)

pre-test and the post-test), and the pictures and the options for the post-test were the same as those for the pre-test.[3]

The production data were gathered in two ways. First, the data from all writing tests[4] were collected to detect any progress or change in the participants' production. The participants were asked to create their own story using nine irrelevant pictures within 20 min. The researcher emphasised that the students should make their story as long and detailed as they could. Second, the free writing task data from every class were collected to identify participants' developmental aspects in terms of using the target linguistic configurations. Two different, yet learner-related, typical topics in each type of ASCs were presented. The researcher did not emphasise that the specific constructions could be frequently used in each writing topic, but it was explained to the students that the writing practices functioned as a summary of each class and were thus a useful tool for learning English more efficiently.

To calculate any statistical significance in the comprehension data, R (R development core team, 2015; version 3.2.2) was utilised specifically for a Wilcoxon matched-pairs signed-rank test due to the fact that the data did not satisfy the assumption of normal distribution. For the analysis of the writing data above, all the handwritten data were primarily converted into electronic files (*.txt files), and then sorted by Wordsmith Tools (version 6.0) to find verb-related instances in the data. Manual inspection of all the writing data was additionally conducted to gather examples of creative uses.[5] In the evaluation of accuracy, misuse of articles, omission of third-person-singular present '-s', tense and aspect errors, and other local errors including spelling and punctuation

[3] An anonymous reviewer raised the possibility of repetitive stimulus effects of GPT. There is little possibility of this effect, however, based on the following reasons. First, the gap between the pre-test and the post-test was at least 2.5 months, and this would block the possibility that they memorised the items on PowerPoint slides and how they answered. Second, the researcher did not let them know any intended answer, so they had no idea on whether an option was appropriate or not. Third, the picture presentation sequence of the post-test was different from that of the pre-test, which probably hindered the participants from retrieving what they perhaps memorised, if any. Taken together, it is skeptical that the repetitive stimulus effect of GPT influenced the participants' responses.

[4] The control group did not participate in the two delayed post-tests.

[5] An anonymous reviewer pointed out the subjectivity of manual inspection. To avoid such subjectivity issue, two solutions were adopted when sifting the relevant samples: strict application of the error rationales established in this study, and cross-validation of the appropriateness of examples with another colleague. Admittedly, the two solutions were not sophisticated enough to fully control the subjectivity, thus becoming another possible limitation of the research. They, however, helped circumvent possible biases when interpreting the data.

rules, were not considered errors since these were neither the main concern or goal of the experiment nor dealt with during the course. However, inappropriate omissions or uses of sentence structures and word order were regarded as critical errors because these are closely related to the grammaticality of ASCs.

4. Analysis of L2 learners' data

4.1. Comprehension data: GPT

As a first step, the comprehension data from GPT were statistically calculated. The mean scores of the percentage of correct answers for ASCs was 27.6 and 41.8, respectively. A Wilcoxon matched-pairs signed-rank test on the two sets of scores indicated a significant change in understanding ASCs after the instruction ($p = 0.003$, $r = 0.54$), implying the contribution of ASCs instruction to English sentence interpretation. In addition, this increase was supported by the proportion of correct answers on each type of ASCs via the same statistical technique. As displayed in Table 6, the participants showed significantly higher percentages of correct answers after the instruction, regardless of ASC types.

Table 6
Proportions of correct answers for each type of ASCs.

Type	Pre-test	Post-test	Z	Sig. (two-tailed)
TR	17.66	68.87	2.865	0.004**
DI	38.23	73.33	2.220	0.026*
CM	48.62	95.28	3.235	0.001**
RT	20.24	90.00	3.305	0.001**
IM	37.02	73.33	2.283	0.022*
IR	33.88	81.78	2.950	0.003**

*$p < 0.05$, **$p < 0.01$.

4.2. Production data: writing test and free writing task

Descriptive analyses of ASCs production were subsequently conducted on the data from the participants' writing tests.[6] From the overall number of correct ASCs over the four writing tests (see Table 7), an incongruence in producing ASCs was detected. For example, transitive constructions were the most actively used configurations amongst ASCs. Constructions with two arguments (i.e., intransitive-motion and intransitive-resultative constructions) were more frequently produced than those with three arguments (i.e., ditransitive, caused-motion, and resultative constructions). Moreover, the number of times that the participants used intransitive-motion constructions increased after the post-test, and intransitive-resultative constructions were also frequently produced in contrast to the zero-usage of resultative constructions.

Fluctuation in ASCs utilisation was revalidated through the individual descriptions of each ASCs production in the writing tests. As Table 8 describes, the participants' production was mostly centred on the transitive constructions, regardless of the test phases. The use of intransitive-motion and intransitive-resultative constructions was more frequent than was that of the other three-argument constructions, especially after the instruction period. However, the proportions of each sentence pattern implied that there was little consistency in ASCs production, which made it more difficult to find any tendencies in the use of the target sentence configurations.

The production of verbs in accordance with the types of ASCs is also noteworthy. Table 9 shows that the overall amount of the six representative verb use was not larger in consideration of the frequency manipulation of the input materials. Especially in the case of transitive constructions, the target verb *do* was scarcely produced. However, the proportions of the verbs regarding the other five types of ASCs revealed that the participants almost always included the target verbs whenever they produced the target ASCs in each case. This tendency was further confirmed by the list of all of the verbs used in the five ASC types (except for the transitive constructions) over the three free writing tasks after the instruction (i.e., the post-test, the 1st delayed post-test, and the 2nd delayed post-test) as summarised in Table 10.

An analysis of all the writing data demonstrated several additional interesting points of the participants' developmental aspects. First, some of the participants stubbornly produced *want to* and *go to* regardless of complement types:

(1) and on rainy day I *want to* korean pancake and kimchi. on rainy day I doesn't *want to* clean (K, 4th)
(2) I *want to* sleep in the house. Umm... I *want to* go to Australia. Because I *want to* a rest. (L, 7th)
(3) and I *go to* big ben. Then I *go to* hotel. and *go to* home (M, 7th)

Likewise, other participants combined certain lexical items as chunks (e.g., *A goes to B, A eats C,* and *A want to go to B because A eat C*) and then produced those chunks repeatedly:

(4) The donkey *goes to* factory. The donkey *eats* blueberry. (D, 1st delayed post)
(5) I *want to go to* the USA *because* I *eat* hamburger in USA (G, 7th)

The participants also showed somewhat sloppy, yet interesting, usages of the constructions in the tasks. Although the participants seemed to understand the basic features of formal patterns, semantics, and the functions of ASCs, their sentence composition still appeared to be clumsy:

(6) then I want everyone come true (M, 2nd)
(7) Then windy blowed me (A, 4th)
(8) I will not give food for you (N, 6th)
(9) Boy want friend rice (O, 1st delayed post)
(10) My friend is whispered me "This present means 'now'" (B, 2nd delayed post)
(11) but his friend give material for him (H, 2nd delayed-post)

5. General discussion

To summarise, when provided frequency-manipulated instruction on ASCs with their representative verbs, Korean-speaking L2 learners of English improved their understanding of ASCs in their English sentence interpretation. This finding provides support for the existence of sentence-level generalisations for language comprehension, irrespective of individual predicates. Indeed, this result joins the growing body of research (e.g., [5,10,37,43,46]) which has confirmed that sentential configurations contribute significantly to sentence processing and interpretation, independent of a verb. This finding may also validate the view that knowledge of ASCs functions as a reasonable pulley for effective language comprehension since the central senses of ASCs are intimately connected to basic human experiences. By contrast, the production data showed four remarkable aspects as follows: 1) far more frequent use of two-argument constructions than three-

[6] For the control group, all and indeed the only ASC type that they produced correctly was the transitive construction, and the number of their sentence production was exceedingly low compared to that of the instruction group. See Table 7 for more information on the production of the target ASCs by the control group. No further analysis will be made on the control group's data afterwards.

Table 7
Overall number of correct ASCs in writing tests.

Type	Instruction Group							Control Group						
	TR (N)	DI (N)	CM (N)	RT (N)	IM (N)	IR (N)	Sum (N)	TR (N)	DI (N)	CM (N)	RT (N)	IM (N)	IR (N)	Sum (N)
Pre	39	0	3	0	5	3	50	8	0	0	0	0	0	8
Post	67	2	8	0	8	14	99	6	0	0	0	0	0	6
1st delayed	54	3	3	0	30	3	93	0	0	0	0	0	0	0
2nd delayed	69	5	1	0	14	6	95	0	0	0	0	0	0	0
Sum (N)	231	10	15	0	57	26	337	14	0	0	0	0	0	14

Table 8
Correct use of each type of ASCs in writing tests.

ASC	Test	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
TR (N (%))[a]	Pre	3 (60)	2 (50)	8 (57)	2 (67)	2 (40)	–	–	1 (33)	4 (44)	6 (75)	6 (40)	–	2 (50)	2 (100)	1 (25)
	Post	4 (50)	7 (33)	6 (46)	4 (36)	3 (60)	3 (60)	7 (78)	3 (50)	5 (45)	4 (57)	1 (33)	2 (22)	6 (43)	3 (30)	9 (69)
	1st delayed	2 (33)	3 (33)	12 (57)	4 (40)	–	5 (56)	3 (38)	3 (43)	4 (36)	2 (29)	2 (40)	7 (54)	5 (71)	2 (20)	–
	2nd delayed	6 (46)	4 (57)	3 (30)	1 (17)	1 (20)	3 (38)	6 (67)	3 (75)	8 (62)	6 (67)	2 (33)	3 (60)	13 (81)	6 (67)	4 (50)
DI (N (%))	Pre	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Post	–	–	–	–	–	–	–	–	1 (9)	–	–	1 (11)	–	–	–
	1st delayed	–	–	2 (10)	–	–	–	–	–	1 (9)	–	–	–	–	–	–
	2nd delayed	3 (23)	–	2 (20)	–	–	–	–	–	–	–	–	–	–	–	–
CM (N (%))	Pre	–	–	1 (7)	–	–	–	–	1 (33)	–	–	–	–	–	–	1 (25)
	Post	1 (13)	–	2 (15)	1 (9)	–	–	–	–	2 (18)	–	–	1 (11)	–	1 (10)	–
	1st delayed	–	–	–	–	–	1 (13)	–	–	2 (18)	–	–	–	–	–	–
	2nd delayed	–	–	–	–	–	–	–	–	–	1 (11)	–	–	–	–	–
RT (N (%))	Pre	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Post	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1st delayed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2nd delayed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
IM (N (%))	Pre	1 (20)	–	–	–	–	–	–	–	1 (11)	–	2 (13)	–	–	–	1 (25)
	Post	–	1 (5)	1 (8)	3 (27)	–	–	–	–	–	–	–	–	–	1 (10)	2 (15)
	1st delayed	3 (50)	1 (11)	4 (19)	4 (40)	1 (50)	1 (11)	2 (25)	1 (14)	2 (18)	1 (14)	1 (20)	–	1 (14)	3 (30)	5 (71)
	2nd delayed	2 (15)	–	2 (20)	2 (33)	–	1 (13)	1 (11)	–	1 (8)	–	1 (17)	–	–	1 (11)	3 (38)
IR (N (%))	Pre	–	–	2 (14)	–	–	1 (100)	–	–	–	–	–	–	–	–	–
	Post	–	2 (10)	–	–	–	2 (40)	–	–	2 (18)	1 (14)	1 (33)	2 (22)	2 (14)	2 (20)	–
	1st delayed	–	–	1 (5)	–	–	1 (13)	–	–	1 (9)	–	–	–	–	–	–
	2nd delayed	–	–	2 (20)	–	–	2 (25)	–	–	–	–	–	–	–	1 (11)	1 (13)

[a] N means the total number of correct ASCs use, and % means the percentage of the correct ASCs use over the entire sentences. Sentence structures such as 'X-be-Y', simple intransitives, and fixed expressions (e.g., *thank you*, *nice to meet you*, etc.) were not included in the calculation.

Table 9
Number of representative verbs used in each type of ASCs.

Verb	Test	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
do in TR (N (%))[a]	Pre	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1 (100)
	Post	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1st delayed	–	–	–	–	–	–	–	–	1 (20)	–	–	–	–	–	–
	2nd delayed	–	–	–	–	–	–	1 (17)	–	–	–	–	–	–	–	–
give in DI (N (%))	Pre	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Post	–	–	–	–	–	–	–	–	1 (100)	–	–	1 (100)	–	–	–
	1st delayed	–	–	1 (50)	–	–	–	–	–	–	–	–	–	–	–	–
	2nd delayed	3 (100)	–	2 (100)	–	–	–	–	–	–	–	–	–	–	–	–
put in CM (N (%))	Pre	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1 (100)
	Post	1 (100)	–	–	–	–	–	–	–	1 (50)	–	–	1 (100)	–	–	–
	1st delayed	–	–	–	–	–	1 (100)	–	–	2 (100)	–	–	–	–	–	–
	2nd delayed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
make in RS (N (%))	Pre	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Post	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1st delayed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	2nd delayed	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
go in IM (N (%))	Pre	1 (100)	–	–	–	–	–	–	–	1 (100)	–	2 (100)	–	–	–	1 (100)
	Post	–	–	1 (100)	3 (100)	–	–	–	–	–	–	–	–	–	1 (100)	2 (100)
	1st delayed	2 (67)	–	3 (75)	3 (75)	1 (100)	1 (100)	2 (100)	1 (100)	2 (100)	1 (100)	1 (100)	–	1 (100)	3 (100)	5 (100)
	2nd delayed	2 (100)	–	2 (100)	2 (100)	–	–	1 (100)	–	1 (100)	–	1 (100)	–	–	1 (100)	3 (100)
become in IR (N (%))	Pre	–	–	–	–	–	1 (100)	–	–	–	–	–	–	–	–	–
	Post	–	2 (100)	–	–	–	2 (100)	–	–	2 (100)	–	–	1 (50)	–	–	–
	1st delayed	–	–	1 (100)	–	–	–	–	–	–	–	–	–	–	–	–
	2nd delayed	–	–	–	–	–	1 (50)	–	–	–	–	–	–	–	–	1 (100)

[a] N means the total number of verb use of the target ASC, and % means the percentage of the verbs in the target ASC.

Table 10
Examples of verb use according to ASCs (except for TR).

DI		CM		RS		IM		IR	
Verb	N	Verb	N	Verb	N	Verb	N	Verb	N
give	8	*put*	6	–	–	*go*	46	*become*	10
make	2	throw	5			come	4	get	8
		take	1			move	2	look	3
								feel	1
								taste	1

argument ones; 2) skewedness of verb use in accordance with their matchable ASCs (except for transitive constructions); 3) employment of certain lexical items (*want to* and *go to*) as chunks repeatedly, regardless of their complement types; and 4) incorporation of new language items with old ones based on particular exemplars that they had received.

The first observation that pertain to the usages of two-argument constructions compared to those of three-argument ones[7] renders a different picture from the inheritance hierarchy schematisation discussed in Goldberg [31]. This finding rather bears a curious likeness to a level of construction-internal complexity [42]. Unquestionably, transitive constructions were the easiest frames to be employed due to the fundamental relationship of human behaviour [20,64], and intransitive-motion and intransitive-resultative constructions were found to be the second most frequently produced frames because of comparatively low processing load. Compared to two-argument constructions, three-argument constructions (i.e., ditransitive, caused-motion, and resultative constructions) might be less cognitively-accessible.[8] As echoed by Lee and Kim [42], the participants in this study were likely to have trouble processing three-argument constructions due to their heavier cognitive burden compared to two-argument ones, yielding an interpretation that they failed to capture the internal network between ASCs.

The second observation that the participants produced a skewed exploitation of a set of verbs matchable with the target ASCs suggests frequency effects, as explored in Section 2.1. The selected five verbs were regarded as a prototype of the respective construction types based on a semantic resemblance between the two entities. When children attempt to apply a particular syntactic frame to particular items, they tend to choose items which they have most frequently heard in the patternised input [1,61]. Likewise, Dabrowska [17] argues that information on the relative frequency of words and constructions helps language users easily activate and process a language system. The participants in this study might thus process a target ASC-BV combination in an unspecified way at the very first time based on high token frequency of the mixture. This unspecified circumstance then lasted for a certain period, which eventually appears by producing the same combination in an unspecified manner again. Although it may be difficult to fully assert that skewed frequency with high tokens of a specific construction-verb set does influence participants' processing and acquisition of the target language system in the current experiment, this finding at the very least indicates the powerfulness of token frequency in spontaneous production at the beginning stage of language acquisition.

However, the way that the participants produced verbs in transitive constructions was distinguished from how the five other representative verbs behaved. This outcome may be attributable to participants' maximal utilisation of language knowledge that they had already acquired. Transitive constructions have comparatively greater accessibility, which helps language learners acquire and use the frame very easily. Therefore, when expressing their communicative intents through transitive constructions, the participants in this experiment might not have needed to stick to use the target verb *do* in the sentence frame. Rather, they might attempt to apply new verbs that they were provided to the frames in order to deliver more accurate and appropriate meanings. Participants' production tendency with regard to transitive constructions then implies, however indirectly, the realisation of type frequency effects after stabilisation of lexical representations for communicative intents.

Returning to the somewhat 'frozen' usage of verbs representative of the target ASCs as reported above, the observed use of chunk repetition provides a more intriguing interpretation of language learners' developmental aspects regarding ASCs. Tomasello [63] assumes that children are confronted with particular exemplars of utterances during their very first stage of language learning. They then develop their linguistic knowledge from the lexically specific stage to the slot stage where they can insert new lexical items [44]. Creating prefabricated chunks [17] is advantageous during this process because the chunks make it easier to retrieve linguistic items from the learners' stored linguistic experiences [61], thus lessening the burden of sentence processing. Diessel [19] also supports this view, emphasising the role of early item-based constructions as holistic symbols that children utilise to achieve their communicative intents. Furthermore, a clear correlation between the use of chunks and language development has been empirically reported (e.g., [50]), which indeed bolsters the exemplar- and item-based emergence of constructions (e.g., [4,27,30,61,62]).

These explanations make the use of prefabricated chunks captured in this experiment precisely conform with the very same scenes of usage-based language acquisition. The participants combined *want* and *go* with *to* based on the frequency of occurrence ((1) to (3)). Once they were familiar with the structural distributions and semantic-functional features of the target frames, they started to utilise the pre-made chunks in a more elaborate, repeated, and patterned manner ((4) and (5)). This aspect is inextricably intertwined with "usage-based syntactic operations" ([61]; p. 74). Sometimes learners cannot easily retrieve expressions to accomplish the communicative intents due to their insufficient linguistic knowledge or experience. To tackle the obstacle, when learners do not have pre-stored expressions readily available, they select some of the linguistic schemas they have already acquired and then cut and paste these materials together as necessary [61,62]. This invites the conclusion that the examples in (6) to (11) can be understood as creative usages, not just simple errors. The learners tried to combine verbs that they already knew with certain constructions that they were also familiar with in order to satisfy their communicative intents. If the participants needed to express dative semantics, they simply borrowed the form of ditransitive constructions and added verbs that denoted the exact actions expressing their communicative intents. Sometimes they combined simple transitive constructions with prepositional phrases, including the preposition *for*, irrespective of verb types. Consequently, these observations may provide good evidence for learners' active employment of human domain-general factors to

[7] It seems that there was a connection between the presentation sequence of the ASCs and the decreased production of the representations. This may be partially true in that, for example, transitive constructions were the most frequently produced configurations and were utilised far more than intransitive-resultative constructions. What was more apparent, however, was a clear tendency for the more frequent production of two-argument ASCs than three-argument ASCs, irrespective of the presentation order. This point cannot be accounted for by the presentation order alone, thereby weakening the suspicion that the presentation sequence affected the frequent production of one construction type over others.

[8] Intuitively speaking, the reason behind these phenomena might be an insufficiency of the input. Although ASCs were given to the learners intensively during the instruction sessions, the number of times that each type of ASCs was presented was less than 50. Thus, the amount of input might not be large enough to help the learners become familiarised with those representations.

compensate for their limited language resources.

Furthermore, the aforementioned interpretations indicate the vigorous interplay between frequency of occurrence and efficiency-related processing considerations to satisfy communicative intents [54]; *inter alia*). At the very beginning, when the learners are ready to assign possible forms, meanings, and functions for the intended conceptual representations incrementally [55], they might fail to utilise constructional information suitable for their original intention. In this regard, the observed preference for utilising two-argument constructions adds to the indirect evidence of the possible repercussions of young language learners' cognitive immaturity, thus supporting the claim that children's difficulty with some of linguistic activities reflects their more general limitations in overall cognitive abilities (e.g., [47,55]). Despite their shortcomings, however, these learners attempted to achieve the original communicative intents under severe limitation of processing resources [53]. Subsequently, they stubbornly employed prefabricated chunks on the basis of the input frequency, or incorporated new language items into their already stabilised constructional knowledge (i.e., *previously entrenched low-cost processing routines*; [54]. Although individual variations do exist in accessing the target language system or activating cognitive mechanisms, it is difficult to escape the conclusion that, after a sheer lexical-specific phase, language learners harness the merits of experience- or probability-based sentential knowledge to efficiently pursue a sentence-building process with the interaction of various domain-general factors to meet their communicative intents.

Taken together, what this study revealed so far provides two meaningful insights for understanding developmental aspects of Korean-speaking L2 learners of English in their beginning stage of language acquisition. First, L2 learners' pathway to acquisition of the target language may be guided by characteristics of input that is provided. The current research shows that instruction skewed towards English ASCs with their representative verbs boosted participants' comprehension of the target language system. Also, despite the fact that the participants did not overcome the complexity of three-argument constructions, the manner in which they were instructed allowed them to produce sentence patterns centred on verbs that were representative of the target constructions. These observations may thus indicate the connection between the frequency-sensitive exposure to English ASCs-verb sets and language behaviours by Korean-speaking L2 learners of English. Second, language learners' employment of human domain-general cognitive factors may coordinate the overall progress of language acquisition. As explained earlier, during (and after) the exposure to English ASCs with their representative verbs, the participants in this study utilised narrowly fixed combinations of language items repetitively and fused their prior language knowledge into new sentential information salient to what they were given. Therefore, the behaviours manifested by the participants may suggest the gradual growth of the target language system driven by cognitive endeavour, thereby corresponding to the major assumptions of usage-based constructional approaches to language development.

6. Concluding remarks

This study investigated Korean-speaking L2 learners of English with regard to English ASCs, by focusing on the developmental patterns found in the major tenets of usage-based linguistics combined with constructionist perspectives. It was found that, after the exposure to English ASCs (combined with representative verbs), participants improved the understanding of the target constructions. In-depth analyses on the production data further revealed four remarkable observations: Preference of two-argument constructions far more than three-argument ones, skewed production of verbs when using ASCs, stubborn use of prefabricated chunks, and incorporation of new and old language items based on particular exemplars. These observations constitute support for merging their narrowly stabilised linguistic routines of L2 knowledge with other (non-)linguistic materials as necessary to minimise processing cost to satisfy target communicative intents.

What this research revealed so far opens the door to understanding how Korean-speaking L2 learners' knowledge of English ASCs grows, capturing the involvement of diverse domain-general factors. The general realisation from this study is indeed in good alignment with the core assumptions of usage-based constructional approaches to language development: After abiding by a lexically specific stage for a certain period of time, learners' utilisation of diverse cognitive abilities tends to attune their overall language processing and acquisition. The essence of language development, therefore, rests in the vigorous interplay between constructional knowledge and frequency effects under the superintendence of cognitive factors in pursuit of efficiency in language processing and acquisition.

There are possible limitations of this research and also areas for awaiting further studies. First, the small number of participants, the limited age/gender range, and the specific order of ASC presentation may prevent us from rendering a complete report of the generalised implications. In that sense, it is worth investigating the effects of ASC-verb learning on various types of learners with diverse language proficiency levels and ASC presentation methods, including both primary and tertiary levels. Second, the findings of this study need to be cross-verified for their interdisciplinary aspects. For instance, utilising ecologically valid techniques (e.g., eye-tracking, fMRI) can pave the way for better ascertaining the relationship between constructional knowledge and language users' (and learners') activation of domain-general factors (see Allen, Pereira, Botvinick, & Goldberg [2] to identify the relationship between the discrimination of constructions and the functions of the human brain). Lastly, there should be L1-transfer effects due to contrastive differences between English and Korean, and these were not comprehensively covered in this research. One exemplary finding was from the participants' skewed production of prepositional datives with the preposition *for* over ditransitive constructions (see also [8]). It may be ascribable to the nature of Korean which allows benefactive datives (combining with a special verbal morpheme and case markers) more broadly than that of English [67]. It will thus be intriguing to investigate possible effects of Korean case-marking systems, one of the remarkable characteristics of Korean, on the acquisition of English ASCs.

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