

Type/Token Frequency Effects in L2 Learners' Canonical Construction Development ¹

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1. Introduction

In the usage-based approach to language acquisition, *the skewed frequency hypothesis* (e.g., Casenhiser & Goldberg, 2005; Hilpart, 2014) assumes that linguistic properties in low type-frequency (skewed) verb(s) facilitate the related construction acquisition. According to the hypothesis, young children are assumed to receive inputs from their linguistic environments and develop constructions (i.e., map linking rules of form-meaning correspondences) through familiar verbs instead of unfamiliar ones. For example, Bates, Bretherton, & Snyder's (1988) corpus-based study reported that *put* accounts for approximately 40 percent of Subject Verb Object Locative (SVOL) constructions; *give* accounts for approximately 20 percent of Subject Verb Object Object (SVOO) constructions; and *go* accounts for approximately 40 percent of Subject Verb Locative (SVL) constructions.

In recent decades, some usage-based linguists examined the association strengths between lexical items and canonical constructions (CCs) through collostructional analysis (Gries, 2011; Gries, Hampe, & Schönefeld, 2005, 2010; Gries & Stefanowitsch, 2004, 2010; Hampe, 2013; Stefanowitsch & Gries, 2003, Stefanowitsch, 2013). Through the grammatically-annotated adult native English corpus, ICE-GB R2 (2006), Notohara (2016)

examined Zipfian type-token verb frequency distribution within 13 CCs and confirmed 13 prototypical verbs for 13 CCs: (1) *be* for States/SVC constructions; (2) *get* for Processes/SVC constructions; (3) *be* for Location/SV constructions; (4) *go* for Object-motion/SV constructions; (5) *have* for Possession/SVO constructions; (6) *want* for Emotion/SVO constructions; (7) *see* for Perception & Cognition/SVO constructions; (8) *think* for Mental/SVO constructions; (9) *make* for Action/SVO constructions; (10) *go* for Subject-motion/SV constructions; (11) *put* for Caused-motion/SVO constructions; (12) *give* for Transfer/SVO constructions; and (13) *say* for Communication/SVO constructions. Thus, the skewed frequency hypothesis has gradually been examined and confirmed through corpus-based studies on native English constructions. Similarly, second language (L2) construction development is also being explored and clarified in usage-based research on second language acquisition (SLA).

2. Literature Review

2.1 L2 Skewed Frequency Distribution and Frequency Effects

The skewed frequency distribution mentioned above can be found in L2 construction development. Through a longitudinal L2 adult learner corpus, Ellis and Ferreira-Junior (2009a, 2009b) examined frequent verbs in three CCs in L2 learners' interlanguage: the SVL construction, the SVOL construction, and the SVOO construction. As a result, they reported frequent verbs in three constructions as follows: *go* for SVL constructions, *put* for SVOL constructions, and *give* for SVOO constructions. Interestingly, although quantity and quality in target language exposure seem to be quite different, both native speakers (NSs) and non-native speakers (NNSs)

develop CCs based on the same limited and frequent verbs (Ellis & Larsen-Freeman, 2009). In fact, L2 learners can use different verb types in certain English CCs; however, recent corpus-based studies show that the prototypical verbs in certain CCs tend to be fixed and their frequencies follow *the Zipfian distribution* (e.g., Ellis, 2012a, 2012b, 2014; Ellis, O'Donnell, & Römer, 2016).

In cognitive linguistics, Taylor (2002) proposes *schema strength* considering frequency effects as follows:

Schemas vary in strength. A schema gains strength (it becomes 'established', or 'entrenched') in proportion to the number of instances which elaborate it. A schema which is elaborated by very many instances will tend to be highly entrenched; a schema which has only a small, fixed number of instances will tend to be weakly entrenched; in the limiting case, a schema with only one instance will not be entrenched at all. (p. 275)

Additionally, he distinguishes *token frequency* from *type frequency*. According to him, token frequency effects are related to the *entrenchment* of certain linguistic items in language acquisition, whereas type frequency effects are related to the *productivity* of certain linguistic items in language comprehension or production. At the morpheme level, for example, the frequency effects of past tense forms of regular verbs (e.g., *walked*, *cooked*, *looked*) and irregular verbs (e.g., *went*, *made*, *saw*) are quite different. When people are exposed to regular verbs, they tend to focus on the suffix *-ed* and abstract a schema [Verb + suffix *-ed*] on past tense forms of regular verbs (type frequency effects). On the other hand, when people are exposed to irregular verbs, they tend to focus on instances of irregular verbs and memorize them directly (token frequency effects).

Similarly, at the syntactic and semantic level, it could be said that frequency effects of the Self-motion/SV construction (e.g., *She came to us. He goes to school. We must move to London. etc.*) and the Possession/SVO construction (e.g., *She kept a clean house. He has a plan. I will hold your ankles. etc.*) are slightly or quite different.

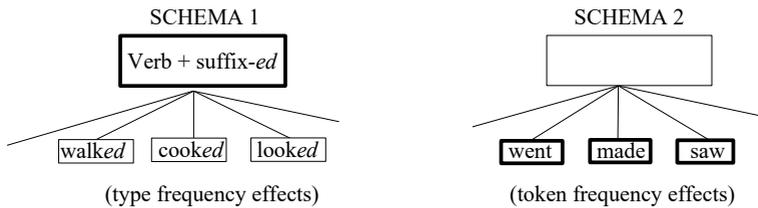


Figure 1. Type/token frequency effects of the past tense forms (modified from Taylor, 2002, p. 276)

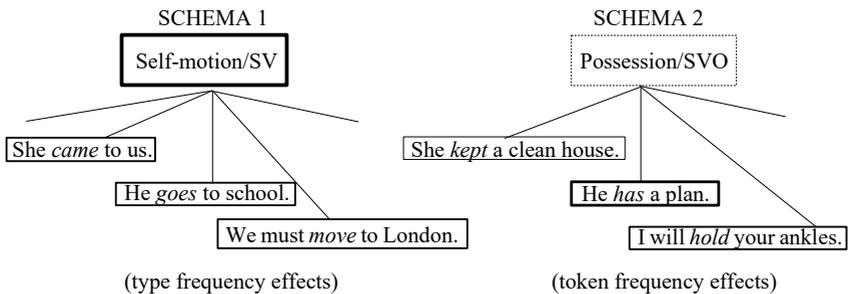


Figure 2. Type/token frequency effects of the Self-motion/SV construction and the Possession/SVO construction (modified from Taylor, 2002, p. 276)

For example, when people are exposed to instances in motion situations, they tend to consciously or unconsciously focus on the common constructional meaning and structure through daily language use and

abstract a schema [Self-motion/SV] from similar lexico-grammatical patterns (e.g., *she came to, he goes to, we (must) move to, etc.*) (type frequency effects). On the other hand, even though people are exposed to instances in possession situations, they tend to directly remember and use apparently different expressions (e.g., *She kept a, He has a, I will hold, etc.*) without abstracting a schema [Possession/SVO] from them (token frequency effects).

In SLA, type/token frequency effects have been explored at several linguistic levels (i.e., morpheme, lexical, syntactical, discursual and pragmatic) (e.g., Cardierno, & Eskildsen, 2015; Evers-Vermeul & Tribushinina, 2017; Madlener, 2015). Tribushinina and Gillis (2017) have emphasized the importance of high type-frequency (balanced) input as follows: “Hence, it is argued that token frequency leads to entrenchment, whereas type frequency correlates with productivity” (p. 19). Even if exposed to enough L2 inputs, beginner L2 learners tend neither to focus on types of instances, nor to abstract linguistic patterns from many inputs in their daily lives. As a result, they might produce *limited tokens* with *limited productive types* in their language use. On the other hand, intermediate or advanced L2 learners could consciously or unconsciously pay attention to types as well as tokens and abstract linguistic patterns from many inputs in their daily lives effectively. Thus, L2 learners could not develop L2 linguistic patterns in their interlanguage simply by being exposed to L2 tokens. Ellis (2012a) sums up the determinants of L2 construction developments as follows: (1) input frequency (type-token frequency, Zipfian distribution, recency); (2) form (salience and perception); (3) function (prototypicality of meaning, importance of form for message comprehension, redundancy); (4) interactions between these (contingency of form-meaning mapping) (p.

11). According to him, L2 learners are required to be exposed to *naturally skewed* L2 inputs and *contingently* map L2 form-function correspondences onto their interlanguage in L2 construction development (e.g., Ellis, 2006a, 2006b). Hence it can be said that L2 construction development could require *long-term, continuous* and *complex* cognitive processing, basically based on type/token frequency effects.

2.2 Complexity and Dynamic Systems Theory (CDST) and Emergent Grammar

Based on complex dynamic systems theory (CDST),² Larsen-Freeman and Cameron (2008) try to capture and explain L2 development as *complex, adaptive, and dynamic systems* rather than *simple, fixed and static*. According to them, the “defining characteristic of a complex system” is “that its behavior emerges from the interactions of its components. The emergent behavior is often non-linear, meaning disproportionate to its causal factors” (p. 2). In such a complex system development, certain *phase shifts* of linguistic behavioral patterns sometimes happen. In CDST, such shifts are assumed to be self-organized into new pattern phenomena with emergent properties. Similarly, L2 development can be thought of as a self-organizing process with *emergent grammar*.

Hopper (1987) explains the nature of emergent grammar: “structure or regularity comes out of discourse and is shaped by discourse as much as it shapes discourse in an ongoing process” (p. 141). Additionally, he adds that emergent grammar is not abstract mental representation, but several different layered linguistic patterns which are always based on concrete utterances. Quite recently, referring to related linguistic, cognitive psychological and biological theories (e.g., functionalism, cognitive grammar, construction grammar, dynamic systems theory, and embodied

cognition, etc.), emergentists (e.g., MacWhinney, 2015; McClelland, 2015) propose theoretical frameworks and approaches, in which embodied, probabilistic, cooperative, competitive, and hierarchical mechanisms of emergent linguistic feature processing in the mind are discussed. Among several emergentists' empirical approaches from data-based longitudinal language development studies to theory-based computer simulation studies (e.g., Verspoor, deBot & Lowie, 2011), as a data-based approach, corpus-based studies have been relatively popular in this area. For example, Thompson and Hopper (2001) explored a small spoken corpus and found that frequencies of emergent transitive constructions were relatively low in spoken English conversations, although they should be considered as cardinal (or canonical) in terms of English grammatical patterns.

Similarly, after reviewing cognitive linguists' theories (e.g., Bybee, 2010, 2013; Langacker, 1987, 2000, 2008; Tomasello, 1992, 2005, 2010), usage-based SLA researchers assume that grammar is based on and gradually abstracted from repeated instances through language use in their daily lives. Verspoor and Behrens (2011) explain their usage-based approaches to second language development as follows:

... we will assume that learners basically move from the simplest, most frequent items that are most similar to their L1, to the items that are more complex, less frequent and less similar at all levels. At the earliest stages, learners will have to rely most on their strongest resource, their L1, and will transfer both positively and negatively. As they have more input and interaction in the L2, they will make more and more use of L2 words and constructions, but learning is not linear. Before learners are able to use the more complex structures, they have to make do with what they already have, so they may

overextend the simpler constructions to express more complex ideas (use a simple present tense to express a past situation or juxtapose two simple sentences to suggest a more complex relation between the two sentences), so we may see peaks of overuse in some constructions. When more complex structures emerge, they may start to emerge around the same time, but the learner will start with a few fixed exemplars and then extend the use to other constructions. The most proficient learner is able to balance the different types of structures best. (p. 38)

From such an emergentist perspective, the next section theoretically considers L2 canonical construction development in detail considering differences in L2 proficiency levels.

2.3 L2 Canonical Construction Development

Theoretically, in cognitive grammar, CCs have been explored and discussed (e.g., Radden & Dirven, 2007). Empirically, based on semantic frame data on the FrameNet (International Computer Science Institute, 1997-present) and English exemplars on the BNC corpus, the canonicity of Radden and Dirven's (2007) 11 CCs was reconfirmed. As a result, an extended list of 13 CCs incorporated an additional two CCs: Mental/SVO (e.g., *think*) and Communication/SVO (e.g., *say*) (Notohara, 2014). Additionally, collostructional analysis confirmed the canonical verbs through the British component of the International Corpus of English (ICE-GB) R2 (2016), which are fully grammatically annotated corpora (Notohara, 2016). With the replacement of two examples, the current version of extended CCs and verbs is summarized in Table 1.

As mentioned above, usage-based SLA researchers explored three main

verb-argument constructions (VACs) through the learner corpora: the Verb Object Locative (VOL) (11. Caused-motion schema in Table 1), the Verb Locative (VL) (4. Spatial schema: (object) motion and 10. Self-motion schema in Table 1), and the ditransitive (VOO) (12. Transfer schema in Table 1) (e.g., Ellis & Larsen-Freeman, 2009; Ellis, O'Donnell, & Römer, 2016). However, the emergent behavior of other CCs has not been examined so far in detail.

Table 1

Extended CCs and Verbs (modified from Radden & Dirven 2007; modified from Notohara 2020)

Event Schema	Role Configuration	Sentence Patterns	Verbs
Material World			
1. Occurrence schema: states e.g., <i>This is true.</i>	T-(T)	SVC	<i>be</i>
2. Occurrence schema: processes e.g., <i>I'm getting better.</i>	T-(T)	SVC	<i>get</i>
3. Spatial schema: location e.g., <i>I'm here.</i>	T-L	SV	<i>be</i>
4. Spatial schema: (object) motion e.g., <i>The prize goes to a child.</i>	T-G	SV	<i>go</i>
5. Possession schema e.g., <i>I have a book about her life.</i>	P-T	SVO	<i>have</i>
Psychological World			
6. Emotion schema e.g., <i>He liked Hamburg and Munich.</i>	E-C	SVO	<i>like</i>
7. Perception/Cognition schema e.g., <i>I saw a black cat on the step.</i>	E-T	SVO	<i>see</i>
8. Mental schema e.g., <i>I think it is very true.</i>	E-T	SVO	<i>think</i>

Event Schema	Role Configuration	Sentence Patterns	Verbs
Force-dynamic World			
9. Action schema: energy chain e.g., <i>I'll make some tea.</i>	A-T	SVO	<i>make</i>
10. Self-motion schema e.g., <i>This summer I went to Spain.</i>	A-G	SV	<i>go</i>
11. Caused-motion schema e.g., <i>He put the platter on the floor.</i>	A-T-G	SVO	<i>put</i>
12. Transfer schema e.g., <i>She gave it to him.</i>	A-T-R	SVO	<i>give</i>
13. Communication schema e.g., <i>He said it to me.</i>	A-T-R	SVO	<i>say</i>

Note. T=theme, L=location, G=goal, P=possessor, E=experiencer, C=cause, A=agent, R=recipient, Examples are selected from the BNCweb (1996-present) corpus by the author. Additionally, the canonical verb of Emotion schema was changed from *want* into *like* for pedagogical analysis.

Notohara (2010) examined beginner and intermediate (CEFR A1-B1) L2 learners' construction development in writing through the Japanese EFL learner (JEFLL) corpus. He found that they tend to use States/SVC (BE) constructions mainly influenced by L1 (Japanese); additionally, they tend to use Possession/SVO (HAVE), Emotion/SVO (LIKE), and Self-motion (GO) constructions in describing situations around them and expressing their feelings.

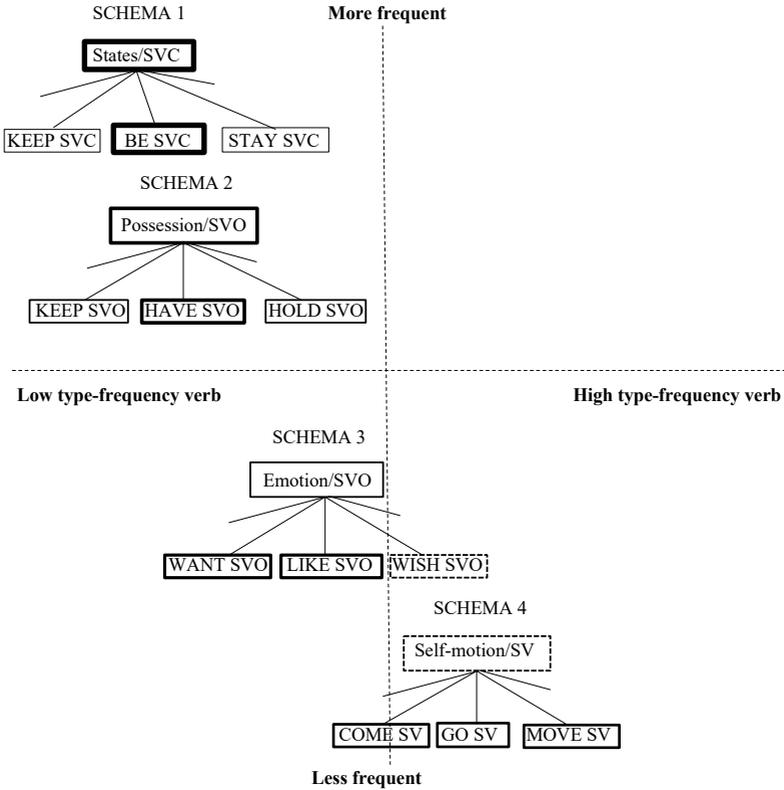


Figure 3. Type/token frequency effects in beginner and intermediate L2 learners' CCs (based on Notohara, 2010; modified from Taylor, 2002, p. 276)

As shown in Figure 3, even beginner and intermediate L2 learners are assumed to have frequent CCs with different *granularities* receiving skewed type/token frequency effects.

However, much remains to be studied in advanced L2 learners' construction development. Supposedly, according to Verspoor and Behrens'

(2011) assumption mentioned above, they are consciously or unconsciously exposed to many L2 inputs in their daily lives and expected to receive *better* balanced frequency effects in CCs development than beginner and intermediate L2 learners at least at morpheme, syntactic and semantic levels. Thus, to more fully understand L2 learners' interlanguage development from an emergentist view, further descriptive studies on intermediate and advanced L2 learners' construction development are needed.

3. The Current Study

3.1 Research Questions

In order to confirm type/token frequency effects of CCs in intermediate and advanced L2 learners' construction development, the following three research questions (RQs) are addressed here:

RQ1: Which constructions in the 13 CCs do intermediate and advanced L2 learners often use?

RQ2: Which additional CC candidates of the 13 canonical verbs do intermediate and advanced L2 learners often use?

RQ3: Do intermediate and advanced L2 learners generally receive type (balanced) or token (skewed) frequency effects in canonical construction development?

3.2 Corpus

The Open Cambridge Learner Corpus (CLC) (2017) on the Sketch Engine was selected for the corpus in this study because it was the largest CEFR-based written learner corpora (approximately 2.9 million words: CEFR B1-C2; Age 12 and above; 61 nationalities; 7 L1s Portuguese, Italian, Spanish-

Latin American, Spanish-European, French, Greek, and Chinese; several genres such as email, article, story, essay, and report, etc.). From the Open CLC corpus, 1,000 usages of each target verb (e.g., *get*) identified by the coding scheme in Table 1 were randomly selected ($11 \times 1,000$ verb usages = 11,000 concordance lines). The selected usages were compiled as the randomly selected verb usage (RSVU) corpus.

3.3 Method

The procedure of the current study is as follows: (1) First, each usage of a particular verb (e.g., *You have made a lot of changes*) was respectively coded as an observed canonical construction (e.g., [Action/SVO]) while confirming five verb tense-aspect-modality (TAM) patterns at the morpheme level (present, past, infin-mood, *ing*-prog, end-perfect) (e.g., *You have made a lot of changes* [Action/SVO, end-perfect]) in order to confirm type/token frequency effects at the morpheme level; (2) Second, in addition to targeting the 13 CCs, additional constructions of target verbs were also identified in order to confirm type/token frequency effects at the syntactic and semantic levels; for example, Transfer/SVOO (GIVE); (3) Third, the distributional relationships between 13 CCs (or additional constructions) and five verb TAM patterns were statistically confirmed through correspondence analysis (IBM SPSS 26, 2019) and cluster analysis (Ward) on langtest.jp (Mizumoto & Plonsky, 2016) in order to classify 13 CCs (or additional constructions) into major groups in terms of type/token frequency effects.

4. Results

4.1 Frequency Distributions

To answer RQ1 and RQ2, raw frequencies of the target 13 CCs with the five TAM patterns per randomly selected 1,000 concordance lines were confirmed (see Figure 4; Appendix in detail). The frequency distributions showed the following three word choices: (1) unlike beginner and intermediate L2 learners, intermediate and advanced L2 learners tend to frequently use psychological and cognitive schema constructions such as Emotion/SVO (LIKE), Mental/SVO (THINK) and Perception & Cognition/SVO (SEE) constructions; (2) they also tend to use relatively frequently some motion and force-dynamic constructions such as Self-motion/SV (GO), Caused-motion/SVO (PUT), and Transfer/SVOO (GIVE); (3) they tend to use less frequently other constructions, especially material and force-dynamic constructions such as Location/SV (BE), Object-motion/SV (GO), Action/SVO (MAKE), Transfer/SVO (GIVE), and Communication/SVO (SAY). As for the additional constructions, six process or force-dynamic constructions such as Processes/SVC (GO), Action/SVO (GET), Self-motion/SV (GET), Caused-motion/SVOC (MAKE), Caused-motion/SVOV (MAKE), Transfer/SVOO (GIVE), were identified as constructions (see Figure 4).

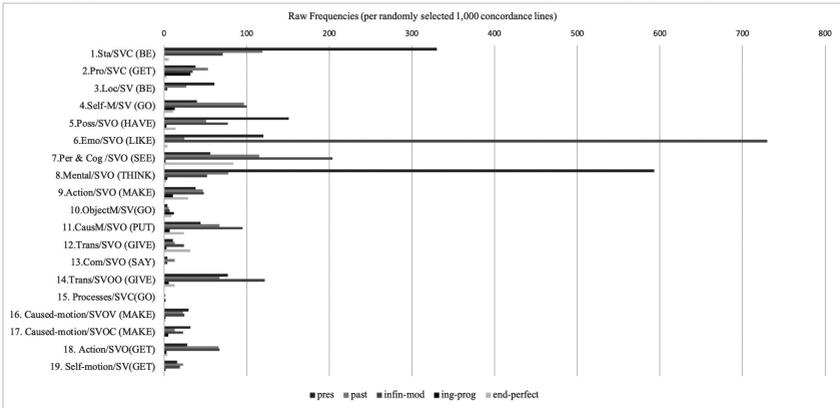


Figure 4. Raw frequencies of 13 CCs with five TAM patterns in the RSVU corpus (per randomly selected 1,000 concordance lines) ($N = 19$). pres = present tense, past = past tense, infin-mod = infinitive-mood (modal verbs + bare-infinitive only), ing-prog = *-ing* form (progressive aspect), edp = *-ed* form (perfect aspect).

4.2 Thirteen CCs and Five TAM Patterns

To answer RQ3, a correspondence analysis and a cluster analysis were conducted. After confirming the frequency distributions of the 13 CCs, the Chi-squared test was used to confirm the relationships between the 13 CCs and the five TAM patterns. Then, the distributional similarities of the 13 CCs were confirmed through correspondence analysis. As a result, there were statistically significant relationships between the 13 CCs and the five TAM patterns (13×5) ($\chi^2(48) = 2825.01, p = .00$, Cramer's $V = .42, p = .00$, 95% CI [.00, .00], Dimension 1 = 53.00%; Dimension 2 = 28.60%, Total inertia = 81.60%). The results highlighted the five relationships between CCs and TAM patterns: (1) States/SVC (BE), Location/SV (BE), and Mental/SVO

(THINK) constructions were closely related to the present tense; (2) The Emotion/SVO (LIKE) construction was closely related to the infinitive mood; (3) Self-motion/SV (GO), Communication/SVO (SAY), Caused-motion/SVO (PUT), and Perception & Cognition/SVO (SEE) constructions were closely related to the past tense; (4) The Transfer/SVO (GIVE) construction was closely related to the *-ed* form (perfect aspect); and finally, (5) The Object-motion/SV (GO) construction was closely related to the *-ing* form (progressive aspect) (see Figure 5; Appendix in detail).

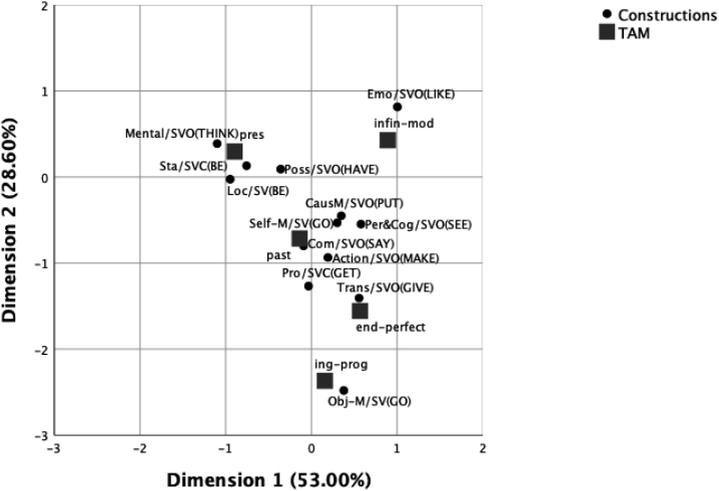


Figure 5. Correspondence analysis between 13 CCs and five TAM patterns.

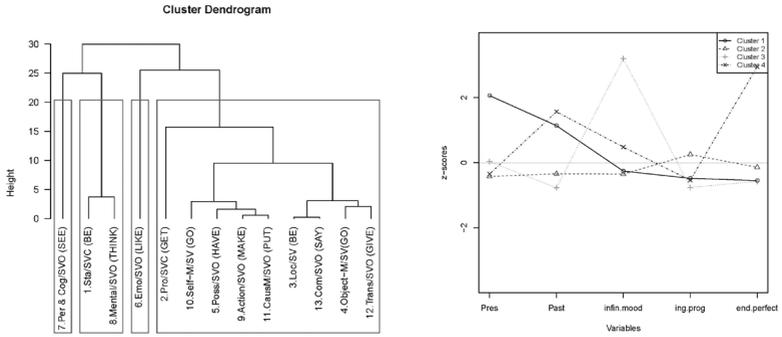


Figure 6. Hierarchical cluster analysis (Ward) and variables (13 CCs and five TAM patterns).

To classify the similar behavior of the 13 CCs, a hierarchical cluster analysis (Ward) was conducted. The result showed that the 13 constructions can be classified into four groups statistically: (1) Cluster 1: States/SVC (BE) and Mental/SVO (THINK); (2) Cluster 2: Perception & Cognition/SVO (SEE); (3) Cluster 3: Emotion/SVO (LIKE); (4) Cluster 4: Process/SVC (GET), Self-motion/SV (GO), Possession/SVO (HAVE), Action/SVO (MAKE), Caused-motion/SVO (PUT), Location/SV (BE), Communication/SVO (SAY), Object-motion/SV (GO), and Transfer/SVO (GIVE) (see Figure 6; Table 2).

Table 2

Type/Token Frequencies of 13 CCs

		Type Frequency			
		Low	←	→	High
Canonical Constructions (CCs)	Token Frequency	Mainly Infinitive-mood Emotion/SVO (LIKE)	Mainly Present & Past States/SVC (BE) Mental/SVO (THINK)	Past & end-perfect Processes/SVC (GET) Location/SV (BE) Object-motion/SV (GO) Possession/SVO (HAVE) Action/SVO (MAKE) Self-motion/SV (GO) Caused-motion/SVO (PUT) Transfer/SVO (GIVE) Communication/SVO (SAY)	Present, Past, Infinitive-mood, & end-perfect Perception & Cognition /SVO (SEE)
	High ↑ ↓ Low				

More specifically, as the z-score of variables showed, the following four patterns of constructions were clarified: (1) States/SVC (BE) and Mental/SVO (THINK) in Cluster 1 were mainly used with the present and secondarily with the past tense (e.g., *I am, I was, I think, and I thought*); (2) Perception & Cognition (SEE) in Cluster 2 was evenly used in various types except for the *-ing* form (progressive aspect) (e.g., *I see, I saw, you can see, and I've seen*); (3) Emotion/SVO (LIKE) in Cluster 3 was often used with the infinitive mood (e.g., *I like to, I would like to*); and finally, (4) Processes/SVC (GET), Self-motion/SV (GO), Possession/SVO (HAVE), Action/SVO (MAKE), Caused-motion/SVO (PUT), Location/SV (BE), Communication/SVO (SAY), Object-motion/SV (GO), and Transfer/SVO (GIVE) in Cluster

4 were often used with the past tense and *-ed* form (perfect aspect). In terms of type/token frequency effects at the morpheme level, it can be said that intermediate and advanced L2 learners develop the Perception & Cognition/SVO (SEE) construction influenced by type frequency (balanced) effects. On the other hand, they tend to develop other constructions influenced by token frequency (skewed) effects.

4.3 Nineteen Constructions and Five TAM Patterns

Similarly, after confirming the frequency distributions of the 19 constructions, the Chi-squared test was used to confirm relationships between the 19 constructions and the five TAM patterns. Then, the distributional similarities of the 19 constructions were confirmed through correspondence analysis. As a result, there were statistically significant relationships between the 19 constructions and the five TAM patterns (19×5) ($\chi^2(72) = 2985.71, p = .00$, Cramer's $V = .40, p = .00$, 95% CI [.00, .00], Dimension 1 = 51.80%; Dimension 2 = 27.60%, Total inertia = 79.40%). Five relationships can be statistically pointed out: (1) States/SVC (BE), Location/SV (BE), and Mental/SVO (THINK) constructions were closely related to the present tense; (2) The Emotion/SVO (LIKE) construction was closely related to the infinitive mood; (3) Self-motion/SV (GET), Communication/SVO (SAY), Caused-motion/SVO (PUT), Perception & Cognition/SVO (SEE), Action/SVO (MAKE), and Action/SVO (GET) constructions were closely related to the past tense; (4) The Transfer/SVO (GIVE) construction was closely related to the *-ed* form (perfect aspect); and finally, (5) The Object-motion/SV (GO) and the Processes/SVC (GO) constructions were closely related to the *-ing* form (progressive aspect). (see Figure 7; Appendix in detail).

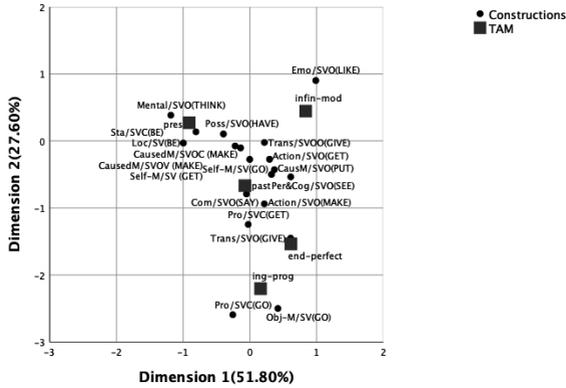


Figure 7. Correspondence analysis between 19 CCs and five TAM patterns.

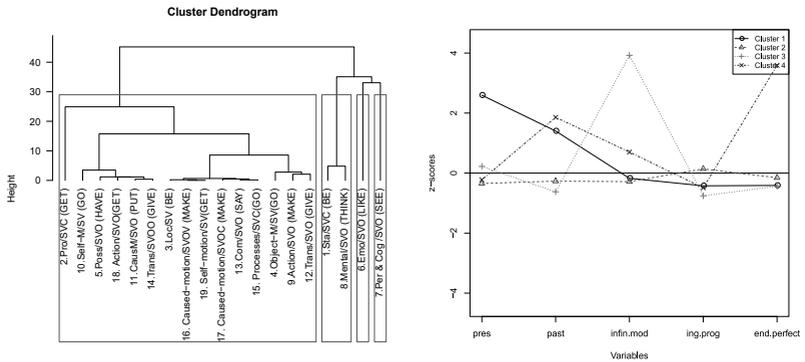


Figure 8. Hierarchical cluster analysis (Ward) and variables (19 CCs and five TAM patterns)

Similarly, to classify the 19 constructions, a hierarchical cluster analysis (Ward) was conducted. The results showed that the 19 constructions can be categorized into four groups statistically: (1) Cluster 1: States/SVC (BE) and Mental/SVO (THINK); (2) Cluster 2: Perception & Cognition (SEE);

(3) Cluster 3: Emotion/SVO (LIKE); (4) Cluster 4: Processes/SVC (GET), Self-motion/SV (GO), Possession/SVO (HAVE), Action/SVO (MAKE), Caused-motion/SVO (PUT), Location/SV (BE), Communication/SVO (SAY), Object-motion/SV (GO), and Transfer/SVO (GIVE). As Figure 8 shows, Clusters 1, 2 and 3 were composed of the same CCs as the previous analysis. However, all additional six constructions such as Processes/SVC (GO), Action/SVO (GET), Self-motion/SV (GET), Caused-motion/SVOC (MAKE), Caused-motion/SVOV (MAKE), Transfer/SVOO (GIVE), can be grouped into Cluster 4 and were often used with the past tense and *-ed* form (perfect aspect). In terms of type/token frequency effects at the morpheme level, it can be said that intermediate and advanced L2 learners develop the Perception & Cognition/SVO (SEE) construction influenced by type frequency (balanced) effects. On the other hand, they tend to develop other constructions influenced by token frequency (skewed) effects at the morpheme level. More importantly, only advanced learners tend to use a wider repertoire of token frequency-based force-dynamic constructions.

Table 3

Type/Token Frequencies of 19 CCs

		Type Frequency			
		Low	←	→	High
Canonical Constructions (CCs)	Token Frequency	Mainly Infinitive-mood Emotion/SVO (LIKE)	Mainly Present & Past States/SVC (BE) Mental/SVO (THINK)	Past & end-perfect Processes/SVC (GET) *Processes/SVC (GO) Location/SV (BE) Object-motion/SV (GO) Possession/SVO (HAVE) Action/SVO (MAKE) *Action/SVO (GET) Self-motion/SV (GO) *Self-motion/SV (GET) Caused-motion/SVO (PUT) *Caused-motion/SVOC (MAKE) *Caused-motion/SVOV (MAKE) Transfer/SVO (GIVE) *Transfer/SVOO (GIVE) Communication/SVO (SAY)	Present, Past, Infinitive-mood, & end-perfect Perception & Cognition /SVO (SEE)
	High ↑ ↓ Low				

Note. *six additional constructions

5. Discussion

5.1 Emergent CCs and Type/Token Frequency Effects

Compared with the type/token frequency effects in beginner and intermediate L2 learners' CCs shown in Figure 3, intermediate and advanced L2 learners often tend to use psychological and mental schema constructions as *emergent CCs* (comparing pseudo-longitudinally, beyond the CEFR B1 level) such as Emotion/SVO (LIKE) and Mental/SVO (THINK) although

they often use material schema constructions such as States/SVC (BE). Additionally, these two constructions are assumed to be developed, mainly based on *token frequency effects* (see Tables 2 and 3): (1) Emotion/SVO (LIKE) mainly tends to be used with the infinitive mood; and (2) Mental/SVO (THINK) mainly tends to be used with the present and past tenses. CEFR-annotated learner data are as follows:

(1) Emotion/SVO (LIKE)

- a. I *would like to* know more about your work with the wildlife ... (B1)
- b. I *would like you to* offer some extra activities such as ... (B2)
- c. I *would like to simply ask how* long the festival is going to ... (C1)
- d. I *would really like to* thank you for giving us the opportunity to ... (C2)

(2) Mental/SVO (THINK)

- a. I *think* we should stay Saturday night ... (B1)
- b. I *thought* she was hiding something from me, but ... (B2)
- c. I *think that if* you play an important role, you should ... (C1)
- d. since everyone *thought* studying was a way of life and ... (C2)

Considering the results, it can be said that the more advanced L2 learners are, the more token frequency-based psychological and mental schema constructions they have and use. With these *pivotal* constructions, they can express themselves in various ways with several grammatical concepts such as *to*-infinitive, accusatives with infinitive, modality, adverbs, tense, aspect, and inanimate subject compared with beginner and intermediate L2 learners with token frequency-based material schema constructions such as States/SVC (BE) as shown in Figure 3.

Second, intermediate and advanced L2 learners often tend to use the

Perception & Cognition/SVO (SEE) construction, which is assumed to be mainly based on *type frequency effects* at the morpheme level. The construction could be a *critical CC candidate* across the CEFR levels (comparing pseudo-longitudinally, beyond the CEFR B1 level).

(3) Perception & Cognition/SVO (SEE)

- a. We *can see* the beautiful views of Lake Frene. (B1)
- b. I *saw* the announcement in your in-flight magazine. (B2)
- c. You *should have seen* him! (C1)
- d. *Seldom have* I *seen* such a determined person. (C2)

With this *pivotal* construction, they can express themselves in various ways with several grammatical concepts such as modality, tense, aspect, adverbs, and inversion compared with beginner and intermediate L2 learners.

Third, intermediate and advanced L2 learners also tend to use Possession/SVO (HAVE) and Self-motion/SV (GO) just as beginner and intermediate L2 learners do. Similarly, the two CCs are based on token frequency effects.

Finally, fourth, intermediate and advanced L2 learners tend to use a wider repertoire of token frequency-based force-dynamic constructions as *new emergent constructions*. These constructions could also be *critical CC candidates* (comparing pseudo-longitudinally, beyond the CEFR B1 level) although the frequencies are relatively small.

(4) Six additional constructions

- a. Everything *was going* so bad. (Processes/SVC (GO), B1)
- b. I *have got* some information about the area from map. (Action/SVO (GET), B1)

- c. I *got* to the place on time and started the exam.
(Self-motion/SV (GET), B1)
- d. This *made* everything easier. (Caused-motion/SVOC (MAKE), B1)
- e. This is why he *made* him use a mask.
(Caused-motion/SVOV (MAKE), B2)
- f. Someone *gave* me an interesting leaflet which said that ...
(Transfer/SVOO (GIVE), B2)

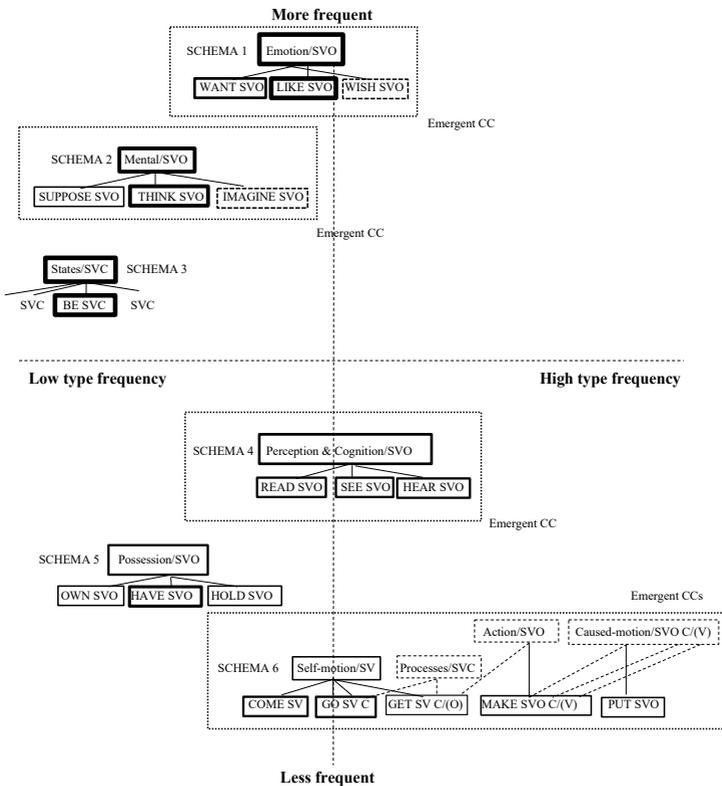


Figure 9. Type/token frequency effects in intermediate and advanced L2 learners' CCs (modified from Taylor, 2002, p. 276)

Thus, as Figure 9 shows, the current study roughly grasped the differences between beginner and intermediate L2 learners (CEFR A1-B1) and intermediate and advanced L2 learners (CEFR B1-C2) in terms of type/token frequency effects and emergent CCs or constructions. But unfortunately, it did not identify definite CEFR levels referring to type/token frequency-based granularities of CCs, nor did it clarify the complex longitudinal L2 construction development process from beginners, intermediate, and finally to advanced learners. Quite recently, although some research has tried to identify criterial CCs (e.g., Notohara, 2018), further detailed research is needed here.

5.2 Pedagogical Implications

As Figure 9 shows, it can be suggested that intermediate and advanced L2 learners often tend to use Emotion/SVO (LIKE) and Mental/SVO (THINK) as *emergent CCs* although they use the constructions with limited typical verbs influenced by token frequency effects at the morpheme level. Through L2 learners' two constructions behavior in writing, teachers could notice the subtle differences between L2 learners' proficiency levels. Primarily, teachers should focus on frequent patterns of the two constructions based on the data of the current study; for example, (1) Emotion/SVO (LIKE) should be taught to beginner and intermediate L2 learners with the infinitive mood (e.g., *I like to* and *I would like you to*); and (2) Mental/SVO (THINK) should be taught to them mainly with the present tense and secondarily with the past tense (e.g., *I think* and *I thought*). Unfortunately, however, the current study does not suggest a comprehensive phraseological units repertoire that intermediate and advanced L2 learners could have. Therefore, further research on qualitative analysis of intermediate and advanced L2 learners'

constructional and phraseological behavior is needed.

Additionally, it can be suggested that intermediate and advanced L2 learners often tend to use the Perception & Cognition/SVO (SEE) construction in various ways except for the progressive aspect. Teachers should help beginner and intermediate L2 learners notice and use a wider variety of verb types (e.g., *We can see, I saw, and you should have seen*) with this construction through communicative tasks.

Furthermore, other schema constructions, most of which are force-dynamic in various constructions, should be taught to beginner and intermediate L2 learners. As these constructions are mainly based on token frequency effects, teachers should focus on the past tense and perfect aspect of the constructions; for example, Action/SVO (GET) (e.g., *I have got some information about the area from map*), Caused-motion/SVOC (MAKE) (e.g., *That made everything easier*) Transfer/SVOO (GIVE) (e.g., *Someone gave me an interesting leaflet which said that...*).

Thus, emergent CCs and constructions in intermediate and advanced L2 learners' interlanguage are mainly based on token frequency effects. Based on the empirical data in this study, teachers should focus on such "linguistic chemistry" between CCs and TAM patterns at the morpheme level and teach CCs effectively and efficiently. On the other hand, as for Perception & Cognition/SVO (SEE), teachers should help beginner and intermediate L2 learners use a wider variety of verb types. As mentioned before, according to the skewed frequency hypothesis, English native speakers are probably assumed to use CCs in similar ways (e.g., Notohara, 2020).

In L2 grammar instruction, Keck and Kim (2014) propose six types of form-focused instruction (FFI): (1) explicit instruction + decontextualized rote practice; (2) explicit instruction + communication about grammar in

collaborative tasks; (3) communicative task + explicit instruction before or after the task; (4) implicit focus on form through planned feedback in oral communication tasks; (5) implicit focus on form through unplanned, reactive feedback in the midst of meaningful communication; and (6) communication tasks. Considering corrective feedback on inflectional morpheme errors in TAM patterns with frequent Emotion/SVO (LIKE), Mental/SVO (THINK) and States/SVC (BE), relatively more implicit approaches in collaborative dialogues or communicative tasks (i.e., (2)(3)(4)(5)) would be more effective and pedagogical because even beginner and intermediate L2 learners can easily notice and correct such grammatical errors in communicative tasks by themselves. However, Perception & Cognition/SVO (SEE) and other constructions are closely related to not only inflectional morphemes, but also thematic and structural patterns (e.g., E-T, SVO, SVOO, SVOC and SVOV) and other cognitive grammatical concepts (e.g., perception, resultative, and causation). Therefore, sometimes more explicit approaches (i.e., (1)(2)(3)) should be preferable and effective to develop beginner and intermediate L2 learners' interlanguage effectively and efficiently. Finally, as for other force-dynamic schema constructions, teachers should help beginner and intermediate L2 learners notice and understand motion or energy-chain-based force-dynamic meanings with constructions even in communicative activities with direction or power-oriented pedagogical gestures.

6. Conclusion

Through the RSVU corpus based on the CLC corpus (2017), type/token frequency effects in L2 learners' 13 CCs and additional constructions development were explored and clarified in terms of TAM patterns, at least

at the morpheme, syntactic, and semantic levels. As a result, it can be said that three emergent CCs and six emergent constructions can be found in intermediate and advanced L2 learners' interlanguage. These constructions can be criterial features (CFs) in confirming L2 learners' proficiency development from the CEFR B1 level and above. In L2 grammar instruction, these nine constructions should be taught as essential target constructions in developing L2 learners' interlanguage from beginner to intermediate or advanced levels.

Finally, three remaining issues are summed up as follows. First, intermediate and advanced L2 learners in this study were not categorized in terms of L1 backgrounds. Therefore, L1-based L2 learner data would be needed for further crosslinguistic transfer studies. In this study, the L1s are mainly European languages such as Spanish, Portuguese, and Italian. Therefore, we should be careful in generalizing the results in this study. Moreover, The RSVU corpus in this study was not categorized in terms of proficiency levels (e.g., CEFR levels) at this time. Therefore, proficiency-based L2 learner data would be needed for exploring criterial CCs. In this study, intermediate and advanced L2 learners could have a repertoire of motion-, interaction- and force-dynamic-based constructions, which could be criterial features identifying intermediate and advanced proficiency levels. Lastly, specifically, further research is needed to clarify the relationships between TAM patterns in CCs and proficiency levels. It could be helpful in identifying L2 learners' proficiency levels, treating L2 learners' morpheme errors related to CCs, and developing their interlanguage more appropriately.

Notes

1. This paper was presented at York St John University (UK) as part of the 51st British Association for Applied Linguistics (BAAL) conference (September 6-8, 2018), when it was titled “Type Frequency Effects on L2 Learners’ Construction Development.” It has been rewritten to reflect recent research on type/token frequency effects, complexity theory (CT) and dynamic systems theory (DST) and emergentist theories in SLA.
2. Quite recently, deBot (2017) historically reconsiders and combines CT and DST as *complex dynamic systems theory* (CDST), both of which originated from mathematic theories such as systems theory, cybernetics and dynamics systems theory.

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Appendix

Raw Frequencies of 19 Canonical Constructions (CCs) with Five TAM Usage Patterns in the RSVU Corpus

	Pres	Past	infin-mood	ing-prog	end-perfect	<i>M</i>	<i>SD</i>
1. States/SVC (BE)	330	119	71	1	6	105.40	134.72
2. Processes/SVC (GET)	38	53	35	32	3	32.20	18.21
3. Location/SV (BE)	61	27	4	0	1	18.60	26.16
4. Object-M/SV (GO)	4	6	7	12	9	7.60	3.05
5. Possession/SVO (HAVE)	151	51	77	3	14	59.20	59.19
6. Emotion/SVO (LIKE)	120	25	730	0	4	175.80	313.61
7. Perception & Cognition/SVO (SEE)	56	115	204	2	84	92.20	75.05
8. Mental/SVO (THINK)	593	78	52	4	3	146.00	251.93
9. Action/SVO (MAKE)	38	47	48	11	29	34.60	15.27
10. Self-motion/SV (GO)	40	97	100	13	11	52.20	43.80
11. Caused-motion/SVO (PUT)	44	67	95	7	24	47.40	34.79
12. Transfer/SVO (GIVE)	11	13	24	3	32	16.60	11.41
13. Communication/SVO (SAY)	4	13	4	0	1	4.40	5.13
14. Processes/SVC (GO)	1	2	0	2	0	1.00	1.00
15. Action/SVO (GET)	28	66	67	3	4	33.60	31.66
16. Self-motion/SV (GET)	16	23	19	2	0	12.00	10.37
17. Caused-motion/SVOC (MAKE)	32	13	23	5	1	14.80	12.77
18. Caused-motion/SVOV (MAKE)	30	23	25	2	2	16.40	13.39
19. Transfer/SVOO (GIVE)	77	67	122	6	13	57.00	48.12
<i>M</i>	88.11	47.63	89.84	5.68	12.68		
<i>SD</i>	143.87	36.27	163.12	7.51	19.86		

Note. Pres = present tense, Past = past tense, infin-mood = infinitive-mood (modal verbs + bare-infinitive only), *ing-prog* = *-ing* form (progressive aspect), *end-perfect* = *-ed* form (perfect aspect).

Synopsis

Type/Token Frequency Effects in L2 Learners' Canonical Construction Development

Yoshiyuki Notohara

This study empirically examines and clarifies type/token frequency effects in L2 learners' canonical construction (CC) development through the randomly selected verb usage (RSVU) corpus from the Open Cambridge Learner Corpus (CLC) (2017) on the Sketch Engine, where learner data is annotated with the CEFR level tags (B1-C2). Based on the results, it also discusses the low type-frequency (skewed) verbs construction network in intermediate and advanced L2 learners' interlanguage with emergent CCs and constructions at the morpheme, syntactic, and semantic levels and presents pedagogical implications for type/token frequency effects-based L2 grammar instruction to beginner and intermediate L2 learners as effective CCs instructions.

First, this paper briefly reviews *the skewed frequency hypothesis* in L1 acquisition and focuses on the low type-frequency (skewed) verbs construction network such as *put* for the Subject Verb Object Locative (SVOL) construction; *give* for the Subject Verb Object Object (SVOO) construction; and *go* for the Subject Verb Locative (SVL) construction (e.g., Casenhiser & Goldberg, 2005; Hilpart, 2014). Then, it also reviews corpus-based studies on L2 skewed type/token frequency effects on verb-argument constructions (VACs) (e.g., Ellis, 2012a, 2012b, 2014, Ellis, O'Donnell, & Römer, 2016) referring to the Verb Object Locative (VOL),

the Verb Locative (VL), and the ditransitive (VOO) (e.g., Ellis & Larsen-Freeman, 2009; Ellis, O'Donnell, & Römer, 2016). Interestingly, it can be found that both native speakers (NSs) and non-native speakers (NNSs) develop CCs based on the same *pivotal* frequent verbs (Ellis & Larsen-Freeman, 2009). According to recent complex dynamic systems theory (CDST), such L2 construction development can be considered to be based on *complex, adaptive, and dynamic systems*. The emergent mental representations accumulated from the development are assumed to be *emergent* constructions. Even beginner and intermediate L2 learners are assumed to have frequent CCs with different *granularities* receiving skewed type/token frequency effects. Specifically, based on Verspoor and Behrens' (2011) assumption, it could be assumed that intermediate and advanced L2 learners are consciously or unconsciously exposed to many L2 inputs in their daily lives and are thus expected to receive *better* balanced frequency effects in CCs development than beginner and intermediate L2 learners at least at the morpheme, syntactic and semantic levels.

Second, the current study empirically examined the relationships between 13 CCs (or additional constructions) and TAM patterns through correspondence analysis and statistically classifies the relationships into the following four clusters through cluster analysis (Ward): (1) Cluster 1: States/SVC (BE) and Mental/SVO (THINK); (2) Cluster 2: Perception & Cognition/SVO (SEE); (3) Cluster 3: Emotion/SVO (LIKE); (4) Cluster 4: Processes/SVC (GET), Self-motion/SV (GO), Possession/SVO (HAVE), Action/SVO (MAKE), Caused-motion/SVO (PUT), Location/SV (BE), Communication/SVO (SAY), Object-motion/SV (GO), and Transfer/SVO (GIVE), including Processes/SVC (GO), Action/SVO (GET), Self-motion/SV (GET), Caused-motion/SVOC (MAKE), Caused-motion/SVOV

(MAKE), Transfer/SVOO (GIVE). Based on the results in the current study, these CCs and constructions could be criterial features (CFs) candidates for the CEFR B1 and beyond levels.

Finally, considering beginner and intermediate L2 learners' low type-frequency (skewed) verbs construction network, this paper focuses on three emergent CCs (i.e., Emotion/SVO (LIKE), Mental/SVO (THINK) and Perception & Cognition/SVO (SEE)), and six emergent constructions (i.e., Processes/SVC (GO), Action/SVO (GET), Self-motion/SV (GET), Caused-motion/SVOC (MAKE), Caused-motion/SVOV (MAKE), Transfer/SVOO (GIVE)). Furthermore, with the nine emergent CCs and constructions, it also suggests three type/token frequency effects-based L2 grammar instruction to beginner and intermediate L2 learners as effective CCs instructions: (1) implicit approaches to inflectional morphemes, thematic and structural patterns, and cognitive grammatical concepts in collaborative dialogues or communicative tasks with frequent Emotion/SVO (LIKE), Mental/SVO (THINK) and States/SVC (BE); (2) concept-based explicit approaches with Perception & Cognition/SVO (SEE); and (3) implicit approaches to motion or energy-chain-based force-dynamic meanings in communicative activities with direction or power-oriented pedagogical gestures.